Airport Master Plan

Duluth Sky Harbor Airport

Duluth, Minnesota

DULAI 156533 | July 24, 2023

SEH

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Plan prepared for:
Duluth Airport Authority

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July 24, 2023

As required by Appendix E, Section E-3 of FAA Order 5100.38D, Change 1, Airport Improvement Program (AIP) Handbook:

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Executive Summary

The Sky Harbor Airport (DYT) in Duluth, Minnesota serves the general aviation air transportation needs of northern Minnesota. DYT is home to 22 based aircraft: 20 single-engine and two multi-engine. The Airport is currently served by one paved runway, Runway 14/32 and two unmarked water landing strips in Superior Bay. Runway 14/32 is a non-precision runway, 2,602 feet long by 75 feet wide, and is constructed of asphalt pavement. DYT's hangar area consists of 16 private hangar buildings, a Terminal Building, as well as 31 tiedown positions.

The purpose of this Focused Master Plan is to evaluate the condition and adequacy of DYT's existing building area facilities, produce 20-year activity forecasts, recommend building area improvements, and prepare an implementation plan for the recommended development for the building area at the Airport. As part of this study, aviation activity forecasts were prepared based on responses to user surveys, outreach with various stakeholders on the airport and existing tenants, on-going analysis of local and national general aviation trends and socioeconomic data. The number of based aircraft at DYT is forecasted to increase from 22 in 2019 to 38 by 2040 (**Section 2.8**). Aircraft operations are expected to increase from 11,740 in 2019 to 16,829 in 2040 (**Section 2.9**). The Critical Aircraft for the airport is forecasted to remain as an A-I Small through the 20-year planning period. Although airside recommendations were not fully evaluated in this study, recommendations and conclusions from other planning and design efforts is summarized related to the runway and taxiway system.

The following are future development recommendations as outlined in the Focused Master Plan:

Runway 14/32:

- Publish Runway 14/32's pavement strength to 12,500 SWG (**Section 4.2.3**).
- Routine maintenance, such as joint and cracking sealing, and slurry seal should continue to be performed on a scheduled basis to extend the life of the pavement (**Section 4.2.4**).

Water Landing Strip

- Remove Water Landing Strip to 9W/27W from FAA and MnDOT publications (**Section 4.2.10)**.

Taxiway & Apron System:

- Future improvements to the taxiway system are designed to TDG 1A standards (**Section 4.2.11.3**)
- Routine maintenance, such as joint and cracking sealing, and slurry seal should continue to be performed on a scheduled basis to extend the life of the pavement (**Section 4.2.12.4**).
- The southeastern portion of the apron area should be reconstructed by 2024 (**Section 4.2.12.4**)
- Apron alternatives should be evaluated to reduce apron flooding, improve drainage, and address safety concerns related to the apron flooding and ponding water (**Section 4.2.12**)

Seaplane Base:

- Reconstruct the Seaplane Ramp to increase its integrity and longevity (**Section 4.3.3**).
- Install additional length or a 'T' to the current seaplane dock (**Section 4.3.3**).
- Install aquatic invasive species warning signs near the seaplane base facilities (**Section 4.3.3**).

Building Area:

- Construct additional hangar space to accommodate 95% of the forecasted 43 based aircraft by 2040 (**Section 4.3.1**).
- Eight additional tiedowns are recommended in the 20-year planning period (**Section 4.3.1.2**)
- The concrete pad under the door of Hangar 1 (DAA Owned) should be reconstructed to improve the integrity of the hangar (**Section 4.3.4**)
- An SRE/Maintenance Building should be constructed to house existing and future SRE vehicles and attachments (**Section 4.3.8**)
- Construct additional hangar space to accommodate forecasted aircraft (**Section** Error! Reference source not found.).
- Relocate the fuel tank outside of the TOFA (Section 4.3.5.1).

Miscellaneous:

- The Airport should consider a change to a non-standard traffic pattern for Runway 32. If a non-standard traffic pattern is implemented, the installation of a segmented circle and an update to appropriate charts and the 5010 will be required (**Section 4.2.14.1**).
- The Airport should monitor the condition of airfield signage for any fading or cracking to ensure pilot situational awareness is maintained (**Section 4.2.15**).
- The beacon should be replaced by 2035, or at the end of its useful life. (**Section 4.2.14**).
- An SPCC Plan should be completed for all fuel tanks to maintain the site's compliance with 40 CFR Parts 110 through 112 (**Section 4.7.4**)
- The Airport should install a Wi-Fi connection to the fuel pump to allow faster credit card authorizations and easier access to the system (**Section 4.3.5.2**)
- Continue to monitor the FAA's and EPA's progress for updated regulations and replacements for AvGas (**Section 4.3.5.3**).
- The Airport should consider installing an aircraft viewing area. (**Section 4.3.7**).

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Duluth Sky Harbor Airport

Prepared for Duluth Airport Authority

1 Inventory

1.1 Introduction

Effective airport planning ensures that an airport is developed in a logical manner that coincides with the demand for facilities. Typically, planning efforts are performed approximately every ten to fifteen years or whenever changing airport needs warrant. This Master Plan has been undertaken to ensure that the planning recommendations and alternatives are consistent with the changing and future needs of the airport and community. The most recent Airport Master Plan or Airport Layout Plan (ALP) was completed for Sky Harbor Airport (Airport or DYT) in 2015.

The Master Plan projects the needed facilities within the planning horizon, which is 20 years, or in this case, through the year 2040. However, when dealing with the development of facilities such as airports, an even longer-term view is often required in order to evaluate the needs of the ultimate layout of the facility. Considering the existing inventory of the Airport allows for informed recommendations throughout this Master Plan Study. This section addresses the existing inventory of the Sky Harbor Airport (DYT) including various aviation factors, the local community and environmental overview. The intent of **Chapter 1**, *Inventory*, is to outline existing conditions of all the facilities at DYT. In later chapters of this report, the ability of the Airport to meet anticipated demand and user needs will be analyzed, and any required improvements will be identified.

1.2 Project Goals

This planning study is a cooperative effort between the Sky Harbor Airport (DYT), the Federal Aviation Administration (FAA), the MnDOT Office of Aeronautics (MnDOT), and the SEH. Several project goals were identified during the scoping process. These goals include:

- **Aviation Forecasts** – Develop activity forecasts to better understand the existing and forecasted users of the airport and their needs.
- **Apron Facilities** – The existing apron layout, tiedown and taxilane spacing needs, rehabilitation and maintenance needs, and alternatives will be explored.
- **Hangar Area Development** – Evaluate if a new hangar area is beneficial to provide various options and layouts to provide additional hangar capacity.
- **Support Facilities** – Support facilities including the fuel system, general aviation terminal space, snow removal equipment storage space, and US Customs space will be evaluated.
- **Seaplane Ramp and Dock Facilities** – The seaplane ramp requires repair or rehabilitation; the capacity and location will be evaluated.

- **Congestion Analysis** – Congestion around the vehicle entrance, DAA hangar, fuel tank, taxilane, and seaplane ramp will be evaluated as well as alternatives evaluated to improve safety.
- **Shoreline Resiliency Analysis** – Lake Superior water levels have an influence on the shoreline and apron areas, options to improve resiliency will be evaluated.
- **Long-term Implementation Plan and Funding Plan** – Prepare a prioritized long-term development plan for a strategic approach to accomplishing airport improvements, including development of a long-term sustainable funding plan for airport improvements.
- **ALP**- Update the ALP to reflect future and ultimate airport development plans as determined as part of this Master Plan.

1.3 Airport Location and Background

1.3.1 City and Location

Sky Harbor Airport is located in the City of Duluth, in southeastern St. Louis County approximately 160 miles north of Minneapolis, Minnesota, as shown in **Figure 1-1** and **Figure 1-2**. Sky Harbor Airport is a public-use airport within the Duluth City limits, approximately 5 miles east of the downtown district located on Minnesota Point. Minnesota Point serves a natural boundary between Lake Superior and Superior Bay and is unique as it is one of the largest baymouth sandbars in the world. It is also home to several state listed protected species and a federally protected bird, the piping plover.

1.3.2 Airport Ownership, Governance, and Management

The Duluth Airport Authority (DAA), which was established in 1969, owns and operates the Sky Harbor Airport. The DAA oversees Sky Harbor Airport as well as the Duluth International Airport (DLH) located northwest of downtown Duluth. Seven members sit on the Board of Directors for the DAA who are appointed by the Mayor of Duluth. Sky Harbor airport has a full-time Airport Manager that supports the operations at the airport.

1.3.3 Airport Development History

The Sky Harbor Airport was founded in 1931 at the end of one of the world's longest freshwater sand spits and is embedded into an environment of beaches, trails, and old-growth pine forests between Lake Superior and Superior Bay. Sky Harbor is a hub for the community and region that provides a base for business, educations, tourism, and exploration. The first takeoff and landing at Sky Harbor was recorded in 1931. 15 years later, in 1946, the first land lease was created for Sportsmen Airways, Inc and just two years later, the Civil Aviation Authority (now Federal Aviation Administration) gave the airport it's license.

The runway has evolved over the years starting from a sand runway, to clay and grass, to a paved runway in 1963 when the City of Duluth took ownership. Later, after the Duluth Airport Authority was formed, the Airport Authority took over responsibility of the airport in 1969. A paved parallel taxiway was constructed in 1985.

1.3.3.1 Runway 14/32 Relocation Project

In 2007, the Duluth Airport Authority (DAA) identified several obstructions to the approach surface to Runway 32. For an airport to be licensed and certified, the runway approaches need to be clear of obstructions. These obstructions included old-growth pine trees growing in a rare plant community found nowhere else in the state of Minnesota. The majority of obstructions (approximately 500 trees) were located in the Minnesota Point Pine Forest Scientific and Natural Area (SNA) (owned and managed by the Minnesota Department of Natural Resources (DNR)). In addition, the land within the SNA has additional protection through a Conservation Easement held by the Minnesota Land Trust. As a result of these findings, DAA proceeded with a complex, multi-year federal Environmental Assessment (EA) and state Environmental Assessment Worksheet (EAW) to evaluate solutions to the obstructed runway approach.

After numerous rounds of alternative analyses, the decision was made to shorten the runway to 2,600 ft. and rotate its southeastern runway end into Superior Bay. This innovative solution balanced environmental protection and preservation with aviation safety. The Draft EA was published in July 2014 and the FAA issued a finding of no significant action/Record of Decision (FONSI/ROD) in May 2015. The most recent ALP was also completed concurrently with the EA/EAW process. The ALP was approved in July of 2015. Robust agency and community engagement were critical elements over the course of the project.

Construction of the runway was completed in three separate phases to allow for material consolidation and to minimize the overall time of runway closure. This included phasing that limited impacts to airport users and maximized reuse of materials on-site. Nearly all the additional rock, earthwork and bituminous paving material were barged across Superior Bay to reach the site. This is significant, as construction traffic along the sole two-lane road would have majorly impacted residences along the five-mile haul route, as well as the historic Aerial Lift Bridge, with over 12,500 truckloads of material. In total, 210,000 tons of material was barged to the site saving approximately 50,000 gallons of fuel. The project also included a new seawall for the seaplane base, replacing an aging timber seawall. The new seawall was built to protect the airport from rising lake levels and wave action.

The project was completed in June 2020 and the relocated runway and parallel taxiway were opened for use. The project resulted in approximately 7 acres of new land and 70,000 cubic yards of fill. As part of the mitigation commitments, the project included 23 acres of native plant community restoration, installation of 3,000 plants on the airport land, installation of 250+ local ecotype aquatic plants off the shoreline, and invasive plant species removal in 10 acres of old growth forest. In addition, 20 timber fish crib structures were constructed and submerged to provide approximately 8 acres of aquatic habitat.

Photo 1-1 – Sky Harbor following the runway relocation

1.4 Airport Use and Classification

The Airport is primarily utilized by recreational users, who mostly utilize small single-engine aircraft including wheeled, amphibious and float aircraft. Airport use is split between operations on the paved runway and those in Superior Bay, utilizing the seaplane base facilities at the airport. Several businesses are located at and utilize the airport. An air tour operator offers flights touring the Twin Ports area. Hangar 10 Aero Supply offers rehabilitation and interior services. The airport also serves as a U.S. Port of entry.

1.4.1 FAA National Plan of Integrated Airport Systems

DYT is included in the FAA's 2021-2025 *National Plan of Integrated Airport Systems* (NPIAS), which classifies the Airport as a General Aviation (GA) Airport[1]. General Aviation Airports are civilian airports open to the public that do not have scheduled passenger service, and usually serve private aircraft and small aircraft charter operations. FAA Order 5090.5, *Formulation of the National Plan of Integrated Airport Systems (NPIAS) and the Airports Capital Improvement Plan (ACIP)*, states that to be included in the NPIAS, an airport must have at least 10 based aircraft and are at least 20 miles from the nearest NPAIS airport. Inclusion in the NPIAS is a requirement to receive federal grants for airport improvement projects. The 2021-2025 NPIAS Report estimates development costs over the 5-year period for DYT eligible for AIP funds at $2,877,983[2].

1.4.1.1 FAA Asset Study

In May 2012, the FAA released a study[3] of the nearly 3,000 GA airports in the federal system. The goal of this study was to more accurately define the roles of the airports in the GA service level and develop a new way to categorize the GA airports within the national system. The following service level categories of general airports were developed.

National – National airports support the national and state system by providing communities with access to national and international markets in multiple states and throughout the United States. These airports are located in metropolitan areas near major business centers and support flying throughout the nation and the world. Currently, 92 airports are categorized as national airports and account for 3 percent of the studied airports.

Regional – Regional airports support regional economies by connecting communities to statewide and interstate markets. These 482 airports are located in metropolitan areas, serve relatively large populations and support interstate and some cross country flying. Regional airports account 14 percent of the studied airports.

Local – Local airports supplement local communities by providing access primarily to intrastate and some interstate markets. These 1,213 airports are also defined as the backbone of the GA system and are typically located near larger population centers. Most users of these airports are piston aircraft supporting business and personal needs. Flights to and from local airports are typically intrastate or regional.

Basic – Basic airports support GA activities such as emergency service, charter or critical passenger service, cargo operations, flight training, and personal flying. These 893 airports

[1]2021-2025 National Plan of Integrated Airport Systems (NPIAS).
[2] 2021-2025 National Plan of Integrated Airport Systems (NPIAS) Report, Appendix A
[3] General Aviation Airports: A National Asset. May 2012. U.S. Department of Transportation Federal Aviation Administration.

provide a community airport that allows for private GA flying and links the community to the national airport system.

There are 228 airports in the NPIAS that were not classified into one of the above classifications. The FAA will continue to assess and potentially classify these airports. DYT is classified as a **Local Airport** in the Asset Study.

1.5 Minnesota State Aviation System Plan (SASP)

Minnesota Department of Transportation (MnDOT) has developed a State Aviation System Plan (SASP) to help guide the development of airports in Minnesota. The most recent SASP was adopted in 2012. The SASP is a planning document that looks at the state's aviation system from a top-down approach. The SASP evaluates system needs for the entire state of Minnesota and how each airport can fulfill these needs now and in the future. The plan helps MnDOT determine the type, extent, location, timing, and cost of aviation-related development needed to ensure that Minnesota has a viable system of airports.

The airports in the SASP classified into three categories: Key Airports, Intermediate Airports, and Landing Strip Airports. Sky Harbor is classified as an Intermediate Airport. The definition of an Intermediate Airport is as follows:

> "*Intermediate Airports have a paved and lighted primary runway that is less than 5,000 feet in length. These airports are capable of accommodating all single-engine aircraft, some multi-engine aircraft, and some business jets. Intermediate airports serve as landing facilities for flight training, aircraft maintenance, and general aviation aircraft up to the smaller business jet size. Intermediate Airports serve many roles in communities ranging from emergency medical transports to manufactured parts distribution. Intermediate Airports enable direct connections across Minnesota and the Central US region. There are currently 83 Intermediate Airports in the state's system.*[4]"

In 2019, MnDOT completed Phase I of the 2020 SASP Update. As part of this update, the SASP airport classifications which had been in effect since 1974 were evaluated. As part of this evaluation, MnDOT recommended dividing the Intermediate airport classification into two sub-classifications, Intermediate Small and Intermediate Large. MnDOT is proposing that Intermediate Small Airports be defined as airports with a paved runway less than 3,800 feet and Intermediate Large Airports be defines as airports with paved runways of at least 3,800 feet up to but not including 4,900 feet. Using this definition, Sky Harbor would be defined as an Intermediate Small airport. MnDOT defines the role of Intermediate Small airports as follows:

> *"Intermediate Small Airports primarily accommodate small single- and multi-engine aircraft with less than 10 passenger seats. Airports in this classification may occasionally be used by aircraft with more than 10 passenger seats. Intermediate Small Airports often serve as landing facilities for recreational flights, flight training, emergency medical transports, business flights, agricultural flights, and other general aviation uses. Intermediate Small Airports enable direct connections across Minnesota and the Central US region."*[5]

[4] Minnesota Continuous State Aviation System Plan Phase I, MnDOT, 2019
[5] Minnesota Continuous State Aviation System Plan Phase I, MnDOT, 2019

1.5.1 Surrounding Airports

Assessing the services and locations of neighboring airports helps understanding how DYT supports local and regional airports.

Within an approximate 100-minute drive time from the Canal Park area of Duluth, there are nine NPIAS airports, including one commercial service airport. There are also two airports not included in the NPIAS. **Table 1-1** lists those airports along with their role in the NPIAS and SASP, including the estimated drive time from Sky Harbor Airport.

Minneapolis – St. Paul International Airport (MSP) is a Large Hub – Primary airport located in Minneapolis, MN with a drive time of approximately 2.5 hours from DYT.

Table 1-1 – Airports in the Vicinity of DYT

Airport	Location	LOC ID	NPIAS Role	Based Aircraft	SASP Role	Approximate Drive Time (Minutes)
Cloquet Carlton County Airport	Cloquet, MN	COQ	Local	54	Intermediate	39
Duluth International Airport	Duluth, MN	DLH	Non-hub Primary	88	Key	27
Eveleth-Virginia Municipal Airport	Virginia, MN	EVM	Local	40	Intermediate	82
Grand Rapids/Itasca County Airport	Grand Rapids, MN	GPZ	Regional	67	Key	100
Range Regional Airport	Hibbing, MN	HIB	Non-hub Primary	43	Key	95
McGregor -Isedor Iverson Airport	McGregor, MN	HZX[1]	-	14	Intermediate	75
Moose Lake/Carlton County Airport	Moose Lake, MN	MZH	Local	16	Intermediate	53
Hill City-Quanda Mountain Airport	Hill City, MN	07Y[1]	-	3	Landing Strip	97
Solon Springs Municipal Airport	Solon Springs, WI	OLG	Basic	12	Small GA	53
Richard I. Bong Airport	Superior, WI	SUW	Local	60	Medium GA	21
Two Harbors Municipal – Richard B. Helgeson Field	Two Harbors, MN	TWM	Local	36	Intermediate	44

1.6 Socioeconomic Information

1.6.1 Population

The City of Duluth is located in northeastern Minnesota, in St. Louis County. The United States Census reports that in 2010 there were approximately 200,226 residents in St. Louis County with 102,931 residents in the labor force. The City of Duluth population, according to the U.S. Census, has remained relatively stable with an estimated 2010 population of 86,265 people and a 2000 estimated population of 86,918 people.

Additionally, the city of Duluth is located within the Duluth, MN-WI Metropolitan Statistical Area (MSA)[6]. The Duluth, MN-WI MSA consist of all of Wisconsin's Douglas County, and Minnesota's Carlton and St. Louis counties – Duluth is the principal city within the MSA. According to the 2010 Census, the population within the Duluth, MN-WI MSA was 290,637.

1.6.2 Employment and Income

The unemployment rate in Duluth has remained above both the county and state rates since recorded in the 2010 Census. The Duluth unemployment was 4.8% in 2000 (compared to county unemployment of 4.3% and state unemployment of 2.9%) and 5.3% in 2010 (compared to county unemployment of 5.0% and state unemployment of 4.5%). The St. Louis County unemployment rate has been consistently above the state average of 2.9% in 2000 and 4.5% in 2010. As of the 2018 American Community Survey data, the unemployment rate for Duluth sits at 3.2% The per capita income in Duluth for 2018 was $29,667, below the county-wide average of $30,321 and the state-wide average of $36,245. Per capita income in St. Louis County was $30,321 in 2018, which is approximately 17 percent below the state average of $36,245

The median household income (MHI) for the Census Tract the airport is located in is $59,511 (Tract 22). This is slightly higher than the MHI for St. Louis County and the Duluth MSA. There is a slightly lower percentage of persons living in poverty in Census Tract 22 (11.5%) than the City of Duluth (19.3%) and St. Louis County (15%). The socioeconomics for these Census areas is shown in **Table 1-2**.

Table 1-2 – Demographics for Duluth, St. Louis County, and Local Census Tract

	Census Tract 22	City of Duluth	Duluth, MN-WI MSA	St. Louis County	State of Minnesota
Total population	1,275	86,265	289,383	200,226	5,527,358
Median Household Income	$59,511	$49,411	$54,385	$53,344	$68,411
% Persons Below Poverty Level	11.5%	19.3%	12.4%	15%	10.1%

Source: 2018 American Community Survey

1.6.3 Local Industries and Economy

In 2019, the Minnesota Department of Transportation Office of Aeronautics conducted a study of the annual economic impacts public airports in Minnesota generated. The study found that a total economic activity of $5,141,560 was a direct impact from Sky Harbor Airport. This dollar amount included area employment, payroll and spending for Airport Management and Business Tenants, Capital Investment and General Aviation Visitor Spending. Sky Harbor supports many uses and

[6] An MSA consists of one or more counties that contain a city of 50,000 or more inhabitants or contain a Census Bureau-defined urbanized area (UA) and have a total population of at least 100,000. Counties containing the principal concentration of population—the largest city and surrounding densely settled area are components of the MSA. Additional counties qualify to be included by meeting a specified level of commuting to the counties containing the population concentration and by meeting certain other requirements of metropolitan character, such as a specified minimum population density or percentage of the population Metropolitan Areas.

users that help sustain vital services and business needs such as Search and Rescue, Aerial Inspections, Law Enforcement (DNR), Healthcare and Medical Support, and Customs & Border Control.

The Port of Duluth-Superior complements the airport by providing another mode of transportation for bulk cargo. The Port is the largest, furthest-inland freshwater port in North America and provides rail connections on regional, national, and international rail lines. According to an Economic Impact Study from 2018, over 7,881 jobs were supported in Minnesota and Wisconsin by cargo moving through the Port. On average the port handles 35 million tons (70 million pounds) of cargo each year[7]. The three top outgoing cargo are iron ore, coal, and grain.

The City also provides a regional hub for medical services. Duluth's medical district is located downtown in a six-block area with services provided by Essentia Health and St. Luke's Hospital.

The City and Region are also able to access a young talent pool from multiple higher education intuitions including the University of Minnesota – Duluth, Lake Superior College, University of Wisconsin – Superior, College of St. Scholastica and Fond du Lac Community College. Some of the major industries in the region include Aviation/Aerospace, Biomed and Healthcare, manufacturing, mining, financing and tourism.

Duluth sees over six million tourists annually. Located halfway between Minneapolis and the U.S.-Canadian border, Duluth is the gateway to the scenic north shore. Located within an hour's drive of Duluth is the Iron Range, home to the largest open pit mine in the World. Just under a two-hour car ride to the northwest of Duluth is the Boundary Waters Canoe Area Wilderness / Quetico Canadian Provincial Park which has thousands of acres of untouched wilderness. The Superior National Forrest, Isle Royale National Park and Apostle Islands National Lakeshore are all easily reachable from Duluth.

1.7 Based Aircraft and Aircraft Operations

Based aircraft are aircraft that reside at an airport. An aircraft operation is a takeoff or a landing at an airport. Based aircraft and aircraft operation are activity metrics used to determine facilities needs at an airport. The various sources of based aircraft and operations data for DYT are summarized in **Table 1-3**.

[7] http://www.duluthport.com/port-stats-facts.php

Table 1-3 – Summary of Based Aircraft and Operations

Source	Based Aircraft	Aircraft Operations
FAA Form 5010	24 (22 single engine, 2 multi engine)	13,900
FAA Terminal Area Forecasts (TAF)	26 (23 single engine, 3 multi engine)	13,900
Basedaircraft.com	22 (20 single-engine, 2 multi-engine)	N/A
MnDOT Aeronautics	20	N/A
Minnesota State Aviation System Plan (2012) – 2020 Forecasted Data	34 (31 single-engine, 3 multi-engine)	14,320
Notes: MnDOT Aeronautics does not collect aircraft operations data. Airport management does not track or maintain historic records of aircraft operations.		

Source: FAA Form 5010 (November 2020), TAF (2020), MnDOT Aeronautics Based Aircraft Records, MN SASP (2012), basedaircraft.com (March 1, 2021)

1.8 Runway Design Code

The FAA classifies airports by the type of aircraft traffic they experience. This classification is known as the Runway Design Code (RDC). This classification is based on two components: approach speed and wingspan or tail height of the aircraft. The Aircraft Approach Category, representing the approach speed, is an alphabetical classification denoted with letters A through E (A being the slowest and E being the fastest), as shown in **Table 1-4**. The Airport Design Group (ADG), representing the wingspan or tail height, is a numerical classification denoted with roman numerals I though VI (I being the smallest and VI being the largest), as shown in **Table 1-5**. The RDC classification of a specific airport and its facilities are based on the RDC of its Critical Aircraft. Critical Aircraft is defined as the most demanding airplane, or family of airplanes, that have a minimum of 500 annual operations forecasted to use an airport.

Table 1-4 – Aircraft Approach Category

Aircraft Approach Category	Approach Speed
A	Approach speed < 91 knots
B	Approach speed ≥ 91 knots < 121 knots
C	Approach speed ≥ 121 knots < 141 knots
D	Approach speed ≥ 141 knots <166 knots
E	Approach speed ≥ 166 knots

Source: FAA Advisory Circular (AC) 150/5300-13B, Airport Design

Table 1-5 – Airplane Design Group (ADG)

Group Numbers	Description	
	Wingspan (feet)	Tail Height (feet)
I	< 49’	< 20’
II	≥ 49’ < 79’	≥ 20’ < 30’
III	≥ 79’ < 118’	≥ 30’ < 45’
IV	≥118’ < 171’	≥ 45’ < 60’
V	≥ 171’ < 214’	≥ 60’ < 66’
VI	≥ 214’ < 262’	≥ 66’ < 80’

Source: FAA Advisory Circular (AC) 150/5300-13B, Airport Design

For comparison purposes**, Exhibit 1-1** depicts examples of the various RDC categories for general aviation and commercial service aircraft.

Exhibit 1-1 – Runway Design Code Aircraft

According to the conditionally approved ALP, Runway 14/32 is designed to RDC A-I small. Through this Master Plan process and the included aviation forecasting (**Chapter 2**), the current and forecasted Critical Aircraft and RDC for each runway facility will be determined.

1.9 Airside Facilities

The geographic location of DYT, known as the Airport Reference Point (ARP), is at latitude of 46º42’49.64” north and a longitude of 92°02’39.79” west at an elevation of 608.5 feet above Mean Sea Level (MSL). The critical aircraft for DYT as noted on the 2015 conditionally approved ALP is a Cessna 177. Cessna 177s have a wingspan of 35’6”, tail height of 8’6”, and an approach speed of 64 knots, which is designated as an A-I small aircraft.

1.9.1 Runway 14/32

The Airport’s existing facilities are shown in **Figure 1-3**. The existing airfield consists of one active asphalt runway: Runway 14/32. Runway 14/32 is 2,600 feet long by 75 feet wide, is designed to RDC A-I Small standards. Although a runway width of only 60 feet is required for A/B-I small runways by FAA design standards, MnDOT Aeronautics licensing standards requires a runway width of 75 feet for intermediate airports, which provided funding for the additional

width. The runway has a weight bearing capacity of 12,500 LBS for Single Wheel Gear (SWG) equipped aircraft but no weight bearing capacity listed for Dual Wheel Gear (DWG) equipped aircraft. Runway 14/32 was constructed in 2020.

Runway 14/32 is a non-precision instrument runway with non-precision markings, which consists of centerline, threshold, and aiming point markings.

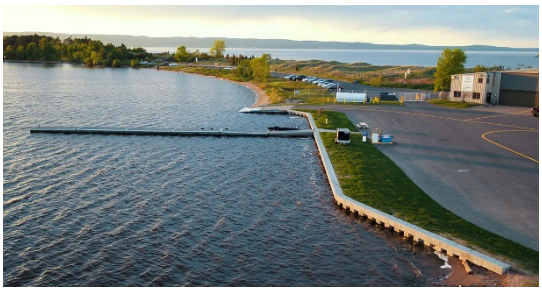


Photo 1-2 – Sky Harbor Airport Seaplane Base

1.9.2 Seaplane Base Facilities

Sky Harbor's seaplane base is served by two water runways in Superior Bay, a ramp, and a seaplane dock. The ramp, which was installed in 2008, is located directly south of the A/D building and is 28 feet wide. The ramp leads aircraft past fuel tank to the apron. The location of the seaplane ramp combined with the fuel tank and the A/D building creates periods of congestion during the summer months during high seaplane activity, and the fuel tank is currently within the Taxilane Object Free Area (TOFA) of the taxilane leading to the ramp.

The seaplane dock is approximately 22 years old located and has gone through several improvements since its' instillation. 72 feet down the shoreline from the ramp. At 120 feet long by 8 feet wide, the dock can accommodate approximately eight seaplanes tied up at one time.

1.9.2.1 Water Landing Strips

Runway 13W/31W

Runway 13W/31W is a water runway 10,000 feet long by 2,000 feet wide and is located on Superior Bay, on Lake Superior between Park Point Peninsula and Wisconsin. The runway is a visual runway and has no markings.

Runway 9W/27W

Runway 9W/27W is a water runway 5,000 feet long by 1,500 feet wide and is located on Superior Bay, on Lake Superior between Park Point Peninsula and Wisconsin. The runway is a visual runway and has no markings.

1.9.3 Lighting and Approach Aids

Runway 14/32 is a non-precision runway and is equipped with Medium Intensity Runway Lights (MIRLs). MIRLs have multiple levels of varying intensity and are used by pilots during nighttime hours and inclement weather to locate the runway.

Both ends of Runway 14/32 are also equipped with flashing Runway End Identifier Lights (REILs)[8]. Threshold lights are installed on each runway end.

Photo 1-3 – Sky Harbor Airport Beacon

[8] REILs are synchronized flashing lights that identify the beginning of the useable runway.

Both ends of Runway 14/32 are equipped with 2-Light Precision Approach Path Indicators (PAPIs)[9], which are owned and maintained by the DAA. PAPIs guide pilots to the runway under visual conditions and ensures obstacle clearance is maintained when following the guidance.

A very-high frequency (VHF) omni-directional range (VOR) transmitter is located 8 miles to the northwest, south of Duluth International Airport.

An FAA-owned Radio Transmitter/Receiver (RTR) facility was constructed at the airport in 2020. An RTR facility is a communication facility which aids communications between aircraft and, in this case, the DLH Tower. The FAA relocated the facility from the roof of St. Mary's Hospital in downtown Duluth to DYT in efforts to improve signal quality.

Additional NAVAIDs on the airfield include a rotating airport beacon northeast of the building area and a lighted wind cone south of the A/D building (**Figure 1-3**). Airport NAVAIDs and ownership are shown in **Table 1-6.** The Airport beacon is currently located outside of the airfield fence line and is surrounded by a separate fence, additionally, the beacon is of an older style which requires the person servicing the beacon to climb a ladder to perform maintenance.

Table 1-6 – Navigational Aids and Ownership

NAVAID	Owning Entity
RWY 14/32 MIRLs	DAA
RWY 14 and 32 REILs	DAA
Rotating Beacon	DAA
RWY 14/32 PAPIs	DAA
AWOS	MnDOT
RTR Facility	FAA

1.9.4 Instrument Approach Procedures

For an aircraft to land in inclement weather conditions, the FAA publishes instrument approach procedures to provide vertical and/or horizontal guidance to pilots. By allowing landings during inclement weather conditions, either obscured cloud ceiling and/or forward-looking visibility, instrument approach procedures increase operational reliability to an airport. A non-precision approach only provides horizontal guidance, while a precision approach provides horizontal and vertical guidance.

Table 1-7 shows the planned non-precision instrument approach for Runway 32. The instrument approach procedures listed below are expected to be published in late 2022. An approach to an airport helps pilots land under adverse weather conditions or in situations where terrain or other obstacles prevent a pilot from making a safe approach and landing at an airport. The FAA publishes instrument approach procedures to provide directional and/or vertical guidance to pilots.

[9] PAPIs provide color-coded descent guidance to a runway.

Table 1-7 – Instrument Approach Procedures

Runway	Type	Category A			Category B		
		DA/MDA	VIS	HA/HAA	DA/MDA	VIS	HA/HAA
32	LPV DA	896	1	287	896	1	287
32	LNAV/VNAV DA	1044	1 1/4	435	1044	1 1/4	435
32	LNAV MDA	1000	1	391	1000	1	391
CIRCLING		1100	1	491	1180	1	571

Notes: DA: Decision Altitude, MDA: Minimum Descent Altitude, VIS: Visibility Minimums, HAA: Height Above Airport, HA:

Source: FAA

1.9.5 Communications

Communication at an uncontrolled airport is done using the Common Traffic Advisory Frequency (CTAF). Pilots announce their position as it relates to the airport and what their intentions are.

Sky Harbor's CTAF is on 122.7 MHz for radio communication between aircraft. The runway's Pilot Controlled Lighting (PCL) can also be activated by keying the aircraft's radio on the CTAF frequency.

Air traffic control services are handled by Minneapolis Air Route Traffic Control Center (ARTCC) located in Farmington, MN and by FAA Flight Service. Minneapolis ARTCC is on 121.05 MHz. Duluth International Airport's Terminal Radar Approach Facility (TRACON), located at DLH, also provides air traffic control services to pilots in the vicinity of the DLH airspace. Duluth Approach and Departure control is on 125.45 MHz.

1.9.6 Taxiways and Apron System

Taxiway systems are designed to ensure the safe and efficient movement of aircraft on the ground and to limit the need to access or cross an active runway. The taxiway Safety Area (TSA), Taxiway Object Free Area (TOFA), and runway to taxiway centerline separation standards are determined by the Airport Design Group (ADG) for the critical aircraft proposed to use the airport over the next 20 years. The ADG is determined by the wingspan and tail height of the critical aircraft.

The Taxiway Design Group (TDG) determines the taxiway width, fillet, and curve design of the taxiways at an airport. Undercarriage dimensions, overall Main Gear Width (MGW), and the Cockpit to Main Gear (CMG) distance of the most demanding aircraft projected to use the airport determine TDG.

Runway 14/32 is served by a full parallel taxiway on the northeast side with three connector taxiways and is designed to meet ADG I and TDG 1A standards. The full-length parallel taxiway is 25 feet wide.

The apron area is comprised of approximately 18,258 square yards with 31 tiedown positions. The existing taxiway and apron system is shown in **Figure 1-3.**

Table 1-8 and **Table 1-9** indicate the design standards that apply to the current taxiway system.

Table 1-8 – Taxiway Design Standards Based on Airplane Design Group (ADG)

AC 150/5300-13B Table 4-1		
Item	**ADG I**	**ADG II**
Taxiway Safety Area (TSA)	49’	79’
Taxiway Object Free Area (TOFA)	89’	124’
Taxilane Object Free Area (TLOFA)	79’	110’
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline	70’	102’
Taxiway Centerline to Fixed or Moveable Object	44.5’	62’
Taxilane centerline to parallel taxilane centerline	64’	94’
Taxilane centerline to fixed or moveable object	39.5’	55
Taxiway Wingtip Clearance	20’	23
Taxilane Wingtip Clearance	15’	16’

Source: AC 150/5300-13B, Table 4-1.

Table 1-9 –
Taxiway Design Standards based on Taxiway Design Group (TDG)

AC 150/5300-13B, Table 4-2				
Item	**TDG 1A**	**TDG 1B**	**TDG 2A**	**TDG 2B**
Taxiway Width	25’	25’	35’	35’
Taxiway Edge Safety Margin (TESM)	5’	5’	7.5’	7.5’

Source: AC 150/5300-13B, Table 4-2.

1.9.7 Weather Reporting and Meteorological Data

There is an Automated Weather Observation System (AWOS) located at the Airport. The AWOS is located east of the hangar area south of the trees. The AWOS provides up to date weather observations and generates routine aviation weather reports. Information typically provided by an AWOS includes wind direction and speed, sky conditions, visibility, temperature, and dew point. The AWOS is MnDOT owned and maintained.

1.9.7.1 Temperature

Duluth, Minnesota has a typical continental climate with hot summer and cold, often frigid, winters. The FAA requires temperature data used for determining airport facilities (e.g. runway lengths, etc.) be obtained from “Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree-Days (Climatography of the United States No. 81)”.[10] Using data obtained from the Sky Harbor Airport AWOS, the mean daily maximum temperature for Duluth is 74.7° Fahrenheit, normally occurring in July, while the mean daily minimum temperature is 2.0° Fahrenheit normally occurring in January, shown in **Table 1-10**.

[10] AC 150/5325-4B, *Runway Length Recommendations for Airport Design*, Paragraph 103.

Table 1-10 – Temperature Summary

Temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann*
Mean Daily Max. °F	21.1	26.0	34.4	46.2	56.0	65.9	74.7	73.9	65.0	52.0	38.3	25.4	48.2
Mean °F	11.6	16.2	25.5	37.6	46.9	56.7	65.2	65.2	56.1	44.1	30.8	17.1	39.4
Mean Daily Min. °F	2.0	6.3	16.7	29.0	37.8	47.4	55.7	56.4	47.2	36.2	23.3	8.7	30.6
*Ann = Annual Average													

Source: U.S. Department of Commerce, NOAA. Station DULUTH SKY HARBOR STATION , MN US GHCND: USC00212246 http://www.ncdc.noaa.gov/cdo-web

1.9.7.2 Precipitation

The maximum average precipitation for Duluth occurs in September with an average of 4.11 inches of rainfall. The average annual snowfall of 86.1 inches, with the most snowfall occurring in January, shown in **Table 1-11**, was taken from the Duluth International Airport ASOS**.**

Table 1-11 – Precipitation Summary

Precipitation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann*
Av. Rain (in.)	0.96	0.81	1.49	2.43	3.23	4.23	3.85	3.7	4.11	2.85	2.09	1.21	30.96
Av. Snow (in.)	19.4	12.4	13.2	6.9	0.4	0.0	0.0	0.0	0.1	2.3	13.7	17.7	86.1
*Ann = Annual Average													

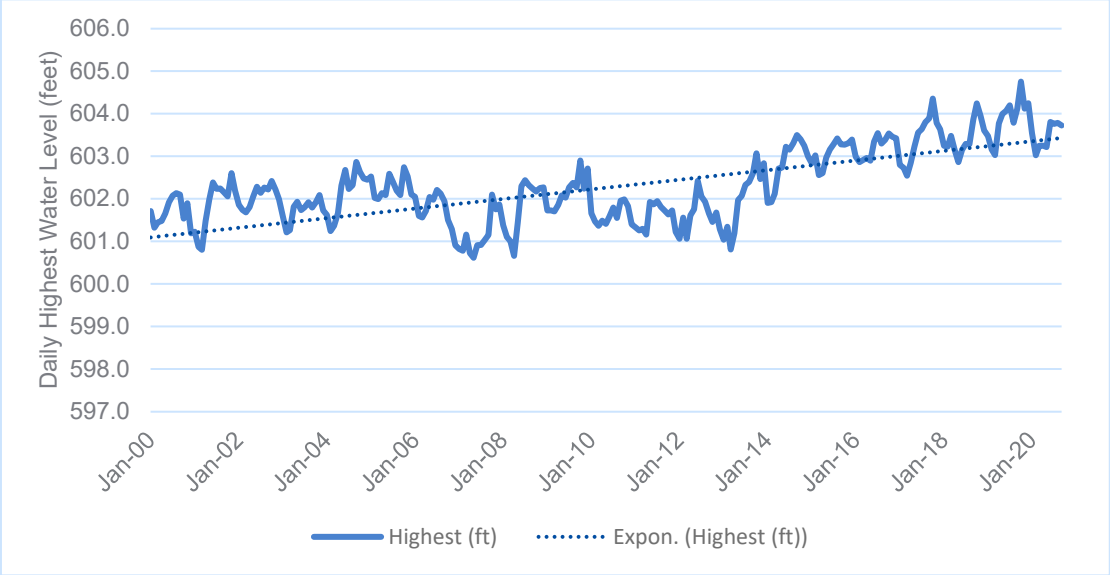
Source: U.S. Department of Commerce, NOAA. Station DULUTH INTERNATIONAL AIRPORT, MN US GHCND: USW00014913 http://www.ncdc.noaa.gov/cdo-web

1.9.7.3 Lake Superior Water Levels

Sky Harbor Airport is located on Park Point between Lake Superior to the north and Superior Bay to the south. The lake's water level is a major influence on the seaplane dock, ramp and potential flooding to the apron.

As shown in the charts below, the water level has steadily been increasing over the last twenty years. The levels have shown a gradual increase and continue to rise. The monthly recordings of the water levels between 2000 and 2020 are shown below in **Chart 1-1**.

Chart 1-1 – Lake Superior Water Levels 2000 - 2020



Source: U.S. Department of Commerce, NOAA. Tides & Currents. Duluth, MN – Station ID 9099064

1.9.7.4 Wind Data Analysis

Prevailing wind is a major factor influencing runway orientation. Wind conditions affect all aircraft to some degree. Generally, the smaller the aircraft, the more it is affected by wind. Therefore, orienting the runway such that it is aligned with the prevailing wind the greatest percentage of time will add substantially to the safety and usefulness of an airport.

The crosswind component of wind direction and velocity is defined as the resultant vector that acts at a right angle to the runway centerline and is equal to the wind velocity multiplied by the sine of the angle between the wind direction and the runway direction. Wind coverage is defined as the percentage of time that crosswind components are below an acceptable velocity. The most desirable runway orientation based on wind is one that has the greatest percentage of wind coverage. The minimum recommended wind coverage for an airport is 95%. The 95% coverage is computed on the basis of the crosswind not exceeding **10.5 knots for A-I and B-I**, 13 knots for A-II and B-II, 16 knots for A-III, B-III, and C-I through D-III, and 20 knots for A-IV through D-VI.

Wind data collected through the National Oceanic and Atmospheric Administration (NOAA) at the actual airport site is the best source of information. NOAA collects wind data at DYT. The FAA requires wind data analysis to be completed with at least 10 years of consecutive data from the airport site or the closest available site. Wind data analysis was completed using data from DYT's AWOS for the period 2010 to 2019. **Table 1-12** shows the wind coverage for the existing runways at the airport.

Table 1-12 – Wind Coverage – Runway 14/32

		10.5 knots	13 knots	16 knots
Runway 14/32	All	89.01%	93.58%	97.5%
	VFR	88.78%	93.42%	97.49%
	IFR	91.97%	95.67%	97.94%

Note[1]: Calculated based on Runway 14/32.

Source: Sky Harbor Airport AWOS. 2010-2019. Obtained from the National Climatic Data Center.

1.9.8 Pavement Condition Index (PCI)

The Minnesota Department of Transportation (MnDOT) Office of Aeronautics assists airports with evaluating pavement. MnDOT contracts with a research company to prepare a pavement evaluation report on a three-year cycle for 103 paved airports in Minnesota. Under federal grant assurances, a pavement maintenance program is required for pavement construction or repairs to continue to receive federal money. This report will identify a Pavement Condition Index (PCI) for each section of pavement on a scale of 0 (worst) – 100 (best).

The most recent pavement ratings were taken from the 2017 MnDOT Airport Pavement Management Study Update. Runway 14/32 and Taxiway A were reconstructed following a multiyear project to realign the runway. The runway and taxiways are new pavement as of 2020 and reflected as such in the table below. The Study did find the main apron pavement was in "Satisfactory" condition, with a PCI of 85 and the secondary apron area was in "Good" condition, with a PCI of 66. **Figure 1-4** graphically depicts the pavement conditions index at DYT per the 2017 MnDOT Airport Pavement Management Study Update. **Table 1-13** lists the PCI ratings at the Airport.

Table 1-13 – Airside Facilities Condition Index

Area*	Section ID	PCI	LCD**
Runway 14/32	Section 1	100	2020
Taxiway A	Section 1	100	2020
Connector Taxiway A1	Section 1	100	2020
Connector Taxiway A2	Section 1	100	2020
Apron	Section 1	85	2016
Apron	Section 2	66	2004

*Note: Areas as defined in the Pavement Condition Report. Taxiway naming as used in the Pavement Condition Report differs from actual taxiway naming. Refer to the Pavement Condition Report for further details.

** Last Construction Date (original construction, last overlay, or reconstruction [whichever is most recent])

Source: Pavement Condition Report, Applied Research Associates, Inc. (2018), SEH

1.10 Landside Facilities

1.10.1 Aircraft Storage

The building area consists of nine box hangars that are individually owned with land leases from the Duluth Airport Authority. The hangar layout is included in **Figure 1-5**. Additionally, the existing apron area is approximately 182,150 square feet with approximately 31 aircraft tiedown positions for based and transient aircraft.

Table 1-14 – Aircraft Storage Hangars

Hangar Number	Square Footage
1	6,558 SF
2	4,897 SF
3	3,433 SF
4	2,964 SF
5	4,919 SF
6	4,119 SF
7	3,594 SF
9	4,050 SF
10	3,160 SF
11	3,640 SF

Source: Aerial Survey

1.10.2 Arrival/Departure (A/D) Building

The existing A/D building is 6,558 square feet and is located on the north side of the main apron, the western most building as seen in **Figure 1-5**. The A/D building provides pilots with a lounge area, flight planning, and restroom. A courtesy car, two rental cars, Uber and Lyft are available for transportation for airport users. The A/D Building is in good condition. Attached to the A/D building is a hangar that is owned by the DAA. The foundation underneath the hangar door is cracked, causing the door to be unstable.

1.10.3 Fixed Based Operator (FBO)

A fixed based operator (FBO) generally provides fuel, maintenance, aircraft rental, and other aviation related services to airport users. While there is no official FBO located on the airfield, Scenic Airrides, Hangar 10 Aero Supply, and the on-airport mechanic provides services to airport users. The Airport Manager issues Notices to Airmen (NOTAMs) when necessary, to inform pilots of airport information. The self-service fueling system, as well as tiedown parking is managed by the DAA.

1.10.4 Fueling

Sky Harbor has a self-service fuel system located southwest of the A/D building. The fueling system consists of one 3,000-gallon aboveground tank containing Aviation Gas (AvGas, 100LL) that was installed in 2008. The DAA owns the fuel tank and manages the fueling operations.

1.10.5 SRE & Maintenance Equipment

The DAA currently provides personnel and equipment for maintenance and snow removal of the Airport. The equipment is currently being stored in a hangar owned by the DAA. The equipment is listed below in **Table 1-15**.

Table 1-15 – SRE Equipment List

Year	Equipment Make & Model	Condition	Funding
2000	Chevrolet Pickup w/Plow	Poor	State 60% / Sponsor 40%
2007	New Holland Tractor	Excellent	State 80/20
2007	Chevrolet Trailblazer	Good	DAA
2007	John Deer Tractor/Mower	Good	State 70% / Sponsor 30%
2007	Snow Wing 12/18 Plow	Good	State 95% / Sponsor 5%
2007	102" Rotating Drum Blower	Good	State 95% / Sponsor 5%

Source: Airport Staff

The SRE, maintenance and mowing equipment is currently stored in the hangar attached to the A/D building. Seasonally, equipment is moved to DLH for storage when not in use during a particular season since there is not sufficient year-round storage for all equipment at DYT.

1.10.6 Customs & Border Protection

Sky Harbor is a port of entry airport and provides U.S. Custom and Border Patrol services to aircraft arriving from international airports. CBP currently provides their services by using a mobile vehicle to drive from the Port of Duluth to Sky Harbor. Future facility needs that are requirements by CBP to ensure that DYT maintains its point of entry status will be discussed in **Chapter 4**. **Table 1-16** shows historical private flights and total crew and passengers that cleared CBP from 2016 through 2020.

Table 1-16 – CBP Flights and persons cleared: 2016 - 2020

Year	Number of Private Flights	Crew/Passengers
2016	69	270
2017	79	305
2018	54	209
2019	68	279
2020	2	2

Source: CBP Area Port, Chicago

1.10.7 Security and Fencing

The Airport has 10-foot chain link fencing located around the existing hangars and runs parallel to the airport property line as shown in **Figure 1-3** on the north side of the airport. The fence separates airport property and the public Park Point Trail which runs parallel to the fence.

A fence is also located between the A/D Building and the water's edge which separates automobile parking from the airfield. An electric vehicle gate and a pedestrian gate are located next to the A/D building which allows for vehicle and pedestrian access.

1.11 Airport User Survey

To better define the volume and character of the users of DYT as well as their user-specific needs, an Airport User Survey was completed. The Pilot User Survey was sent to based aircraft pilots at DYT, transient and seasonal users, and registered aircraft pilots from Wisconsin and Minnesota within 25 nautical mile range and known seaplane pilots from Minnesota. Surveys (over 800) were distributed in October of 2020. An overview of the User Survey is included in **Appendix A**.

1.12 Transportation

1.12.1 Automobile Parking

Sky Harbor Airport is located at the end of Minnesota Point and around the Minnesota Point Pine Forest Scientific and Natural Area (SNA) and public beach access. There are approximately 70 parking spaces located outside of the fence, with the majority of these located on airport property, along Minnesota Avenue. The spaces are paved and in fair condition. The parking lot is maintained by the City of Duluth.

1.12.2 Airport Access and Ground Transportation

The Airport is accessed via Minnesota Avenue that enters the airport property on the northwest side of the airfield as shown in Figure 1-3. There is a courtesy car located at the airport that is used on a first come, first serve basis. Uber and Lyft have an agreement with the Duluth Airport Authority and have extended their services to the Park Point peninsula, reaching down to the airport.

Additionally, the Duluth Transit Authority (DTA) provides bus service to Park Point on Route 15 and terminates immediately prior to entering Park Point Recreational Area, approximately one mile northwest of the airport.

1.13 Utilities

1.13.1 Electricity and Gas

Electricity is provided by Minnesota Power. Gas (propane, heating oil, and diesel) is provided by Inner City Oil and Caywood Oil.

1.13.2 Water and Sewer

Water is provided by the City of Duluth water services. Sewer is provided by St. Louis County.

1.13.3 Telephone and Internet

Phone and internet services are provided by Nextera. Wi-Fi is available in the Terminal Building for the general public. The Wi-Fi signal is weak and is only available in the immediate vicinity of the terminal building.

1.14 Police and Emergency Services

The City of Duluth Police Department provide police and emergency services for the Airport. In addition, the Duluth Fire Department provides service to the Airport in the event of a fire.

1.14.1 Water Emergency Services

The Duluth Airport Authority owns and operates an emergency boat that is located at the airport. The Coast Guard, stationed 4 miles from the airport, is also available in the event of water emergencies.

1.15 Zoning, Land Use and Authority

Since the Airport is within Duluth city limits, the Airport is subject to Duluth zoning, and planning restrictions and controls. The Airport itself is zoned as Airport (AP). The area west of the airport is classified as Park (P-1) and the area east of the airport is Rural Conservation (R-C). These zones are described in **Table 1-17** and shown in **Figure 1-6.**

Table 1-17 – Duluth Zoning Descriptions

District	Purpose	Permitted Uses
Airport (AP)	This district is intended to protect and reserve lands dedication for airport operations. Structures and development that are incidental to and supportive of airport operations may be permitted.	
Residential-Traditional (R1)	This district is intended to be used primarily in established neighborhoods. Many of the dimensional standards in this district require development and redevelopment to be consistent with development patterns, building scale, and building location of nearby areas.	The R-1 district is established to accommodate traditional neighborhoods of • single-family detached residences • duplexes • townhouses on moderately sized lots.
Rural-Conservation (RC)	The district encourages development designs that conserve open space and natural resources and preserve rural character. Complimentary uses such as limited agriculture, parks, minor utilities and certain temporary uses are allowed.	The R-C district is established to accommodate • low density, • single-family detached residential uses on parcels of at least ten acres each in areas where the comprehensive land use plan calls for protection of rural character.
Park and Open Space District (P1)	The P-1 district is intended to protect and reserve lands for recreational, scenic, and natural resource uses. All uses and structures shall be compatible in scale, design and impact with the natural features and character of the land.	This district is intended to be applied to publicly owned land but may be applied to private property with the landowner's written consent. • passive recreational (e.g., walking paths, picnic tables) • active recreational (e.g., playgrounds, ball fields, tennis courts) uses may be permitted. • Small-scale buildings, structures and development (e.g., parking) that are incidental to and supportive of an approved use may also be permitted.

Source: Duluth Zoning Ordinance (2018)

1.15.2 Nearby Zoning – City of Superior, Wisconsin

Sky Harbor airport is located on the north side of Superior Bay with Superior, Wisconsin being located on directly south across the bay. Land directly across the bay from DYT is zoned as W-1, or Waterfront according to the 2014 City of Superior Zoning map.

1.15.3 Floodplain Zoning Ordinances

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) were reviewed to determine if the preferred alternative would result in development within a 100-year floodplain.

The FIRM for the City of Duluth, Minnesota, St. Louis County – Panel Number 270421 0040, effective February 1, 1980, indicates that the Airport and all of Minnesota Point are located

outside the FEMA designated 100-year floodplain of Lake Superior (**Figure 1-12**) The Airport is located in Zone C, indicating it is of higher elevation than the 500-year flood.

The adjacent areas of Lake Superior and Superior Bay are identified as Zone A1 on the FIRM. This means the area is subject to the 100-year flood event as determined by detailed methods. The map indicates the methodology indicates a base flood elevation (BFE) of 605 feet. The FIRM indicates that flood insurance is not available for new construction or substantially improved structures on and after November 16, 1990 in designated coastal barriers for the entire area of Minnesota Point south of 42nd Street South.

The City of Duluth Natural Resources Overlay Zone District Map indicates that the narrow strip of land immediately adjacent to the Airport runway on the bay side is designated as City General Floodplain Zone. Further out in Superior Bay is considered a Floodway of Lake Superior. Neither the Airport nor the area immediately adjacent to it is in the floodway.

1.15.4 Shoreland Zoning District

The City of Duluth Natural Resources Overlay Zone District Map indicates that the Airport and Minnesota Point are located along general development waters. The shoreland overlay district applies to all Lake Superior shoreland and lands within 1,000 feet of Lake Superior or within 300 feet of rivers, creeks, streams and tributaries and floodplains. This district is depicted on **Figure 1-7**. The Ordinary High-Water Mark for Lake Superior is 603.1'.

The City of Duluth has minimum shoreland area standards and are shown in **Table 1-18**.

Table 1-18 – City of Duluth Minimum Shoreland Area Standards

Standards[1]	Setback Requirement
Setback for Structures	50 ft.
Commercial, mixed use, & industrial structures in the harbor	25 ft.
Setback for Structures	50 ft.
Lowers floor elevation above Ordinary High Water Level or highest known water level, whichever is higher	3 ft.
Width of naturally vegetive buffer	50 ft.

[1] Minimum setback from Ordinary High-Water Level or highest known water level, whichever is higher

Source: City of Duluth, 50-13 General Provisions Districts

1.16 Airport Zoning Ordinance

The Duluth Airport Authority enforces the Airport Zoning Ordinance on and around the Airport to protect the Sky Harbor Regional Airport from encroachment and incompatible land uses in accordance with the state rules. Minnesota Administrative Rules, Chapter 8800 requires all publicly owned licensed airports in the State of Minnesota to have height and safety zoning. The purpose of the height and safety zoning is to ensure that no objects penetrate the 14 Code of Federal Regulations (CFR) Part 77 imaginary surfaces, except, when necessary, for airport

operations; and to ensure that the areas around an airport are clear of incompatible land uses. The Sky Harbor Airport Zoning Ordinance was adopted in 1994 by the Duluth Airport Authority.

The existing airport Safety Zones for DYT are shown on **Figure 1-8**. The Sky Harbor Airport Zoning Ordinance establishes protections in accordance with the minimum standards defined by Minnesota Rules Chapter 8800.2400. The rule includes boundaries (Safety Zones A, B, and C) established for the purpose of restricting those uses which may be hazardous to the operational safety of aircraft using the Airport, and furthermore, to protect the safety and property of people on the ground in the area near the Airport. This is accomplished by limiting population and building density in the runway approach areas, thereby creating sufficient open space to protect life and property in case of an accident.

The safety zones are intended to protect the investment of the Airport by limiting or preventing situations that would become an incompatible land use, and potentially affect Airport safety and durability.

The City of Duluth-Sky Harbor Airport Zoning Ordinance, Ordinance Number 9215 (Adopted in September 1994) and Airport Overlay District, Article 2, Section 50.18.2 (adopted in August 2010) addresses the requirements of Minnesota Rule 8800.2400. The UDC defines safety zones for the existing airport facilities and regulates and restricts the presence and height of structures and natural growth objects and the use of property in the vicinity of the Airport. Because the Airport had previously planned to extend the runway longer than the previous 3,050 feet (the length prior to the 2020 runway relocation), the existing ordinance is based on a 3,350-foot-long runway. The following land use safety zones were established with relation to the Airport and Runway 14/32 and are shown on **Figure 1-8**:

- **Safety Zone A** extends outward from the end of the primary surface a distance equal to two-thirds of the planned runway length, in this case 2,230 feet. No buildings, temporary structures, exposed transmission lines, or other similar land use structural hazards are allowed in Zone A. Land uses in Zone A are restricted to those that do not create, attract, or bring together an assembly of people. Permitted uses may include agriculture (seasonal crops), horticulture, raising of livestock, animal husbandry, wildlife habitat, light outdoor recreation (non-spectator), cemeteries, and auto parking.
- **Safety Zone B** extends outward from Safety Zone A to a distance equal to one-third of the planned runway length, in this case 1,120 feet. Use in Zone B is restricted to those that do not create, attract, or bring together a site population that would exceed 15 times that of the site acreage. Parcel size is limited to less than three (3) acres in Zone B and no more than one building site on each parcel is allowed. Churches, hospitals, schools, theaters, stadiums, hotels and motels, trailer courts, campgrounds, and other places of public or semipublic assembly are specifically prohibited in Zone B.

The provisions of Zone A and Zone B do not apply to land uses in “established residential neighborhoods in built up urban areas.” This means that in an area designated as such, existing land uses will be allowed to continue as a conforming use with a few restrictions.

- **Safety Zone C** includes all the land enclosed within the perimeter of the horizontal zone (6,000-foot diameter arc beginning at the end of the primary surface) and not included in Zone A or Zone B. Land uses in Zone C are subject only to the general restrictions that no use creates or causes interference with the operation of radio or electronic facilities on the Airport, or with radio or electronic communications between the Airport and aircraft.

During the planning process for the Runway 14/32 runway relocation, MnDOT Aeronautics indicated via written correspondence with the Environmental Assessment project team and the City of Duluth Attorney that rezoning the airport to match the planned runway location and length was not needed; therefore, the airport was not rezoned.

1.16.1 Wisconsin Airport Height Limitation Zoning Ordinance

Similar to the Airport Safety Zoning required in Minnesota to receive an airport license, Wisconsin airports also have height limitation zoning ordinances to protect the airspace surrounding an airport. The zoning ordinance are based off of FAR Part 77 imaginary surfaces and can extend to 3 miles beyond the airport and are extraterritorial. The Superior Airport (SUW) is located approximately three miles to the southwest of DYT. According to the 2030 Wisconsin State Aviation System Plan, SUW Airport published their height limitation zoning ordinance in 1968 and a height limitation zoning map in 1976. Due to the proximity of Sky Harbor Airport and Superior Airport, the height limitation zoning ordinance for Superior Airport extends over Sky Harbor. The height limitation, according to the SUW height limitation zoning ordinance, over Sky Harbor is 811' mean sea level (MSL) or approximately 202.5' above ground level (AGL).

1.17 Environmental Inventory

1.17.1 Air Quality

The Clean Air Act (CAA), which was last amended in 1990, requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards [NAAQS - 40 Code of Federal Regulations (CFR) part 50] for pollutants considered harmful to public health and the environment. The CAA established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA uses six criteria pollutants as indicators of air quality and has established for each a maximum concentration above which adverse effects on human health may occur. The six criteria pollutants include ozone, which includes 1-hour ozone and 8-hour ozone; carbon monoxide; nitrogen dioxide; sulfur dioxide; particulate matter, which includes PM-10 and PM-2.5; and lead. EPA air quality classifications include:

- Nonattainment – any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
- Attainment – any area [other than an area identified in clause (i)] that meets the national primary or secondary ambient air quality standard for the pollutant.
- Unclassifiable – any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.
- Maintenance Areas – are previously nonattainment areas that now meet standards.

The information on the EPA Greenbook website (http://www.epa.gov/air/oaqps/greenbk/index.html) indicates that there are no non-attainment areas in the City of Duluth and surrounding areas. However, the City of Duluth, including Sky Harbor Airport, is a Maintenance Area for carbon monoxide (CO).

1.17.2 Coastal Resources

Federal activities involving or affecting coastal resources are governed by the Coastal Barriers Resources Act (CBRA) of 1982, the Coastal Zone Management Act (CZMA) of 1972, and Executive Order (E.O.) 13089, Coral Reef Protection. The CBRA prohibits federal funding for new development within the Coastal Barriers Resources System (CBRS), which consists of undeveloped coastal barriers along the Atlantic and Gulf coasts and the shores of the Great Lakes. Federals agencies are required to consult with the USFWS prior to committing funds for project or actions within the CBRS. Minnesota Point, including the Airport, is within the CBRS.

The CZMA applies to states having an approved Coastal Zone Management (CZM) plan. The CZM plan is implemented by a designated state or local agency and proposed federal actions within the CZM boundary must work to achieve consistency with the applicable CZM plan. The CZM plan typically compliments and implements relevant and applicable federal, state, and local regulations, policies, and managements plans to achieve the goals and intent of the CZMA. In Minnesota, the CZM is implemented through Minnesota's Lake Superior Coastal Program (MLSCP), a federal-state partnership dedicated to comprehensive planning and management within the designated Coastal Boundary of Lake Superior. MLSCP is administered by the MNDNR and encourages greater cooperation, simplifies governmental processes, and provides tools for implementing existing policies, authorities, and programs within the Coastal Boundary shown on **Figure 1-9**. The Airport is located entirely within the Coastal Boundary with the City of Duluth as the local unit of government.

Executive Order (EO) 13089, Coral Reef Protection, established the United States Coral Reef Task Force to lead U.S. efforts to preserve and protect coral reef ecosystems. EO 13089 directs federal agencies to ensure, to the extent practicable, that actions authorized, funded, or carried out do not degrade these ecosystems. No coral reefs are present in the project area, at Minnesota Point, or at any other location in Lake Superior or the St. Louis River.

1.17.3 Section 4(f)

Section 4(f) legislation was established under the Department of Transportation (DOT) Act of 1966 (now codified at 49 USC 303, 23 USC 138) and provides protection for publicly owned land in public parks, recreation areas, or wildlife and waterfowl refuges of national, state, or local significance.

Multiple Section 4(f) resources exist in the vicinity of the Airport. These include: Minnesota Point Pine Forest Scientific and Natural Area (SNA), Park Point, Park Point Trail, Park Point Recreation Area, Point Zero Light House, Hartman Park, and Southworth Marsh Wildlife Refuge. These areas are shown in **Figure 1-10**.

1.17.4 Farmlands

The Farmland Protection Policy Act (FPPA) was enacted to minimize the extent to which federal actions contribute to the conversion of farmland to non-agricultural uses. As used in the FPPA, farmland includes prime and unique farmland and land of statewide or local importance. "Farmland" subject to FPPA requirements does not have to be currently used for cropland. It can be forestland, pastureland, cropland, or other and not under water or built-up.

While some areas across the bay in Superior, Wisconsin contain prime farmland or soils of statewide importance, no soils within the Airport boundary or adjacent to the Airport are designated prime or unique farmlands (**Figure 1-11**).

1.17.5 Floodplains

Executive Order 11988, Floodplain Management, bans federal actions in a floodplain unless no practicable alternative exists, and requires measures to minimize unavoidable short-term and long-term impacts if the preferred alternative is constructed in a floodplain. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) were reviewed to determine if the preferred alternative would result in development within a 100-year floodplain.

The FIRM for the City of Duluth, Minnesota, St. Louis County – Panel Number 270421 0040D, indicates that the Airport and all of Minnesota Point are located outside the FEMA designated 100-year floodplain of Lake Superior (**Figure 1-12**). The Airport is located in Zone C, indicated it is of higher elevation than the 500-year flood.

The adjacent areas of Lake Superior and Superior Bay are identified as Zone A1 on the FIRM. This means the area is subject to the 100-year flood event as determined by detailed methods. The map indicates the methodology indicates a base flood elevation (BFE) of 605 feet. The FIRM indicates that flood insurance is not available for new construction or substantially improved structures on and after November 16, 1990 in designated coastal barriers for the entire area of Minnesota Point south of 42nd Street South.

The City of Duluth Natural Resources Overlay Zone District Map indicates that the narrow strip of land immediately adjacent to the Airport runway on the bay side is designated as City General Floodplain zone. Further out in Superior Bay is considered a Floodway of Lake Superior. Neither the Airport nor the area immediately adjacent to it is located in the floodway.

1.17.6 Fish and Wildlife Resources

Two important and distinct fisheries occur in the vicinity of the Airport. These include the deep, clear, and cold water of Lake Superior, and the shallow and warmer waters of the Duluth and Superior Harbors and the St. Louis River and Bay. Lake Superior's fish community is composed of Salmonids as well as Coregonids. In the shallower waters near the airport, species of game fish common to the region are present, such as walleye (*Sander vitreus*) and yellow perch (*Perca flavescens*). The warm water fisheries within the Duluth and Superior Harbors and the Superior Bay are composed of walleye, yellow perch, sauger (*Sander canadense*), northern pike (*Esox lucius*), Lake sturgeon (*Acipenser fluvescens*), eastern elliptio (*Elliptio complanate*), creek heelsplitter (*Lasmigona compressa*), and panfish (Centrarchids) as well as a diverse assemblage of minnow and bait species. Habitats within the harbors and the bays near the Airport is primarily shallow to deep, sluggish, tannin-stained waters. Bottom composition is soft sediments and sand. Aquatic macroinvertebrates and freshwater mussels are also known from the harbors and bay.

The Airport is located within the Northern Superior Uplands (NSU) Section, and more specifically the North Shore Highlands Subsection as defined by the MNDNR Ecological Classification System (ECS) *Field guide to the Native Plant Communities of Minnesota: the Laurentian Mixed Forest Province* (MNDNR 2003). The Minnesota Biological Survey (MBS) has assigned native plant community descriptions on the surrounding forest, shrub, and beach native plant communities following the MNDNR's ECS (MNDNR 2003), as depicted on **Figure 1-13**. Vegetative cover immediately surrounding the Airport facilities is maintained by mowing to keep

grasses and shrubs low to the ground as to not create any potential vegetative obstructions for aircraft utilization of the runway, taxiway, or other ground surfaces. This open, grasses area is dominated by a combination of native and non-native herbaceous plant species and is not classified as a native plant community following the MNDNR's ECS. The natural communities surrounding the Airport include forested, shrub, and grassland dunes associated with the sandy shores of Lake Superior.

The forest communities, Juniper Dune Shrubland, and Beachgrass Dune communities provide habitat for a wide array of fauna. Minnesota Point has a long history of bird research and hobby bird watching due in large part to its unique geologic setting, formation, and important presence for nesting, roosting and resting/stop-over during annual bird migrations. Breeding bird assemblages present include species that would be expected in mature and intact forest habitat including, but not limited to, the veery (*Catharus fuscescens*) and wood thrush (*Hylocichla mustelina*). The forest also provides important habitat for common amphibians, mammals, and macroinvertebrates. Beach dune and shoreline habitats provide suitable nesting and foraging habitats for shorebirds, including gulls, terns, plovers, and sandpipers. Of these birds, the federally-endangered piping plover (*Charadrius melodus*), which is known to occur in the Superior Bay area, is a concern as it has specific habitat requirements. Beach dunes also provide habitat for small mammals and rodents that prefer open habitats as well as unique macroinvertebrate assemblages, such as tiger beetles (Cicindelinae).

1.17.7 Rare Threatened and Endangered Species

A search of the MNDNR Natural Heritage Information System (NHIS) database was performed to identify known occurrences of rare plant and animal species on and around the Airport. The most recent data available from the NHIS in 2020 identified nineteen (19) plant, animal, or ecological features. The species that were identified are summarized in **Table 1-19** below.

The Airport is not located within or immediately adjacent to mapped critical habitat for any federally listed species. Critical habitat is mapped by the U.S. Fish & Wildlife Service to identify habitat that is critical to the conservation of the species but does not necessarily reflect the distributional range of the species. Although the airport does not occur in mapped critical habitat, it does occur within the distributional range of the rusty-patched bumble bee and piping plover.

Table 1-19 – Rare Species and Ecological Features within One-Mile of DYT

Common Name	Scientific Name	Resource Type	Protection Status
Lake Sturgeon	*Acipenser fulvescens*	Fish	State-listed Special Concern
Beach Grass	*Ammophila breviligulata*	Plant	State-listed Threatened
Discoid Beggarticks	*Bidens discoidea*	Plant	State-listed Special Concern
Rusty-patched Bumble Bee	*Bombus affinis*	Insect	Federally-listed Endangered
Tailed Grapefern	*Botrychium acuminatum*	Plant	State-listed Special Concern
Narrow Triangle Moonwort	*Botrychium lanceolatum*	Plant	State-listed Threatened
Pale Moonwort	*Botrychium pallidum*	Plant	State-listed Special Concern
St. Lawrence Grapefern	*Botrychium rugulosum*	Plant	State-listed Special Concern
Least Moonwort	*Botrychium simplex*	Plant	State-listed Special Concern
Piping Plover	*Charadrius melodus*	Bird	Federally-listed Endangered State-listed Endangered
Hairy-necked Tiger Beetle	*Cicindela hirticollis* var. *rhodensis*	Insect	State-listed Endangered
Lake Chub	*Couesius plumbeus*	Fish	State-listed Special Concern
Slender Hair Grass	*Deschampsia flexuosa*	Plant	State-listed Threatened
Eastern Elliptio	*Elliptio complanate*	Mussel	State-listed Special Concern
Beach Heather	*Hudsonia tomentosa*	Plant	State-listed Threatened
Sand-loving Laccaria	*Laccaria trullisata*	Fungus	State-listed Special Concern
Tricolored Bat	*Perimyotis subflavus*	Bat	State-listed Special Concern
Common Tern	*Sterna hirundo*	Bird	State-listed Threatened
Lake and wetland deposition (quaternary)	N/A	Ecological Feature	N/A

Notes:
A species is considered federally endangered if the species is threatened with extinction throughout all or a significant portion of its range within the United States for species listed under the federal Endangered Species Act.
A species is considered endangered in Minnesota if the species is threatened with extinction throughout all or a significant portion of its range within the Minnesota for species listed under the Minnesota Endangered Species Statute.
A species is considered threatened in Minnesota if the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range within Minnesota for species listed under the Minnesota Endangered Species Statute.
A species is considered a species of special concern in Minnesota if the species is extremely uncommon in Minnesota or has unique or highly specific habitat requirements and deserves careful monitoring of its status. Species on the periphery of their range that are nor listed as threatened may be included in this category along with those species that were once threatened or endangered but now have increasing or protected, stable populations; for species listed under the Minnesota Endangered Species Statue.
N/A or Not Applicable is assigned to ecological features that do not have scientific names or have state or federal protection status.

1.17.8 Hazardous Materials, Pollution Prevention and Solid Waste

A review of the Minnesota Pollution Control Agency (MPCA) *What's in My Neighborhood* mapping resource was completed on October 29th, 2020 to obtain information regarding hazardous waste or any hazardous material related impacts near the Airport (**Figure 1-14**). One (1) active Hazardous Waste Generator Numbers issued for companies or individuals operating out of the Airport were identified: Abateco Inc. – MND985756923. Additionally, active Industrial Stormwater (MNR0539NL), Aboveground Tanks (TS0005146), and Underground Tanks (TS0005146) were identified at the Airport.

Solid wastes and hazardous materials/wastes are generated and stored at the Airport. Standard policies are employed at the Airport to minimize the potential for contamination. The aboveground tank and fuel system are subject to routine monitoring and reporting including daily, monthly, and quarterly inspections. Required Spill Prevention Control and Countermeasure (SPCC) plan inspections are also conducted and inspections and fuel safety activities are recorded as required. Solid waste from the Airport owned facilities is collected by Waste Management. Private hangars contract for solid waste collection through private waste collection companies. All solid waste collected by licensed haulers in the City of Duluth area is transported to the solid waste transfer station operated by the Western Lake Superior Sanitary District (WLSSD). Waste delivered to the WLSSD is then transported to the Moccasin Mike Landfill in Superior, Wisconsin, a facility licensed by the Wisconsin Department of Natural Resources. Recyclable materials are not picked up from DAA owned facilities at the Airport.

Several private tenants contract recycling collection services including plastic, metal, glass, and cardboard through their waste hauler. Airport users can dispose of recyclable materials not handled by their waste hauler at the WLSSD Materials Recovery Center. Duluth-Sky Harbor Airport collects and recycles used maintenance fluids, including engine and hydraulic oil, at the Duluth International Airport.

1.17.8.1 City and County Solid Waste Management Plan

St. Louis County Environmental Services plans and manages the waste streams within St. Louis County except for Duluth and surrounding townships. Western Lake Superior Sanitary District (WLSSD) has been established to specifically plan and manage waste streams in Duluth and its surrounding townships including recycling, licensure, and the transportation and end processing of waste. WLSSD's Solid Waste Ordinance is applied to Duluth and its surrounding townships to provide for safe, legal, and proper management of solid waste materials.

WLSSD completed its current Solid Waste Management Plan in 2013. As described in the Plan, waste is managed through several programs including the following facilities: Transfer Station, Household Hazardous Waste Facility, Yard Waste Compost Site, Organics Composting Facility and Materials Recovery Center. Curbside recycling is provided in Duluth, Proctor, and Hermantown. The recycling drop box locations accept mixed paper including newsprint, paper, cardboard, magazines, phone books; the bins also accept commingled recyclables including metal, food and beverage glass, and all types of recyclable plastic containers.

WLSSD operates a household hazardous waste facility that accepts household hazardous waste (HHW) as well as a Clean Shop, hazardous waste collection program for Very Small Quantity Generators. HHW collected generally includes paint, pesticides, cleaning, batteries, light bulbs, and motor vehicle fluids/filters. HHW collection services for most items are provided free of charge. Problem materials (waste that is recyclable or banned from land disposal including tires,

electronics, and appliances) are generally accepted at the WLSSD Materials Recovery Center. Local businesses may also provide recycling or disposal services for motor vehicle fluids/filters, tires, electronics, and appliances.

1.17.9 Historical, Archeological, Architectural and Cultural Resources

The National Historic Preservation Act (NHPA) of 1966, as amended, established the Advisory Council on Historic Preservation (ACHP) and the National Register of Historic Places (NRHP). Section 106 of the NHPA requires consideration of the effects of undertaking on properties on or eligible for inclusion in the NRHP. Compliance with Section 106 requires consultation with the State Historic Preservation Officer (SHPO) if there is potential adverse effect to historic properties on or eligible for listing on the NRHP.

There are two structures on Minnesota Point that are listed on the NRHP, the Minnesota Point Lighthouse and the U.S.S. Essex Shipwreck. These sites are located approximately 1.0 miles and approximately 0.6 miles, respective from the existing Runway 32 end. The Pine Knot Cabin, a recreational cabin, once stood within the southernmost parcel of the Minnesota Pine Forest SNA but was removed by the MNDNR in November and December 2010.

As of October 29th, 2020, none of the existing structures on airport property are over 50 years old. The oldest hangars (Hangars 2, 3, and 4) were constructed in 1969 and the terminal building was constructed in the 1970s.

A Phase I archeological survey within and around the Airport was conducted by Duluth Archaeology in 2009. The survey identified six possible cabin locations. No indication of Native American sites or burials were observed. Monitoring of future ground disturbing activities was recommended for unrecorded archaeological sites or burials.

1.17.10 Noise

FAA Orders 1050.1E and 5050.4B as well as FAA 14 CFR Part 150 provide the guidance for determining airport noise impacts. Noise is measured by the Day-Night Sound Level (DNL). It is the logarithmic average of sound levels in decibels and is based on a 24-hour Equivalent Sound Level (Leq). DNL values incorporate a 10-decibel penalty for noise events occurring between 10:00 PM and 7:00 AM to account for increased noise sensitivity at night. The FAA considers a noise impact would be significant if an action would cause noise sensitive areas to experience an increase in Noise of DNL 1.5 dB or more at or above DNL 65 dB noise exposure when compared to the no action alternative for the same timeframe. Sensitive areas include residential, school, hospital, day care, and retirement home uses.

The DNL measurement was developed under the direction of the EPA to measure the cumulative impact of multiple noise events in an average day. The U.S. Departments of Housing and Urban Development, Transportation, and Defense recognize it as a proper basis for land use planning around airports. The recognized tool used to predict anticipated DNL coverage for an airport is the Aviation Environmental Design Tool (AEDT) developed by the FAA. The AEDT is the FAA approved noise and emission modeling program that simulates aircraft activity at an airport and provides a prediction of aircraft-related noise and emissions levels.

In accordance with the guidelines set forth in FAA Order 5050.4B, Chapter 5, Paragraph 47e, Section (1), a noise analysis is not required for proposed development options at airports where existing or forecast operation levels do not exceed 90,000 annual propeller operations or 700

annual jet operations. These numbers of propeller or jet aircraft operations result in cumulative noise levels not exceeding 60 Day/Night Level (DNL) more than 5,500 feet from start of takeoff roll or 65 DNL on the runway itself. Therefore, impacts in excess of these noise levels would not be expected outside of the Airport property limits. The operations levels at DYT are below these thresholds. No jets operations are conducted at the Airport.

1.17.11 Water Quality

The Airport is located in the South St. Louis Soil and Water Conservation District. The Airport is located near Lake Superior, Superior Bay (16-1P), and the St. Louis River, all of which are listed as Public Waters by the MNDNR Public Waters Inventory. These waters contain a variety of aquatic habitats that support a diverse assemblage of aquatic species further described in **Section 1.17.6** above.

The sand bar making up Minnesota Point (on which the Airport is located) is bounded by Lake Superior on the north Superior Bay on the south. Lake Superior is the largest of the Great Lakes and the largest surface area of any freshwater lake in the world. Superior Bay is the narrow inlet of western Lake Superior. The bay is seven miles long and ½-to-one-mile wide, separated and sheltered from Lake Superior by Minnesota Point. Receiving the St. Louis River, the bay forms part of one of the most important harbors on the Great Lakes.

Lake Superior is an impaired lake under two categories as established by MPCA: Mercury in Fish Tissue and polychlorinated biphenyl (PCB) in Fish Tissue. Impaired waters are those waters that do not meet state water quality standards as defined Section 303(d) of the Federal Clean Water Act. Lake Superior is also classified by the MPCA as a “Special Water.”

St. Louis Bay of the St. Louis River is also listed as an “Impaired Water” by the MPCA. The waterbody is impaired for non-construction related parameters including: Dieldrin, Dioxin, DDT, Mercury in Fish Tissue, Mercury in Water Column, PCB in Fish Tissue, PCB in Water Column, and Toxaphene.

Typical pollutants carried in airport runoff could include spilled fuel and oil, deposits from rubber tires and accidentally discharged chemicals. At the Duluth-Sky Harbor Airport, fuel is dispensed to aircraft located on the apron and aircraft located at the dock through the same fueling system. Sky Harbor has a self-service fuel system located southwest of the A/D building. The fueling system consists of three fuel tanks: one 3,000-gallon aboveground tank containing Aviation Gas (AvGas, 100LL), one 265-gallon aboveground tanks containing Diesel Gasoline, and one 275-gallon tank using for heating oil to heat the terminal building. The AvGas tank was installed in 2008 and the Diesel tank was installed in 1996. The City owns the fuel tank and manages the fueling operations.

The Airport has a NPDES Industrial Stormwater Permit and corresponding SWPPP which requires the Airport to monitor and manage stormwater runoff from the industrial activity areas. Stormwater runoff from the Airport in existing conditions is collected in vegetated swales. Most if not all of the runoff is then infiltrated though the site’s sandy soils. This nearly eliminates direct surface runoff leaving the Airport and entering the surrounding surface waters. In the rare instances where runoff may leave the site during large rain events, runoff is directed to the north and south through culverts before entering Superior Bay. There are no currently used drinking water intakes in the vicinity of the Airport that would be affected by runoff from the Airport.

The Airport is served by a City of Duluth water line. The Airport does not use groundwater for consumption.

1.17.12 Water Resources

Wetlands are defined in federal Executive Order 11990 as: “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.”

Wetlands are subject to regulation under Sections 401 and 404 of the federal Clean Water Act as regulated by the USACE, the Minnesota Wetland Conservation Act of 1991 (WCA). MPCA under Minnesota Rules 7050, and MNDNR Public Waters rules. Actions that are implemented by a federal agency are also subject to Executive Order 11990 mandating that federal agencies through their actions, implement “no net loss” of wetlands. The National Wetlands Inventory (NWI) Map (**Figure 1-15**) shows a small freshwater forested/shrub wetland just SE of the runway. The Airport is located near Lake Superior, Superior Bay (16-1P), and the St. Louis River, all of which are listed as Public Waters by the MNDNR Public Waters Inventory.

1.17.13 Environmental Awareness

A water quality task force was created by the Minnesota Seaplane Pilots Association (MSPA) to increase environmental awareness of seaplane pilots. MSPA does this through education on the invasive species and proactive contact with local and state authorities on water quality issues. This education also includes having invasive species on the premises of seaplane bases.

MSPA recommends members and seaplane pilots to be informed of water quality and invasive aquatic species and to take a proactive approach within the community to minimize non-native and invasive plant species.

1.18 Sustainability

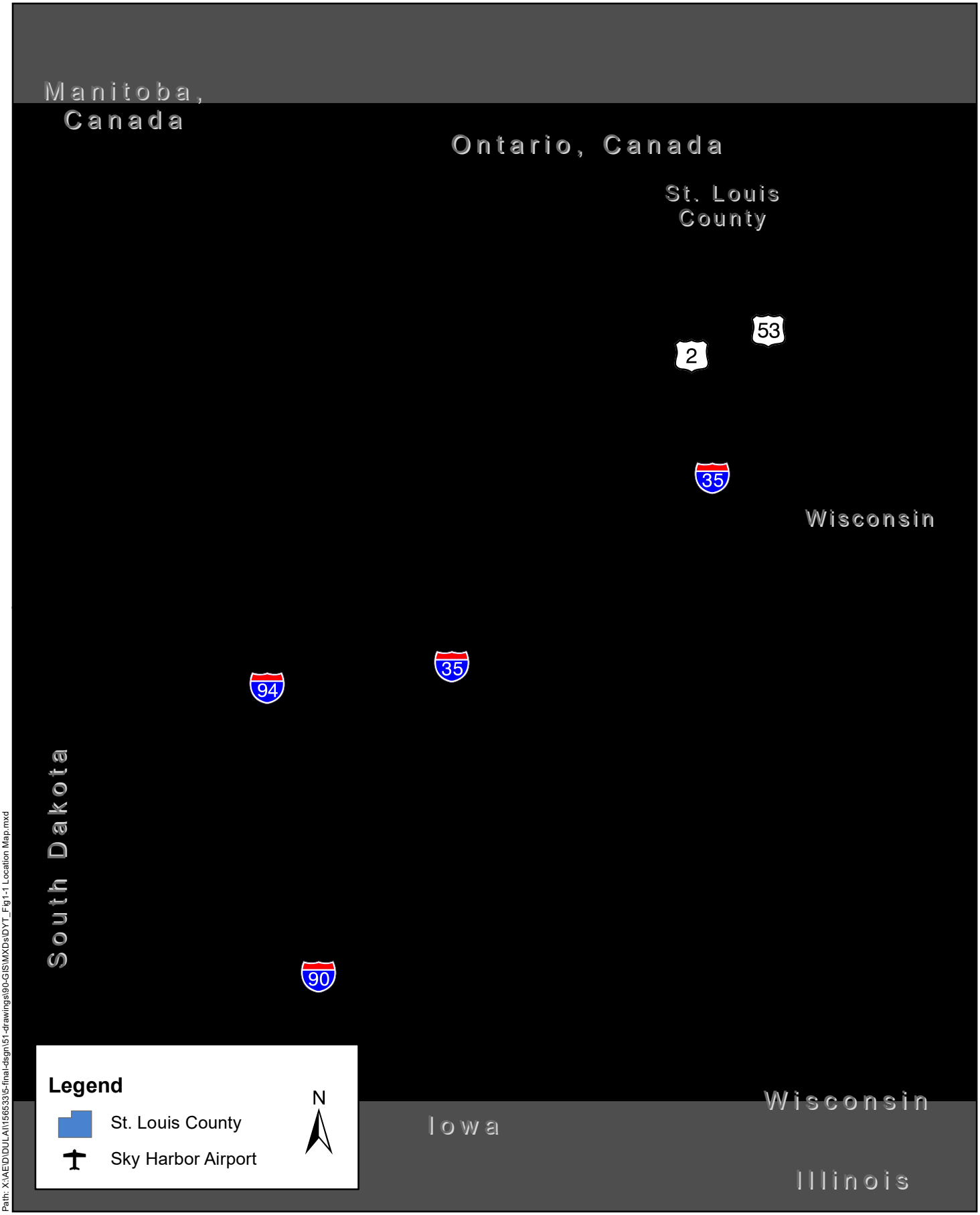
Sky Harbor Airport does not currently have a sustainability plan. Sustainability recommendations are included in **Chapter 4, Environmental and Sustainability Recommendations.**

Airport Master Plan

Figure 1-1

Sky Harbor Airport
Duluth, Minnesota

Location Map
08/2020; DULAI 156533



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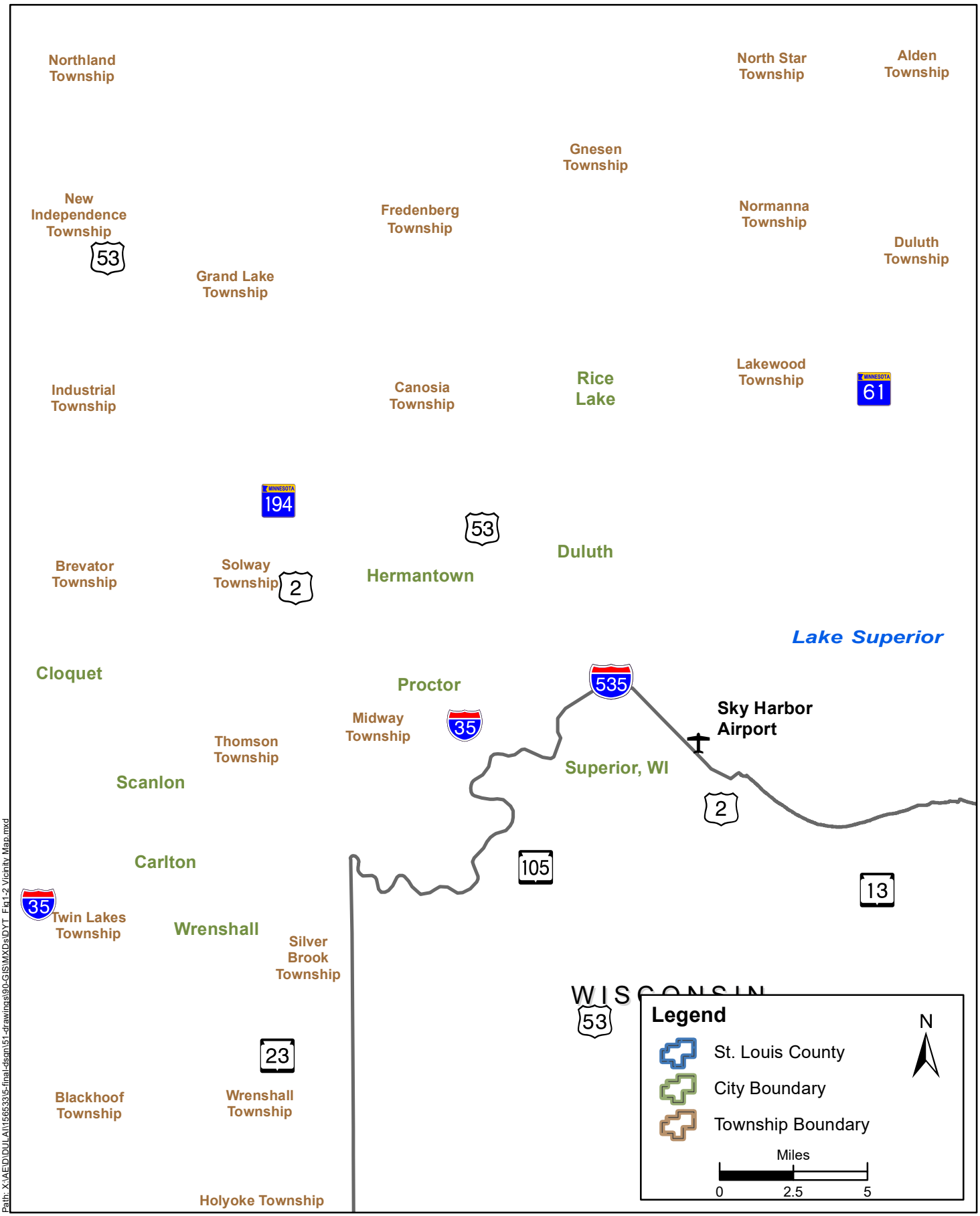
Airport Master Plan

Figure 1-2

Sky Harbor Airport
Duluth, Minnesota

Vicinity Map
08/2020; DULAI 156533



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X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\Master Plan\DYT_Figure 1-3 Existing Facilities.dwg

Sky Harbor Airport
Duluth, Minnesota

Pavement Condition Index
11/2020; DULAI 156533

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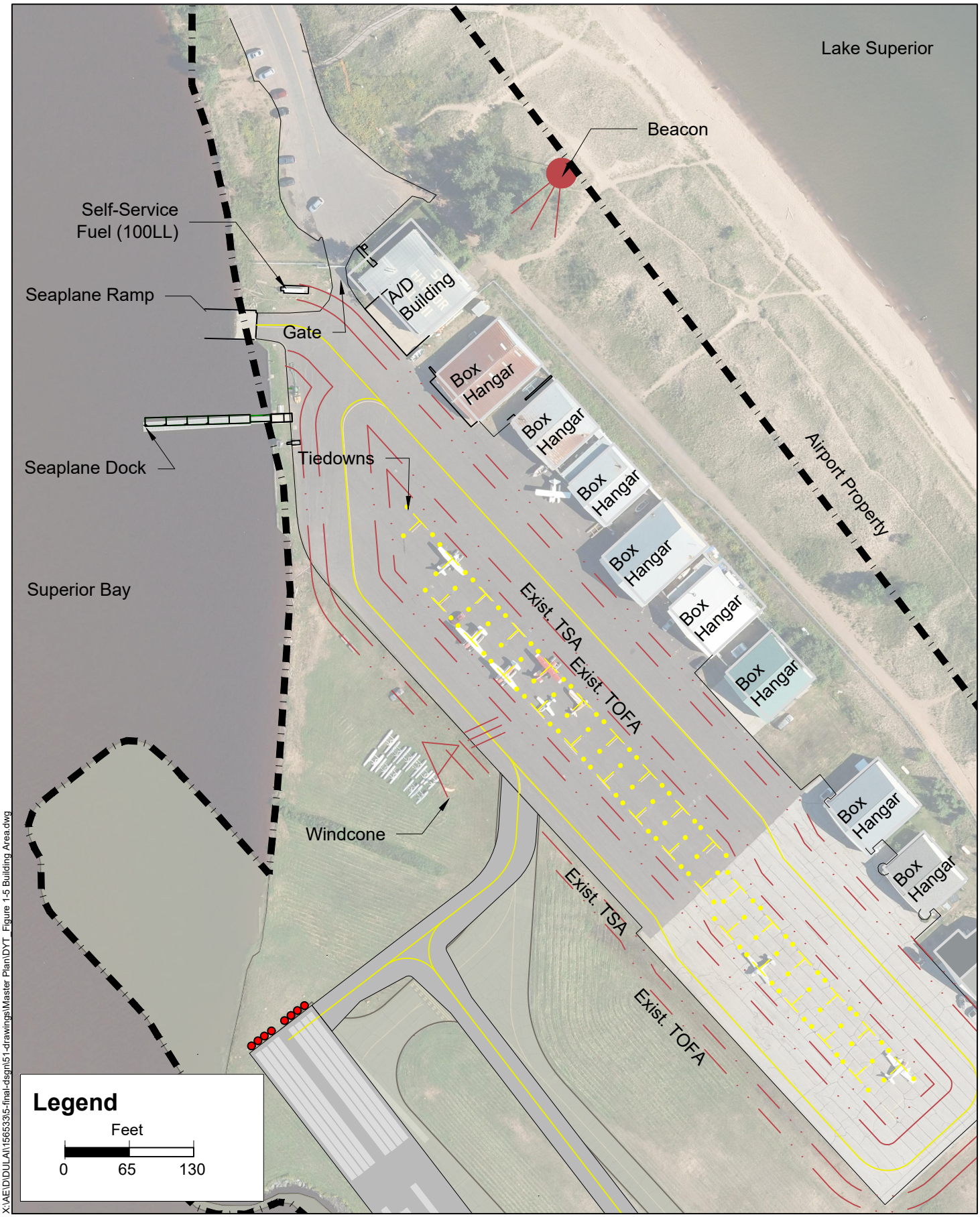


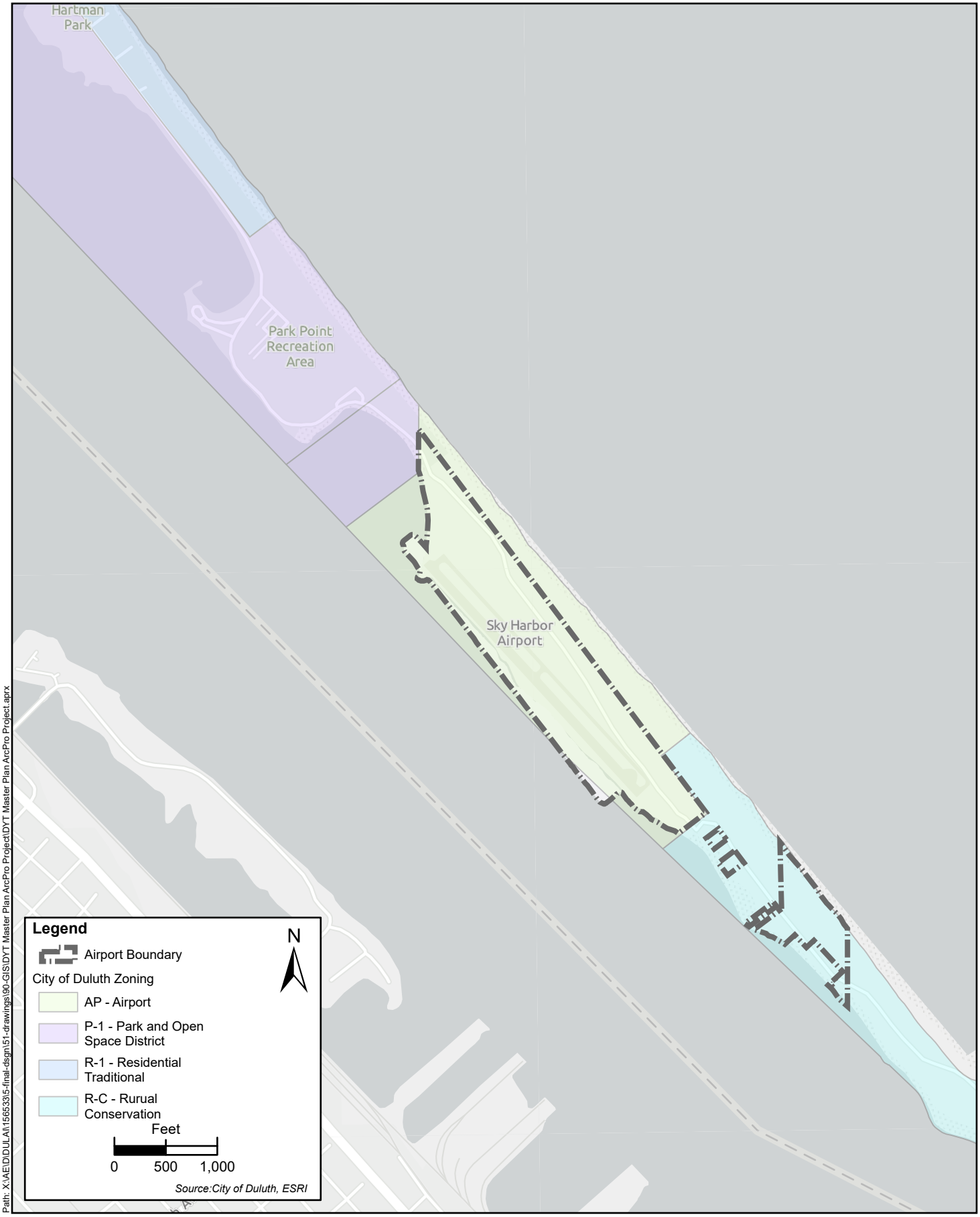
X:\AE\D\DULAI\1565335-final-dsgn\51-drawings\Master Plan\DYT_Figure 1-5 Building Area.dwg

Airport Master Plan

Figure 1-6

Sky Harbor Airport
Duluth, Minnesota

City of Duluth Zoning
11/2020; DULAI 156533



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Building Area Planning Study

Figure 1-7

Sky Harbor Regional Airport
Duluth, Minnesota

Environmental Setback Requirements
06/2021; DULAI 156533

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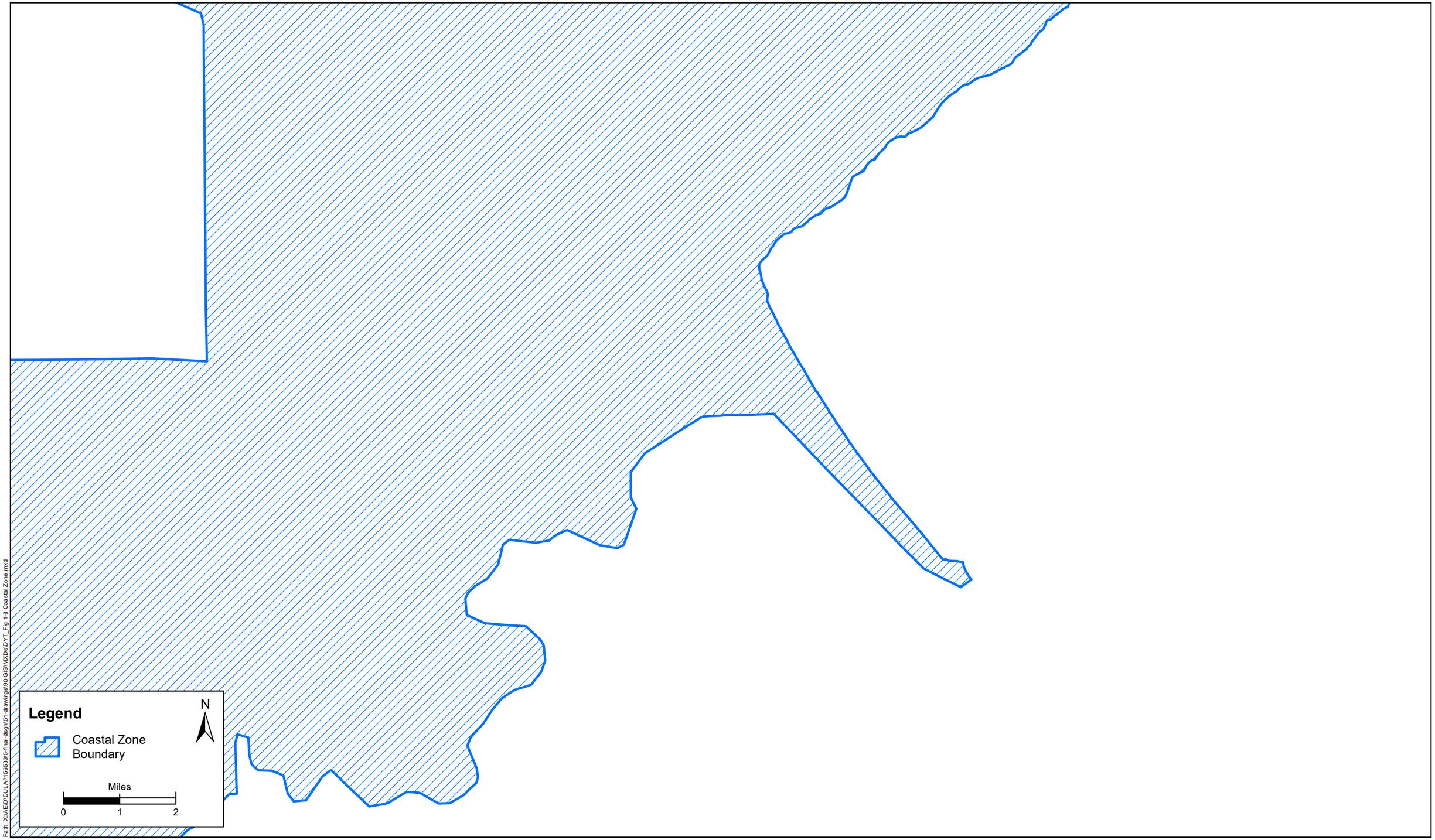

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Southworth Marsh Wildlife Refuge

Hartman Park

Park Point

Park Point Recreation Area

Minnesota Point

U.S.S. Essex Shipwreck

Point Zero Light House

Legend

N

Airport Boundary

Placenames

Minnesota Point Pine Forest Scientific and Natural Area (SNA)

St Louis Co. Parcel Ownership

Federal

Municipal

Private

State

Tax Forfeit

Feet

0 1,000 2,000

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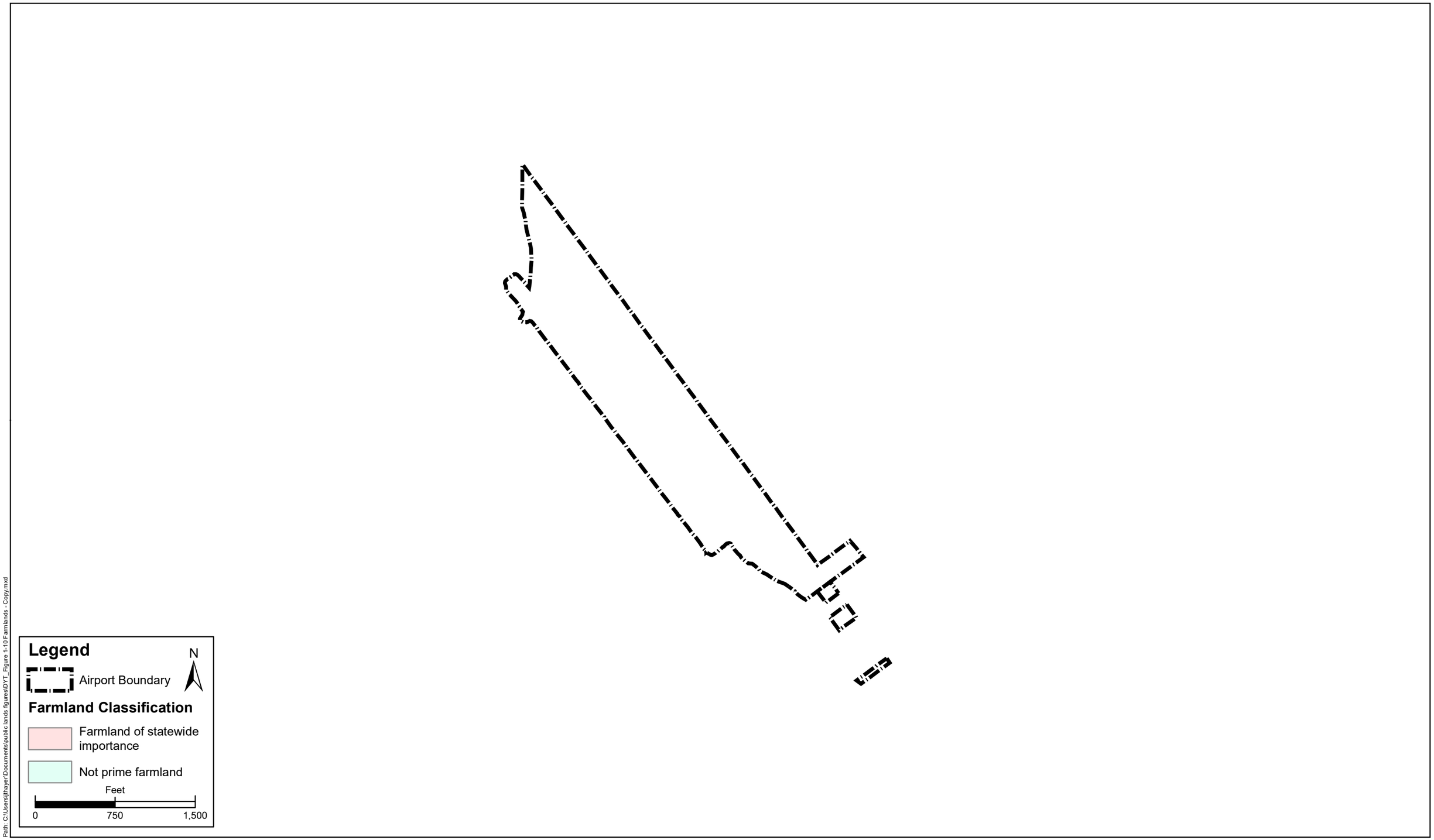
Legend
N
Airport Boundary
Farmland Classification
Farmland of statewide importance
Not prime farmland
Feet
0
750
1,500
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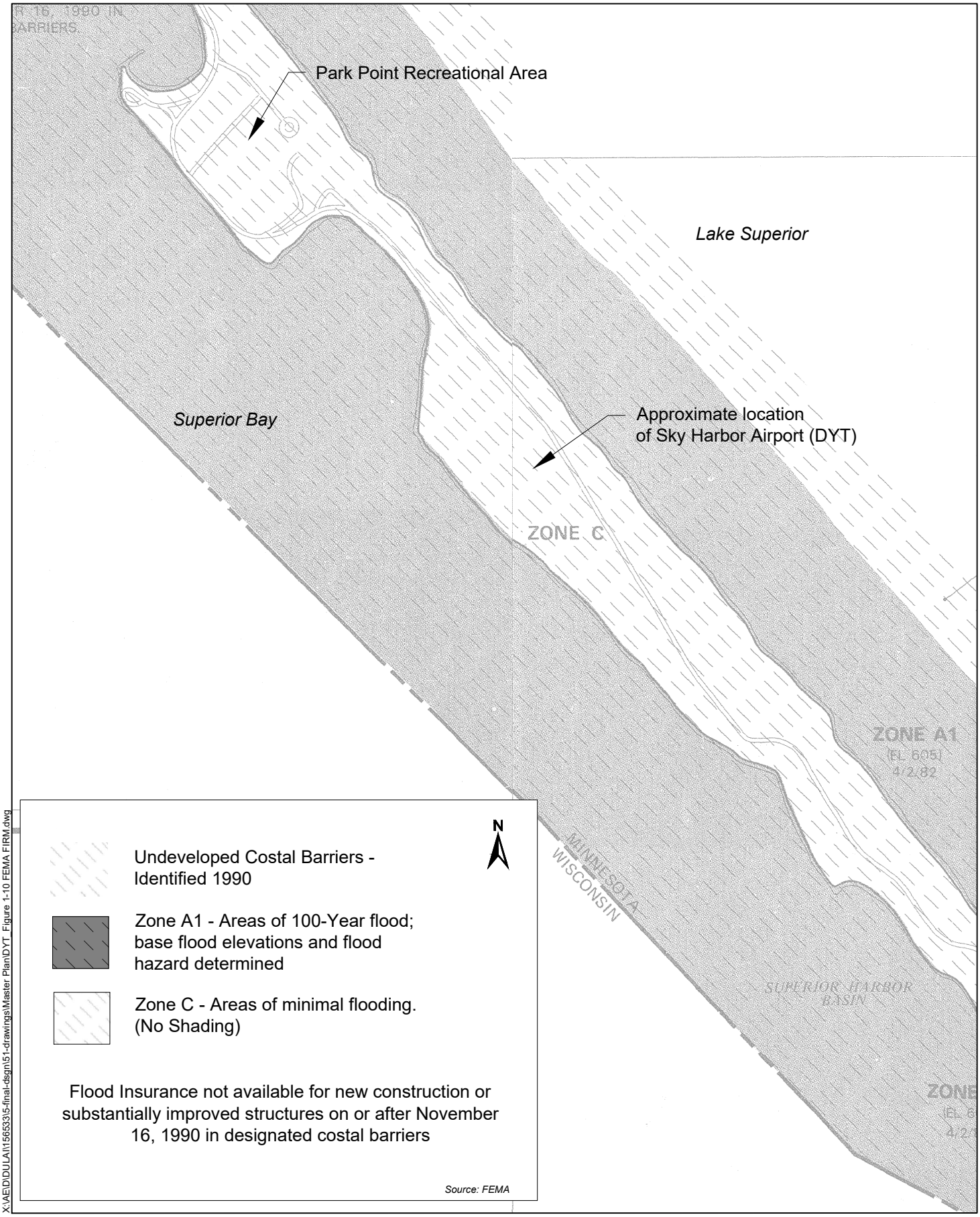

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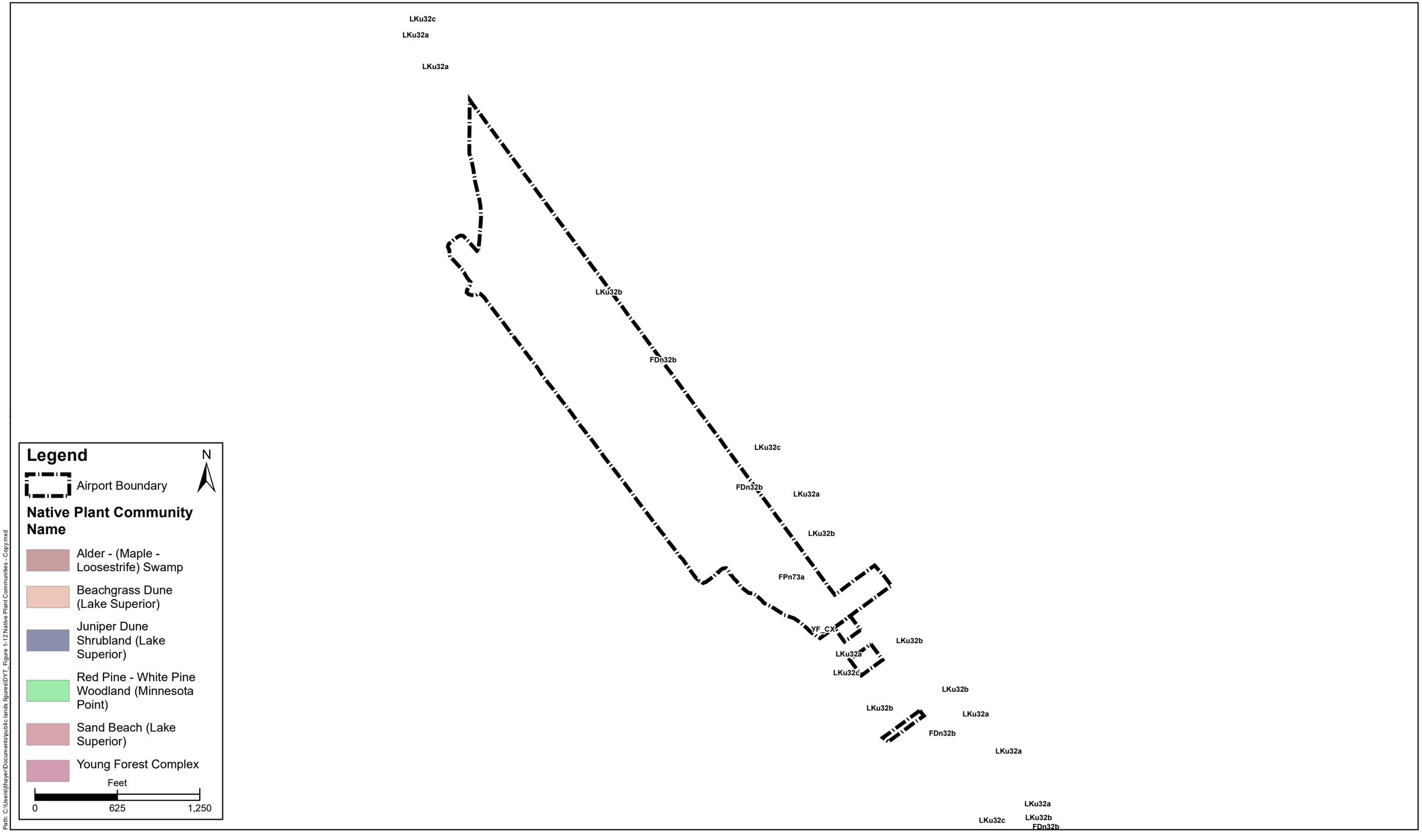
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LKu32b
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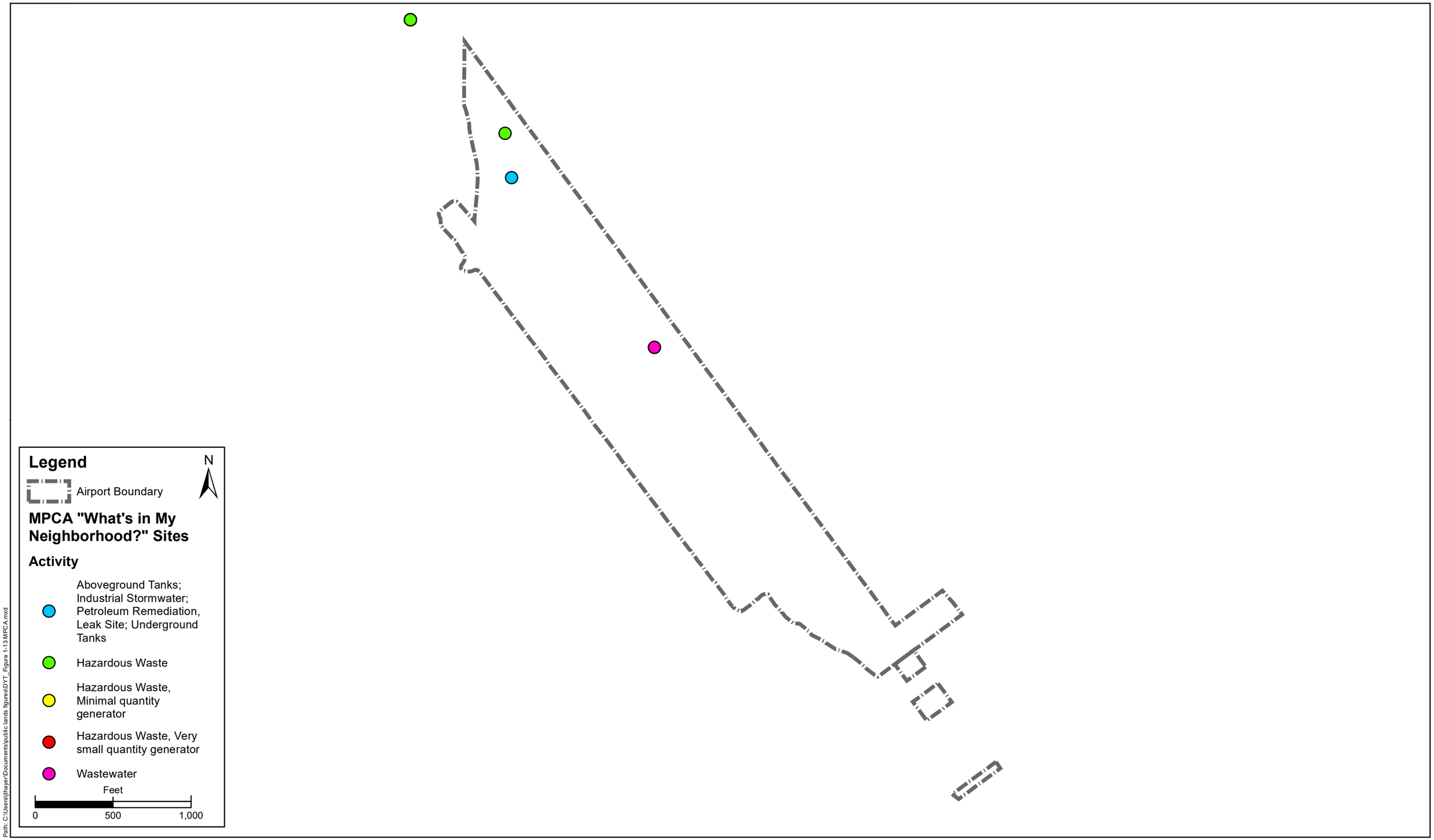
LKu32c
LKu32b
LKu32b
LKu32a
FDn32b
LKu32a
LKu32a
LKu32c
LKu32b
FDn32b
Legend
N
Airport Boundary
Native Plant Community Name
Alder - (Maple - Loosestrife) Swamp
Beachgrass Dune (Lake Superior)
Juniper Dune Shrubland (Lake Superior)
Red Pine - White Pine Woodland (Minnesota Point)
Sand Beach (Lake Superior)
Young Forest Complex
Feet
0
625
1,250
Path: C:\Users\jthayer\Documents\public lands figures\DYT_Figure 1-12 Native Plant Communities - Copy.mxd


Legend
N
Airport Boundary
MPCA "What's in My Neighborhood?" Sites
Activity
Aboveground Tanks; Industrial Stormwater; Petroleum Remediation, Leak Site; Underground Tanks
Hazardous Waste
Hazardous Waste, Minimal quantity generator
Hazardous Waste, Very small quantity generator
Wastewater
Feet
0
500
1,000
Path: C:\Users\jthayer\Documents\public lands figures\DYT_Figure 1-13 MPCA.mxd


PEM1A
L1UBH
PSS1/EM1A
Legend
Airport Boundary
Wetland Type
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Lake
Riverine
N
Feet
0
500
1,000
Path: C:\Users\jthayer\Documents\public lands figures\DYT_Figure 1-14 NWI.mxd

2 Aviation Activity Forecasts

The objective of the activity forecasts chapter is to provide forecasts of aviation activity and input for the assessment of the facility requirements and the evaluation of future development alternatives at Sky Harbor Airport (DYT). It also provides information needed to assess the type and timing of new facilities and aid in the evaluation of potential impacts of improvements on the Airport and its surroundings.

The forecasts are for a 20-year planning period and comprise of short-term (5 year), mid-term (10 year), and long-term (20 year) increments. The forecasts are broken down into annual aircraft operations, itinerant and local operations, aircraft fleet mix, based aircraft, and identification of the most demanding (critical) aircraft. The forecast of aviation activity includes an analysis of existing national and state general aviation activity forecasts, the development of an airport service area, a tabulation of the Airport User Survey data, and the determination of current aviation activity at DYT. Using the estimation of current airport activity and reasonable forecasting methodologies, future projections are made based upon established growth rates, area demographics, industry trends, stakeholder input, and consultant experience.

This forecast was prepared at the same time as the evolving impacts of the COVID-19 public health emergency. Forecast approval is based on the methodology, data, and conclusions at the time the document was prepared. However, consideration of the impacts of the COVID-19 public health emergency on aviation activity is warranted to acknowledge the reduced confidence in growth projections using currently available data.

Accordingly, FAA approval of this forecast does not constitute justification for future projects. Justification for future projects will be made based on activity levels at the time the project is requested for development. Documentation of actual activity levels meeting planning activity levels will be necessary to justify AIP funding for eligible projects.

This forecast approval is subject to the caveats identified above being inserted as a disclaimer at the beginning of the forecast document and applicable master plan chapters. While forecasting is important to determine demand, it is only an estimate of possible future activity. Various unforeseen factors can affect the forecast, positively and negatively. Therefore, activity forecasts should be revisited periodically.

2.1 Forecasting Aviation Metrics

The forecasting metrics used for a general aviation airport consist of the number of based aircraft and aircraft operations. The baseline year used for forecasting both based aircraft and aircraft operations is 2019, as a full year of data is required. The forecasts were produced for a 20-year period, 2020 through 2040.

In January of 2020, a Public Health Emergency was declared by the Department of Health and Human Service due to COVID-19. COVID-19 was declared a global pandemic by the World Health Organization (WHO) in March of 2020. Several public outreach methods were used to establish the forecast, which included feedback with based aircraft owners as well as transient users of the airport. They were encouraged to estimate their pre-pandemic activity levels. With 2019 as a base year, the forecast assumes that growth continued through 2020.

2.1.1 Based Aircraft

Based aircraft are aircraft that reside at an airport. Based aircraft forecasts assist in identifying the amount and type of hangars and aircraft parking apron space needed at an airport.

The FAA requires non-primary National Plan of Integrated Airport Systems (NPIAS) airports, such as DYT, to enter the aircraft that are based at their facilities into the National Based Aircraft Inventory website (www.basedaircraft.com). As a result, the FAA requires the National Based Aircraft Inventory website to be used as the official list for based aircraft for master planning purposes. Currently, the National Based Aircraft Inventory indicates there are 22 aircraft based at DYT (20 single-engine and two multi-engine).

The 2019 based aircraft baseline used for forecasting utilizes the 22 "Validated Aircraft" (20 single-engine and two multi-engine) from the FAA's National Based Aircraft Inventory[11]. **Table 2-1** summarizes various sources of based aircraft data.

Table 2-1 – Summary of Based Aircraft

Source	Based Aircraft				
	Single-Engine	Multi-Engine	Jet	Other	Total
National Based Aircraft Inventory	20	2	0	0	22
FAA Form 5010	22	2	0	0	24
FAA Terminal Area Forecasts (TAF)	23	3	0	0	26
MnDOT Aeronautics	-	-	-	-	20
Minnesota State Aviation System Plan (Forecast Year 2020)	31	3	0	0	34

Source: FAA Form 5010 (November 2020), TAF (2020), MnDOT Aeronautics Based Aircraft Records, MN SASP (2012), BasedAircraft.com (3/1/2021).

2.1.2 Aircraft Operations

An aircraft operation is a takeoff or a landing at an airport. Thus, an airplane flying to an airport performs one operation when landing and another operation when departing. Aircraft operation forecasts are the most important activity metric for airfield planning because they help determine the level, capacity, and type of aviation activity for an airport.

Since DYT is a non-controlled airport, meaning that it does not have a traffic control tower, it is more difficult to obtain the exact number of operations that occur. Estimates are based on several sources including existing historical data, the Airport User Surveys, user and stakeholder input, and existing forecasts prepared by State and Federal agencies. **Table 2-2** shows the aircraft operations at DYT in 2019 per the various available sources.

[11] BasedAircraft.com; March 1, 2021.

Table 2-2 – Summary of 2019 Aircraft Operations

Source	2019 Aircraft Operations
FAA Form 5010	13,900
FAA Terminal Area Forecasts (TAF)	13,900
Minnesota State Aviation System Plan (Forecast Year 2020)	14,320
Notes: MnDOT Aeronautics does not collect aircraft operations data. Airport management does not track or maintain records of aircraft operations.	

Source: FAA Form 5010 (November 2020), TAF (2020), MN SASP (2012) Mid-term forecast

Based on feedback from DYT tenants, airport stakeholders, transient pilots and airport business, it was determined that the operations counts presented in **Table 2-2** do not accurately reflect the activity at DYT.

The master plan baseline for aircraft operations was determined by data and feedback provided by Sky Harbor Airport tenants, airport stakeholders and airport staff, as well as analysis of FAA's Traffic Flow Management System Counts (TFMSC) and airport user survey data (**Section 1.11**). During a stakeholder meeting in October of 2020 airport tenants provided and advisory committee members estimated peak airport operations on a summer day and a winter day.

In addition, to help determine actual activity levels at DYT, the Airport User Survey (**Section 1.11**) asked users questions to estimate the number of annual operations they complete at DYT. Of the nine based aircraft users who responded to this section of the survey, they reported an average of 203 annual operations per based aircraft. Additionally, 54 transient users responded to this section of the survey, reporting a total of 626 annual operations, or an average of 12 operations per responding transient aircraft.

Based on this information, the 2019 baseline of 11,740 aircraft operations will be used in the Master Plan for forecasting purposes. The summary of seasonal and annual operations is summarized in **Table 2-3.**

Table 2-3 – Summary of Stakeholder Input on 2019 Operations

Stakeholder Input	2019 Aircraft Operations
Summer Months (Estimated Operations, May-October)	7,533
Winter Months (Estimated Operations, November-April)	2,788
Yearly Airport Business Related Operations[1]	1,419
Total	**11,740**
Notes: [1]Estimated business-related operations were provided by Beaver Air Tours and Lake Country Air	

Source: SEH, Airport Tenants

2.1.3 Runway and Sealane Usage

Respondents of the user survey were also asked to estimate total land operations compared to floatplane operations. Responses indicated that approximately 53.2% of all operations occurred on the runway compared to 46.8% of operations occurring in the water and utilizing the seaplane base facilities. This mix of operations was also echoed during multiple stakeholder outreach efforts and feedback from airport staff and frequent visitors to the airport.

2.2 Demographic and Economic Factors

Demographic and economic factors, such as population, disposable income, and geographic attributes, influence aviation demand. Given that there is a causal relationship, aviation demand is largely a function of demographic and economic activity. Socioeconomic data was considered in the preparation of the aviation activity forecasts. For this Master Plan, data was collected from Woods & Poole Economics. Woods & Poole is an independent firm that specializes in long-term economic and demographic projections through 2050 for every county in the United States, using more than 900 variables.

DYT is located within St. Louis County and within the Duluth, MN-WI Metropolitan Statistical Area (MSA)[12] which includes St. Louis and Carlton counties in Minnesota and Douglas County in Wisconsin. **Table 2-4** shows Woods & Poole's projected growth of St. Louis County and the Duluth-Superior MSA demographic and economic activity. Woods & Poole forecasts an increase in population (0.0153%) in St. Louis County, but a faster increase in population (0.024%) for the Duluth, MN-WI MSA. The State of Minnesota shows an increase in population (0.527%) for the same period. Additionally, Woods & Poole forecast growth in employment and personal income for both St. Louis County and the Duluth, MN-WI MSA.

Table 2-4 – Woods & Poole Demographic and Economic Forecasts

Year	St. Louis County			Duluth, MN-WI Metropolitan Statistical Area (MSA)		
	Population (in 1,000s)	Employment (in 1,000s)	Income (in millions of 2012 dollars)	Population (in 1,000s)	Employment (in 1,000s)	Income (in millions of 2012 dollars)
2020	200.188	128.423	9,278.32	290.048	175.231	13,053.62
2025	201.084	132.947	10,128.52	291.293	181.128	14,240.87
2030	201.488	136.825	10,996.2	291.942	186.05	15,451.49
2035	201.27	140.229	11,871.7	291.836	190.326	16,675.48
2040	200.581	142.652	12,570.57	291.125	193.347	17,900.27
CAGR	**0.004%**	**0.573%**	**1.621%**	**0.014%**	**0.511%**	**1.591%**

Source: Woods & Poole Economics 2020

[12] An MSA consists of one or more counties that contain a city of 50,000 or more inhabitants or contain a Census Bureau-defined urbanized area (UA) and have a total population of at least 100,000. Counties containing the principal concentration of population, the largest city, and surrounding densely settled area are components of the MSA.

2.3 Airport Service Area

In determining the airport's general aviation service area, it is assumed that airport users choose to base their aircraft or use airports that are closest to their residence or business and provides the level of services required by their needs. An additional determining factor in this decision is the length of the paved runway that is required by the type of aircraft being operated.

Current FAA planning guidelines for selecting an airport site indicate that a NPIAS airport should be located 30 minutes or more average ground travel time from the nearest existing or proposed NPIAS airport. This is a valid assumption since the main advantage of flying is in the savings in long-distance travel time. Service area boundaries for the Airport were constructed for three separate cases, 30-minute, 60-minute and 90-minute drive time service areas.

Drive time service areas for the Airport were determined by travel along established thoroughfares. In this case, travel was assumed along the most direct route and at published speed limits. The drive time service areas are shown in **Figure 2-1**.

2.4 FAA Aerospace Forecast Fiscal Years 2019-2039

The FAA prepares the "FAA Aerospace Forecasts", a national aviation forecast, annually. This forecast attempts to project commercial and general aviation activity levels for the FAA to determine the funding needs for various sections of the FAA, such as Air Traffic Control and Airspace. The current forecast document is for the federal fiscal years 2019-2039.

The active general aviation fleet is projected to remain stable, with the number of general aviation hours flown projected to increase by 0.8% annually through 2039. The more expensive and sophisticated turbine-power aircraft are projected to grow by an average of 2.0% annually, with jet aircraft expecting to account for much of the increase at an average annual rate of 2.2%. Lastly, the number of active general aviation pilots, excluding Air Transport Pilots (ATP), is projected to decrease by 0.2% annually by 2039, with the ATP category forecasted to increase annually by 0.7%.[13]

2.5 FAA Terminal Area Forecast

Annually, the FAA publishes the *FAA Terminal Aerospace Forecasts* (TAF). The TAF includes past data as well as forecasts of based aircraft and operations for all airports in the National Plan of Integrated Airport System (NPIAS). The FAA normally uses a conservative approach when forecasting general aviation airports similar to DYT, especially when no site-specific data is available. **Table 2-5** shows the TAF's forecasted number of based aircraft and aircraft operations for DYT. The FAA forecasts no growth in both the number of based aircraft and aircraft operations for DYT within the 20-year planning period (2020-2040). The 0% growth is typical for general aviation airports in the TAF for which there is no site-specific data to indicate a different growth rate.

[13] FAA Aerospace Forecasts Fiscal Year 2019-2039.
https://www.faa.gov/data_research/aviation/aerospace_forecasts/

Table 2-5 – FAA TAF for DYT

	2020	2025	2030	2035	2040
Airport Operations					
Itinerant Operations					
Air Taxi & Commuter	800	800	800	800	800
GA	2,100	2,100	2,100	2,100	2,100
Military	0	0	0	0	0
Total Itinerant	**2,900**	**2,900**	**2,900**	**2,900**	**2,900**
GA	11,000	11,000	11,000	11,000	11,000
Military	0	0	0	0	0
Total Local	**11,000**	**11,000**	**11,000**	**11,000**	**11,000**
TOTAL Operations	**13,900**	**13,900**	**13,900**	**13,900**	**13,900**
Based Aircraft					
TOTAL Based Aircraft	**26**	**26**	**26**	**26**	**26**

Source: FAA Terminal Area Forecast (TAF) for Duluth Sky Harbor Airport

2.6 Minnesota State Aviation System Plan (SASP)

The 2012 Minnesota State Aviation System Plan (SASP), adopted in 2013, provides a description and assessment of the performance of the current Minnesota State Aviation System, which consists of 133 state-funded airports, as well as guidance for the future development of aviation in Minnesota. As part of the SASP, aviation activity forecasts prepared for DYT estimates that from 2010 to 2030 aircraft operations will grow at a CAGR of 1.06%, and based aircraft will grow by 0.45% annually as shown in **Table 2-6**.

Table 2-6 – MN SASP Forecast for DYT

	2010	2015	2020	2030
Operations				
Local	10,981	11,111	11,313	13,457
Itinerant	2,919	2,954	3,007	3,602
Total Operations	**13,900**	**14,065**	**14,320**	**17,149**
Based Aircraft				
Single-Engine	29	30	31	32
Multi-Engine	3	3	3	3
Other	-	-	-	-
Total Based Aircraft	**32**	**33**	**34**	**35**

Source: 2012 MnDOT SASP for Duluth – Sky Harbor Airport and Seaplane Base

2.7 Forecasting Methodologies

Regression analysis and the Minnesota SASP's general aviation forecasted growth rates. Short-term (5 year), mid-term (10 year), and long-term (20 year) forecasts were developed with each methodology used. The different methodologies are described below.

It is anticipated the Airport can expand its facilities as needed to meet demand. As a result, all forecasting scenarios used are unconstrained forecasting. Meaning, the forecasts assume that all airport facilities will be in place to meet demand as the demand warrants. For example, enough hangar space is provided at the Airport to meet based aircraft demand.

2.7.1 Regression Analysis

Regression analysis is a statistical technique that ties aviation activity (dependent variable) to socioeconomic metrics (independent variables), such as income and population. The independent variable in essence "explains" the projected aviation activity levels. Regression analyses should use simple models utilizing independent variables for which reliable forecasts are available. For these aviation activity models, the regression analyses used socioeconomic data collected from Woods & Poole. This analysis used forecasted growth rates for Duluth, MN-WI MSA's population, employment, total earnings, personal income, and retail sales to reflect the activity that occurs at DYT, which are shown in **Table 2-7**.

Table 2-7 – Woods & Poole CAGR Forecasted Demographic and Economic

	Duluth, MN-WI MSA				
	Population	Employment	Total Earnings	Income	Retail Sales
20-Year CAGR	0.014%	0.511%	1.293%	1.591%	1.086%

Source: Woods & Poole Economics 2020; SEH

2.8 Based Aircraft Forecast

Utilizing the 2019 baseline of 22 aircraft (20 single-engine and 2 multi-engine aircraft) [14], **Table 2-8** shows the forecasts prepared for this analysis. The forecasting scenarios range from 22 to 39 based aircraft within the 20-year planning period. These forecasts represent a realistic upper and lower limit of what may occur at DYT within the planning period. The based aircraft forecast is unconstrained and may ultimately be limited by the natural environment or available developable space.

[14] BasedAircraft.Com Report (3/1/2021).

Table 2-8 – Based Aircraft Forecasts

Year	Regression Analysis					SASP Growth
	Population	Employment	Earnings (Selected forecast)	Income	Retail Sales	
2020	22	22	22	22	22	22
2025*	29	29	29	29	29	23
2030*	34	34	34	34	34	25
2035	34	35	36	37	36	26
2040	34	35	38	39	38	27
CAGR**	**0.01%**	**0.51%**	**1.29%**	**1.59%**	**1.09%**	**1.06%**

Source: SEH, Airport Management, Stakeholder input

** 7 based aircraft were added to the 2025 based aircraft forecast based on the DYT Airport hangar waiting list (September 2020) and stakeholder input on anticipated growth of business-related activities. 5 based aircraft were added to the 2030 based aircraft forecast based on the DYT Airport hangar waiting list (September 2020).*

***CAGR accounts for the growth rates applied to each forecast scenario and does not account for the "added" based aircraft in 2025 and 2030 as a result of tenant and stakeholder feedback.*

Both the aircraft hangar waiting list and anticipated growth of business-related activities were used to forecast the based aircraft in 2025 and 2030. In 2025, based on the data provided, seven (7) aircraft were added to the base year and five (5) additional aircraft were added to the 2030 forecasted based aircraft. The earning regression analysis was then applied for the remaining 10 years of the based aircraft forecast.

The earnings regression analysis, with 38 based aircraft and a CAGR of 1.29% in 20-year forecast, will be used for planning purposes as it represents the most probable upper and lower limits of what may realistically occur at DYT within the planning period based on available information from the airport, economic data, the FAA and the MN SASP. Again, the forecast is unconstrained, and assumes there will be space to accommodate the additional based aircraft included in the selected growth rate. The alternatives evaluated in the alternatives chapter will discuss each alternative's ability to meet this forecast demand. The feasible forecast may be determined to be less than 38 aircraft if the airport is not able to accommodate development adequate for that number of aircraft.

2.8.2 Based Aircraft Breakout

Table 2-9 shows the aircraft distribution for the planning period (2020-2040). Currently, there are 20 single-engine and two multi-engine aircraft based at DYT[15]. It is anticipated that total based aircraft will grow at the rate of 1.29% (earnings regression analysis), as previously discussed. The total based aircraft are expected to grow to a total of 35 single-engine aircraft and three multi-engine aircraft based at DYT by 2040.

[15]BasedAircraft.Com Report (3/1/2021)

Table 2-9 – DYT Based Aircraft Forecast Summary

Based Aircraft	2020	2025	2030	2035	2040
Single-Engine	20	27	31	33	35
Multi-Engine	2	2	3	3	3
Other	0	0	0	0	0
Total	**22**	**29**	**34**	**36**	**38**

Source: SEH

2.9 Aircraft Operations Forecast

As discussed in **Section 2.1.2**, 11,740 operations were used as the 2019 baseline for forecasting. **Table 2-10** shows the operations forecasts prepared for this analysis. The forecasting scenarios, described in **Section 2.7**, range from 11,786 to 16,387 total operations in the 20-year planning period, with a CAGR range of 0.01% to 1.59%.

Table 2-10 – Aircraft Operations Forecast Scenarios

Year	Regression Analysis					SASP Growth
	Population	Employment	Earnings	Income	Retail Sales	
2019 (Base Year)	11,740	11,740	11,740	11,740	11,740	11,740
2020	11,752	11,837	11,910	11,950	12,066	11,864
2025	11,802	12,235	12,785	13,037	12,901	12,504
2030	11,829	12,568	13,651	14,145	13,620	13,178
2035	11,824	12,856	14,522	15,266	14,290	13,888
2040	11,786	13,108	15,400	16,387	14,978	14,637
CAGR	**0.01%**	**0.51%**	**1.29%**	**1.59%**	**1.09%**	**1.06%**

Source: SEH

Following one-on-one meetings with individual stakeholders it was determined that business-related operations should grow at a more gradual rate of 1.133%[16] as this rate is correlated to tourist related activity within of the Airport's service area. While general aviation operations were forecasted to grow at a similar rate as Earnings (1.29%) based on anticipated flying activity of tenants. Additionally, for the forecasted business-related operations an increase of 1,192 operations was added in 2025 to reflect projected growth from existing aviation related business as well as the addition instrument approach procedures (IAPs), which are expected to be published in December of 2021. Lastly, 75 general aviation operations were added to forecast year 2025 to account for the anticipated increased activity following the publication of IAPs. **Table 2-11** shows these growth rates separated by type of operations.

[16] Woods & Poole Economics 2020; Accommodation and Food Service Earnings

Table 2-11 – Aircraft Operations Forecast Scenarios

Year	General Aviation Operations	Business Related Operations	Total Annual Operations
2020	10,471	1,440	11,911
2025*	11,317	2,734	14,048
2030	12,081	2,900	14,980
2035	12,852	3,053	15,905
2040	13,629	3,200	16,829
CAGR**	**1.29%**	**1.133%**	**1.27%**

Source: SEH

** 1,192 operations were added to the 2025 business related operations forecast based on the feedback of expected growth from aviation related business at Sky Harbor and the publication of Instrument Approach Procedures (IAPs). Additionally, 75 operations were added to the general aviation forecast based on feedback on the user's anticipated increase in activity following the publication of IAPs.*

***CAGR accounts for the growth rates applied to each forecast scenario and does not account for the "added" operations in 2025 as a result of tenant and stakeholder feedback.*

Based on conversations with the stakeholders at the airport, the larger operations increase in 2025 of the forecasts is realistic and representative of future activity at DYT. The increase reflects the impact of IAPs being published, and the anticipated increase in flight training, business opportunities and community flying events in the near-term. These increases in activity are expected following the completion of the runway relocation which resulted in multiple summers of extensive construction activities at the Airport between 2017 and 2020.

These forecasts presented in **Table 2-10** and **Table 2-11** represent the most probable upper and lower limits of what may realistically occur at DYT within the planning period based on available information from Woods & Poole (**Section 2.2**), MN SASP (**Section 2.6)** and stakeholder input. The operations forecast presented in **Table 2-11,** with a CAGR of 1.27% and 16,829 operations in the final forecast year (2040), will be used as the selected Master Plan forecast. This forecast is a conservative estimate of the total operations forecast while also reflecting the existing and anticipated activity at the Airport.

2.9.2 Local and Itinerant Operations Forecast

Local operations are operations to and from an airport that operates in the local traffic patterns or within sight of an airport. Itinerant operations, also known as transient operations, are take-offs and landings from aircraft traveling to or from other airports. Both the SASP and Form 5010 indicate that 79% of DYT's operations are local and 21% are itinerant. Based on stakeholder committee meetings and user survey results, it was indicated that the typical mix of traffic at DYT is closer to a ratio of 77% local and 23% itinerant traffic. A mix of 76% local and 24% itinerant was used for this forecast, as shown in **Table 2-12**.

Table 2-12 – Forecasted Local and Itinerant Operations Forecast

Year	Local	Itinerant	Total
2020	9,141	2,770	11,911
2025	10,781	3,267	14,048
2030	11,497	3,484	14,980
2035	12,206	3,699	15,166
2040	12,915	3,914	16,829

Source: SEH

2.9.3 Aircraft Seasonal Use Determination

A seasonal fluctuation in aircraft operations is expected at any airport. This fluctuation is most pronounced in regions where severe winter weather patterns exist in combination with non-towered airports. **Table 2-13** illustrates the seasonal use trends for airports similar to DYT (SEH Planning Studies) and IFR flight plans filed to DYT based on data collected from the FAA's Traffic Flow Management System Counts (TFMSC) program from January of 2020 through December of 2019. It is important to note that Sky Harbor has not had published instrument approach procedures since 2010, however pilots are still able to file an Instrument Flight Rules (IFR) flight plan to DYT and land using visual flight rules (VFR) if weather permits. These flight plans are shown in the TFMSC database. Prior to 2010 and between 2010 and 2019 flight plans filed to DYT remained consistent. An average of flights plans between 2000 and 2019 was used for this analysis.

Table 2-13 – Seasonal Use – Percent Usage

Month	SEH Planning Studies	Flight Plans Filed
January	3.50%	1.83%
February	4.00%	3.61%
March	4.80%	4.26%
April	7.50%	6.03%
May	11.30%	9.99%
June	13.50%	12.71%
July	**14.80%**	**18.91%**
August	13.00%	15.13%
September	10.00%	10.82%
October	8.00%	8.51%
November	5.80%	5.20%
December	3.80%	3.01%

Source: SEH Planning Studies, TFMSC January 2000 – December 2019

Based on stakeholder feedback, the flight plans filed to reflect the seasonality of operations at DYT and more accurately represent a higher activity in the summer months; July was estimated to be the peak month with 18.9% of total annual operations.

Using the seasonal usage as shown above and using stakeholder feedback, a calculation of total operations occurring on the paved runway as well as usage of the seaplane base facilities was calculated. Seasonality in seaplane operations is more dramatic than land operations and is important to note when developing facility recommendations as floatplanes, wheeled aircraft and amphibious aircraft all have unique needs. Stakeholders indicated that seaplane operations typically occur between May and October, however, vary depending on the year and weather.

Table 2-14 shows the seasonal use of both the paved surface and the seaplane base. This was calculated using data from the FAA's TFMSC report as well as discussions with stakeholders. It was indicated that during the busiest day in the summer, roughly 44% of operations used the seaplane base. This data was used to derive monthly operations of the runway and the seaplane base.

Table 2-14 – Type of Seasonal Use Based on Annual Operations

Month	Wheeled Aircraft Use	Seaplane Base Use	Average
January	1.8%	0.0%	0.9%
February	3.6%	0.0%	1.8%
March	4.3%	0.0%	2.2%
April	6.0%	0.0%	3.0%
May	10.1%	7.2%	8.6%
June	12.7%	18.4%	15.6%
July	18.9%	26.1%	22.6%
August	15.1%	22.8%	19.0%
September	10.8%	18.3%	14.6%
October	8.5%	7.2%	7.9%
November	5.2%	0.0%	2.6%
December	3.0%	0.0%	1.5%

Source: SEH

2.10 Determination of Critical Aircraft

The FAA classifies airports by the type of aircraft traffic they experience, this classification is known as the Runway Design Code (RDC). This classification is based on two components: approach speed and wingspan or tail height of the aircraft. The Aircraft Approach Category, approach speed, is an alphabetical classification, denoted with letters A through E (A being the slowest and E being the fastest). While the Airport Design Group (ADG), wingspan or tail height, is a numerical classification, denoted with Roman numerals I through VI (I being the smallest and VI being the largest). The RDC classification of a specific airport and its facilities are based on the RDC of its Critical Aircraft. Critical Aircraft is defined as the most demanding airplane, or family of airplanes, that have a minimum of 500 annual operations currently using or forecasted to use the airport. Existing aviation activity at DYT and stakeholder input were used to determine the distribution of RDC aircraft type.

Since there is no Air Traffic Control Tower (ATCT) at DYT, the exact breakout of operations conducted by each RDC is not known. **Table 2-15** shows the average annual fleet mix from the data gathered from IFR Flight Plans filed from 2010 through 2019. Sky Harbor has not had published instrument approach procedures since 2010, however pilots are still able to file an Instrument Flight Rules (IFR) flight plan to DYT and land using visual flight rules (VFR) if weather permits. These flight plans are shown in the TFMSC database. The past ten years of data was used to calculate forecasted fleet mix

Table 2-15 – IFR Flight Plan Fleet Mix

RDC	Flight Plans Filed										Average Annual Fleet Mix
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
A-I	81	64	65	64	45	74	66	70	89	64	95.0%
A-II					1				4		0.7%
B-I					4	4	4	2	6	1	2.9%
B-II	4	3	2							1	1.4%
Total	**85**	**67**	**67**	**64**	**50**	**78**	**70**	**72**	**99**	**66**	**718**

Source: FAA TFMSC 2010-2019; SEH

Table 2-16 further documents the common aircraft that filed IFR flight plans from 2015 to 2020.

Table 2-16 – DYT IFR Flight Plans Filed – By Aircraft

Aircraft	RDC	TDG	Flight Plans Filed				
			2015	2016	2017	2018	2019
Beech King Air 90L	B-I	1A			2	4	1
Bonanza BE35	A-I	1A	6			4	1
Bonanza BE36	A-I	1A	3	5	6	5	2
Cessna 172	A-I	1A	22	22	9	21	9
Cessna 182	A-I	1A	7	2	1	9	17
Cessna 206	B-I	1A				1	
Cessna 210	A-I	1A	5	3	2	2	3
Cessna 340	B-I	1A	4	4		1	
Cirrus SR 22	A-I	1A	3	6	2	2	2
Mooney M20P	A-I	1A	5	4	2	2	4
Piper Cherokee	A-I	1A	11	19	21	22	13

Source: FAA TFMSC 2015-2019; SEH

It is important to note that since the Sky Harbor Airport currently does not have any approach procedures (visual airport), and has not had any procedures since 2010, IFR flight plans to the airport are not filed very often.

Evaluation of the RDC of based aircraft is also helpful in determining the critical aircraft. **Table 2-17** summarizes the based aircraft by RDC.

Table 2-17 – Based Aircraft RDC

RDC (Fleet Mix)	A-I	B-I	A-II	B-II
Based Aircraft	23	-	1	-

Source: Basedaicraft.com Report (3/1/2021)

Based on the IFR Flight Plan data and discussions with stakeholders, the estimated operations at DYT are approximately 95% A-I traffic, 1.0% A-II traffic, and 2.0% B-I traffic and 2% B-II traffic. Using this information, the estimated operations forecast by RDC type is shown in **Table 2-18**.

Table 2-18– RDC Forecast (Operations per Year)

RDC (Fleet Mix)	2020	2025	2030	2035	2040
A-I	11,314	13,344	14,229	14,405	15,985
A-II	83	98	104	106	117
B-I	348	411	438	444	492
B-II	166	196	209	211	234
Total Operations	**11,911**	**14,048**	**14,980**	**15,166**	**16,829**

Source: SEH; FAA TFMSC, Stakeholder Advisory Committee Members

The current and forecasted future critical aircraft using the Sky Harbor Airport is an A-I Small single-engine aircraft, as shown in **Table 2-18**. This aircraft can be described as having a wingspan up to but not including 49 feet and an approach speed less than 91 knots, with a maximum takeoff weight (MTOW) of 12,500 pounds or less. With this, the Critical Aircraft for Duluth Sky Harbor Airport is the Cessna 172 (C172).

It should be noted that B-I small aircraft are nearing the 500 annual operations threshold in 2040; the runway design standards for A/B-I small aircraft are the same and for the purpose of this Master Plan forecast, an A-I small aircraft will represent the most demanding aircraft through the forecast period.

2.11 Factors that May Create Changes in the Forecast

Aviation forecasts attempt to predict the future based on known conditions. Nevertheless, numerous factors, on a local and national scale, can greatly affect the future activity at any airport. The survey data collected was used to develop realistic first year estimates; however, these estimates do not account for those who did not respond to the surveys. Several circumstances could measurably alter the number of forecasted based aircraft, as well as levels and types of aviation activity at DYT. Some examples are:

- Business operations
- Flight training
- Maintenance and repair facilities
- Pricing of fuel
- Charter operations

2.12 Comparison to Existing FAA TAF

The FAA requires that study-related forecasts be consistent with the TAF or include sufficient documentation to explain the difference. **Table 2-19** summarizes the forecast comparison to the TAF as recommended in Appendix C of the FAA document, Forecasting Aviation Activity by Airport. A forecast is considered consistent with the FAA TAF if it:

- Differs by less than 10% in the 5-year forecast and 15% in the 10-year forecast, or
- Does not affect the timing or scale of an airport project, or
- Does not affect the role of the Airport as defined in the current version of FAA Order 5090.5, Formulation of the NPIAS and ACIP (September 2019) (see **Section 1.4.1**)

Table 2-19– FAA Template for Comparing Airport Planning and TAF Forecasts

AIRPORT NAME: Duluth - Sky Harbor Airport				
	Year	Airport Forecast	TAF	AF/TAF (% Difference)
Based Aircraft				
Base yr.	2020	22	22	0.0%
Base yr. + 5yrs.	2025	29	22	31.8%
Base yr. + 10yrs.	2030	34	22	54.5%
Base yr. + 20yrs.	2040	38	22	72.7%
Total Operations				
Base yr.	2020	11,911	13,900	-14.3%
Base yr. + 5yrs.	2025	14,048	13,900	1.1%
Base yr. + 10yrs.	2030	14,980	13,900	7.8%
Base yr. + 20yrs.	2040	16,829	13,900	21.1%

Source: FAA; SEH; Airport Management

2.12.2 Based Aircraft Forecast

The FAA forecasts show no growth for based aircraft for DYT, with a based aircraft forecast of 22 for the 20-year planning period (CAGR of 0.0%); whereas the chosen based aircraft forecast shows 43 based aircraft in 2039 with CAGR of 1.29%. The chosen based aircraft forecast differs from the TAF's 5-year forecast by 40.9 % and the 10-year forecast by 72.7%, as shown in **Table 2-19**. The primary difference is due to the FAA TAF showing no growth for the 20-year planning period. The based aircraft forecast does not affect the timing or scale of an airport project and does not affect the role of the Airport as defined in FAA Order 5090.5, and therefore is considered consistent with the FAA TAF.

2.12.3 Aircraft Operations Forecast

Similar to the based aircraft forecast, the FAA forecasts show no growth in aircraft operations for DYT, with an operations forecast of 13,900 for the 20-year planning period (CAGR of 0.0%). The selected aircraft operations forecast projects 16,829 aircraft operations at the end of the planning period, with a CAGR of 1.74%. The preferred operations forecast differs from the TAF's 5-year forecast by -14.3% and the 10-year forecast by 7.8%, as shown in **Table 2-19.** Once more, this

difference is primarily due to the FAA TAF has a baseline of 13,900 operations and forecasting no growth in operations at DYT. Additionally, stakeholder and user survey feedback drove the initial baseline forecast number which is believed to be more accurate than the TAF. The input was provided from Airport Management and Airport Tenants that substituted the growth in the early years of the forecast and addresses the instrument approach procedures being published and increasing the usability of the airport.

The operations forecast is consistent with the FAA TAF as it does not affect the timing or scale of an airport project and does not affect the role of the Airport as defined in FAA Order 5090.

2.13 Summary of Chosen Forecasts

Appendix B of the FAA document, *Forecasting Aviation Activity by Airport*, recommends formatting the preferred forecast data into a particular tabular format for ease of readability. This format is shown in **Table 2-20**.

Table 2-20 – Summarizing and Documenting Airport Planning Forecasts

Airport Name: Duluth Sky Harbor Airport **Specify base year:** 2019

	2019	2020	2025	2030	2040	2020	2025	2030	2040
Operations									
Itinerant									
Commuter/air taxi	704	715	843	899	1,010	N/A	N/A	N/A	N/A
General aviation	2,026	2,055	2,424	2,585	2,904	1.4%	3.7%	2.5%	2.4%
Military						0.0%	0.0%	0.0%	0.0%
Local									
General aviation	9,010	9,141	10,781	11,496	12,915	1.5%	3.7%	2.5%	2.4%
Military						0.0%	0.0%	0.0%	0.0%
TOTAL OPERATIONS	**11,740**	**11,911**	**14,048**	**14,980**	**16,829**	**1.5%**	**3.7%**	**2.5%**	**2.4%**
Instrument Operations	1,074	1,090	1,285	1,370	1,540	1.5%	3.7%	2.5%	2.4%
Peak Hour Operations	30	30	36	38	42	0.0%	0.0%	0.0%	0.0%
Based Aircraft									
Single Engine (Nonjet)	20	20	27	31	35	0.0%	6.2%	4.5%	3.8%
Multi Engine (Nonjet)	2	2	2	3	3	0.0%	0.0%	4.1%	2.7%
Jet Engine						0.0%	0.0%	0.0%	0.0%
Helicopter						0.0%	0.0%	0.0%	0.0%
Other						0.0%	0.0%	0.0%	0.0%
TOTAL BASED AIRCRAFT	**22**	**22**	**29**	**34**	**38**	**0.0%**	**5.7%**	**4.4%**	**3.7%**

B. Operational Factors

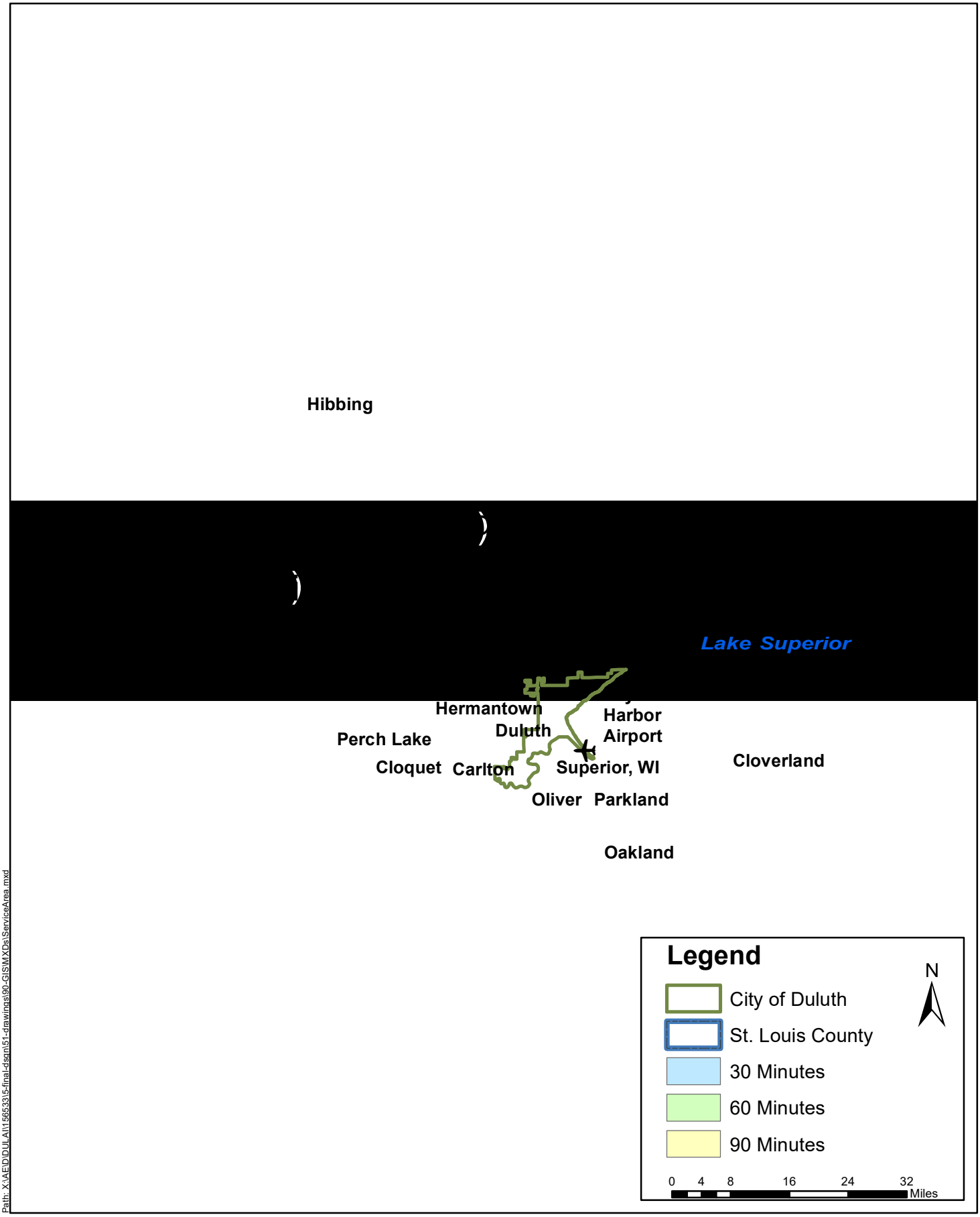
	2019	2020	2025	2030	2040
GA operations per based aircraft	410	416	348	303	300

Building Area Planning Study

Figure 2-1

Sky Harbor Regional Airport
Duluth, Minnesota

Service Area Map
08/2020; DULAI 156533



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3 Capacity and Demand

3.1 Estimated Runway Hourly Demand

In order to arrive at a reasonable estimate of the actual demand on the Airport facilities, it is necessary to develop a method to calculate the estimated Maximum Peak Hourly Demand that might be expected to occur.

Using the information calculated above, a formula was derived which calculates the average daily operations (D) in a given month. The formula is as follows:

D = Average Daily Operations in a given month (M/30)

Where M = Monthly operations (A*T)

A = Total annual operations

T = Monthly percent of use (as discussed in **Table 2-14**)

Based on stakeholder feedback and airport data it was estimated that approximately 75% percent of total daily operations occur between the hours of 10:00 A.M. and 4:00 P.M for runway operations, and the Maximum Peak Hour activity may be 50% greater than the average hourly operations calculated for this time period.

The Estimated Peak Hourly Demand (P) in a given month was determined by compressing 90 percent of the Average Daily Operations (D) into the 6-hour peak use period. This is demonstrated as follows:

P = 1.5(0.75D/6)

Where P = Estimated Peak Hourly Demand in a given month

D = Average Daily Operations in a given month

The calculations were made for each month for 2020 and 2040 operations levels based on the type of operation such as runway or seaplane operations.

Table 3-1 – Total Estimated Hourly Demand/Month of Paved Runway Operations

Month	"T" % Use	2020 "A" = 10,150			2040 "A" = 14,285		
		"M"	"D"	"P"	"M"	"D"	"P"
January	1.8%	186	9	2	262	13	2
February	3.6%	366	18	3	515	26	5
March	4.3%	432	22	4	608	30	6
April	6.0%	612	31	6	861	43	8
May	10.0%	1,014	51	10	1,427	71	13
June	12.7%	1,290	64	12	1,815	91	17
July	**18.9%**	**1,920**	**96**	**18**	**2,702**	**135**	**25**
August	15.1%	1,536	77	14	2,161	108	20
September	10.8%	1,098	55	10	1,545	77	14
October	8.5%	864	43	8	1,216	61	11
November	5.2%	528	26	5	743	37	7
December	3.0%	306	15	3	431	22	4

Source: SEH

As depicted in **Table 3-1**, the Maximum Peak Hourly Demand for runway operations at DYT occurs in July, with 18 operations in 2020 and 25 operations in 2040.

3.2 Estimated Seaplane Base Hourly Demand

Using the information calculated above, a formula was derived which calculates the average daily operations (D) in a given month. The formula is as follows:

D = Average Daily Operations in a given month (M/30)

Where M = Monthly operations (A*T)

A = Total annual operations

T = Monthly percent of use (as discussed in **Table 2-14**)

It was estimated that approximately 55% percent of total daily operations occur between the hours of 10:00 A.M. and 4:00 P.M for seaplane base operations during a busy weekend day, and the Maximum Peak Hour activity may be 50% greater than the average hourly operations calculated for this time period.

The Estimated Peak Hourly Demand (P) in a given month was determined by compressing 90 percent of the Average Daily Operations (D) into the 6-hour peak use period. This is demonstrated as follows:

P = 1.5(0.55D/6)

Where P = Estimated Peak Hourly Demand in a given month

D = Average Daily Operations in a given month

The calculations were made for each month for 2020 and 2040 operations levels based on type of operation such as runway or seaplane operations.

Table 3-2 – Total Estimated Hourly Demand/Month of Seaplane Base Operations

Month	"T" % Use	2020 "A" = 1,761			2040 "A" = 2,479		
		"M"	"D"	"P"	"M"	"D"	"P"
May	7.2%	128	26	4	179	36	5
June	18.8%	332	66	9	467	93	13
July	**25.1%**	**442**	**88**	**12**	**622**	**124**	**17**
August	22.8%	401	80	11	564	113	16
September	18.8%	332	66	9	467	93	13
October	7.2%	128	26	4	179	36	5

Notes: Other months are omitted from the table based on stakeholder feedback stating typical seaplane base operations occur between May and October at DYT.

Source: SEH

As depicted in **Table 3-2**, the Maximum Peak Hourly Demand for seaplane base operations at DYT occurs in July, with 13 operations in 2020 and 19 operations in 2040.

3.3 Theoretical Hourly Capacity

The methodology for computing the relationship between an airport's demand versus its capacity is discussed in FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*. The method included in AC 150/5060-5 is derived from computer models used by the FAA to analyze airport capacity and reduce delay at larger air carrier facilities.

Moreover, in order to facilitate comparison, computations were made to approximate the hourly capacity of the Airport in Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) conditions. The determinations were made using the assumption recommended in AC 150/5060-5 for the particular airport layout and conditions combined with the forecast operational data generated with this study. For the theoretical airport hourly capacity, it was assumed that less than 1% of the aircraft using DYT have a maximum gross takeoff weight of 12,500 pounds or more, and the peak hour movement consists of 50 percent arrivals and 50 percent departures.

The result of this analysis indicates that, with the one runway configuration, DYT has an airfield theoretical hourly capacity of 98 aircraft in VFR conditions and 59 aircraft in IFR conditions.

3.4 Annual Service Volume

The Annual Service Volume (ASV) is a calculated estimate of an airport's annual capacity in aircraft operations. FAA AC 150/5060-5, *Airport Capacity and Delay* specifies the method used to calculate ASV, and considers the difference in runway use, aircraft mix, and weather conditions, as well as other factors that be encountered over a year's time.

For this analysis, based on the weather data collected from DYT's AWOS (see **Section 0**), it was assumed that weather conditions dictate IFR about 9.1% of the time. Based upon the assumptions stated above, DYT ASV is approximately 230,000 annual operations.

3.5 Summary of Airside Demand/Capacity Relationship

The comparison of an airport's demand versus its capacity is critical in determining the need and timing of capacity-related improvements. A summary of the airport's demand/capacity relationship is presented in **Table 3-3**.

Table 3-3 – Summary of Demand/Capacity Relationship

	2020	2040
Runway		
Annual Peak Operations	10,150/230,000 = 4.4%	14285/230,000 = 6.2%
Peak Hour VFR	18/98 = 18.4%	25/98 = 25.5%
Peak Hour IFR	18/59 = 30.5%	25/59 = 42.4%
Seaplane Base		
Annual Peak Operations	1,761/230,000 = 0.7%	2,479/230,000 = 1.1%
Peak Hour VFR	12/98 = 12.2%	17/98 = 17.3%
Peak Hour IFR	12/59 = 20.3%	17/59 = 28.8%

Source: SEH

By comparing the relationship between the airport's theoretical demand and its capacity, the hourly and annual capacities of the runway system at DYT far exceed the operations forecasted for the entire 20-year planning horizon. No airfield improvements are warranted based on capacity.

4 Facility Recommendations

This section identifies airfield (airside) and building area (landside) facilities needed to satisfy the 20-year forecast of aviation demand at Sky Harbor Airport (DYT). Airport facilities are developed in accordance with FAA airport design standards and airspace criteria. The following is an outline of facilities documented in this section:

- Runway Design Code & Designations
- Runway Length & Width Design Standards
- Instrument Approach Requirements
- Taxiway System
- Airport Visual Aids, Communications, and Weather Reporting
- Aircraft Storage & Parking
- Seaplane Ramp & Dock
- Building Area Needs
- SRE & Maintenance Equipment

The basic intention of this study is to develop realistic recommendations for the planning period. The planning period of this study covers calendar years 2020 through 2040. Whether the recommendations for the future development will be implemented depends on the actual demand, ability of the Airport to accommodate the development, environmental impacts, and available resources of the local, state, and federal decision-makers to meet that demand. Of importance is that this Master Plan considers a future design that represents an aggressive approach to the planning process, addressing the most demanding contingencies that may present themselves during the planning period.

Due to the rapid changes occurring in the general aviation market and industries as well as continued regulatory changes within the FAA, it is equally important that an ongoing process of evaluation for existing conditions and near-term trends be implemented to assure the validity of the contents and recommendations of this master plan.

4.1 Minnesota State Aviation System Plan (SASP) Recommendations

As previously discussed in **Section 1.5**, the 2012 Update to the Minnesota State Aviation System Plan (SASP) classifies DYT as an Intermediate Airport.

In May 2022, MnDOT published the final Draft of the 2022 Minnesota State Aviation System Plan (2022 MnSASP) for public comment. The 2022 MnSASP is MnDOT Aeronautics' long-term strategic plan, designed to provide a description and assessment of the system's current performance, as well as guidance for future development. The MnSASP is part of MnDOT's Family of Plans, which stem from the Minnesota GO 50-year Vision.

The 2022 MnSASP had two phases: Phase 1 (completed in 2019) and Phase 2 (draft complete May 2022). Phase 1 built the framework for a continuous MnSASP which strives to keep data current to better track performance metrics and share progress towards those metrics with aviation stakeholders. Phase 2 analyzed policy issues facing the state aviation system, acquired and managed data to develop a MnSASP database and display dashboard, and developed a continuous implementation plan.

In 2019, MnDOT completed Phase I of the 2020 SASP Update. As part of this update, the SASP airport classifications which had been in effect since 1974, were reevaluated. As part of this evaluation, MnDOT recommended dividing the Intermediate airport classification into two sub-classifications, Intermediate Small and Intermediate Large. MnDOT is proposing that Intermediate Small Airports be defined as airports with a paved runway less than 3,800 feet and Intermediate Large Airports be defines as airports with paved runways of at least 3,800 feet up to but not including 4,900 feet. Using this definition, Sky Harbor would be defined as an Intermediate Small airport.

Table 4-1 is the SASP's "Report Card" for DYT, which evaluates the Airport's current facilities and service objectives as an Intermediate Airport. Airports should strive to meet the minimum objectives established by MnDOT for their category. The objectives summarized in **Table 4-1** are discussed in further sections of this chapter.

Table 4-1 – MnDOT SASP Intermediate Airport Objectives

Facility	Intermediate Airports	Existing DYT Facilities	Draft 2022 SASP Recommendations
Runway Length (Primary)	2,400 feet	2,600 feet	No Change
Runway Width (Primary)	75 feet	75 feet	Required: 60' minimum Recommend: 75' for B-II
Taxiway Type	Full-Parallel	Full Parallel	Required: Partial Parallel Recommend: Full Parallel
Primary Runway Approach	Enhanced NPI w/ Vertical	Non-Precision w/ vertical for Runway 32	Required: NPI ≤ 1 mile Recommend: w/ Vertical
Runway Lighting	MIRLs or LIRLs	MIRLs	Required: MIRLs
Visual Aids and Approach Light Configuration	Lighted Wind Cone, Rotating Beacon, PAPIs & REILs	Lighted Wind Cone, Rotating Beacon, PAPIs, & REILs	Required: Beacon, windcone
Approach Lighting	None	None	Required: Recommend:
Weather Reporting	As Needed	AWOS	Recommend: AWOS
Fuel	24/7 100LL Desirable	24/7 100LL	Recommend: 100LL As-needed: Jet A
T-Hangar (Units)	**100% of Jets & Turboprops; 95% of Single & Multi Engine**	**0**	**Evaluate the need for based aircraft hangars.**
Conventional Hangars		**9 (not all based aircraft are in hangars)**	
Transient Aircraft Apron (SY)	Unhangared Based Aircraft & Peak Hour Itinerant Operations	18,258 SY – 31 spots	Required: Tiedowns for at least 3 more aircraft than are normally parked
Based Aircraft Apron (SY)			
Based Tiedowns (Ea.)			
Public Facility	GA/Administration Building	GA/Administration Building	Required: GA terminal with phone and restrooms
Automobile Parking	1 Stall per Based Aircraft Plus 25%	70	Required: Adequate parking as determined at the local level
Perimeter Fencing	Full Desirable	Fence around Hangars, along the North Property Line, and separating the Apron to the Parking Lot. No fence along the natural boarder with the harbor	As-Needed: controlled vehicle access and full perimeter and wildlife fencing as determined at local level

*Data did not exist for all airports at the completion of the SASP.
IFR = Instrument Flight Rules; NM = Nautical Miles; AWOS/ASOS = Automated Weather Observation Systems

Source: 2022 Minnesota SASP

4.2 Airside Facility Recommendations

After taking inventory of the existing facilities of DYT and determining the future needs of the facility, the Master Plan has developed the following airside facility recommendations:

Runway 14/32:

- Publish Runway 14/32's pavement strength to 12,500 SWG (**Section 4.2.3**).
- Routine maintenance, such as joint and cracking sealing, and slurry seal should continue to be performed on a scheduled basis to extend the life of the pavement (**Section 4.2.4**).

Water Landing Strip

- Remove Water Landing Strip to 9W/27W from FAA and MnDOT publications (**Section 4.2.10)**.

Taxiway & Apron System:

- Future improvements to the taxiway system are designed to TDG 1A standards (**Section 4.2.11.3**)
- Routine maintenance, such as joint and cracking sealing, and slurry seal should continue to be performed on a scheduled basis to extend the life of the pavement (**Section 4.2.12.4**).
- The southeastern portion of the apron area should be reconstructed by 2024 (**Section 4.2.12.4**)
- Apron alternatives should be evaluated to reduce apron flooding, improve drainage, and address safety concerns related to the apron flooding and ponding water (**Section 4.2.12**)

Miscellaneous:

- The beacon should be replaced by 2035, or at the end of its useful life. (**Section 4.2.14**).
- The Airport should consider a change to a non-standard traffic pattern for Runway 32. If a non-standard traffic pattern is implemented, the installation of a segmented circle and an update to appropriate charts and the 5010 will be required (**Section 4.2.14.1**)
- The Airport should monitor the condition of airfield signage for any fading or cracking to ensure pilot situational awareness is maintained (**Section 4.2.15**)

4.2.1 Runway Design Code (RDC)

As discussed in **Section 1.8** and **Section 2.10**, the FAA classifies airports and each runway facility by the Runway Design Code (RDC) of its Critical Aircraft. The current and future Critical Aircraft for DYT has been identified in **Chapter 3** as RDC A-I Small and can be represented by a Cessna 172 for the current and the ultimate (20-year) forecast. Facility recommendations for Runway 14/32 are designed to accommodate RDC A-I Small standards for small aircraft weighing less than 12,500 pounds.

4.2.2 Runway 14/32 Designation

Aircraft compasses and runway identifiers utilize magnetic north for directional guidance. For this reason, it is important to evaluate an airport's runway number designations every few years to ensure that the numbers painted on the runway truly represent the magnetic heading of the runway. The magnetic forces across the planet are constantly shifting, and therefore a declination must be applied to a compass to arrive at a true north heading. The current declination is used

for the runway designation calculations. According to the National Geophysical Data Center, as of January 13, 2021, the current declination for Sky Harbor is 1°5 West with an uncertainty of 0°26' and is changing by 0°2' west per year[17].

The current true bearing for Runway 14/32 is North 323°13'16.2522" West. Applying the declination of 0°2' west to the true bearing results in a magnetic heading of 142°7'57.52" for Runway 14 and 322°8'13.79" for Runway 32. This means that the current runway designations of 14 and 32 are correct. ***No changes to the runway designations are required.***

4.2.3 Runway Pavement Strength

Runway 14/32 has a weight bearing capacity of 12,500 pounds for Single Wheel Gear (SWG) aircraft. DYT is designed to accommodate RDC A-I Small standards for small aircraft weighing no more than 12,500 pounds. ***Therefore, Runway 14/32's pavement strength meets the needs of the Critical Aircraft, no additional strengthening is recommended.***

The existing 5010 Form does not list a pavement strength for Runway 14/32. ***With this, it is recommended that the 5010 published pavement strength for Runway 14/32 be updated to 12,500 pounds SWG.***

4.2.4 Runway Pavement Condition

The most current pavement ratings were taken from the 2018 MnDOT Airport Pavement Management Study (see **Figure 1-4**). Runway 14/32 and Taxiway A was constructed in 2020 and now has an assumed PCI rating of 100. ***Routine maintenance, such as joint and cracking sealing, and slurry seal should be performed on a scheduled basis to extend the life of the pavement. No other surface improvements to the Runway 14/32 are recommended.***

It is recommended that a runway rehabilitation project be planned, as pavement conditions warrant, between 2035 and 2040.

4.2.5 Runway Length

Runway length is dependent on many factors including airport elevation, temperature, wind velocity and direction, ambient air temperature, aircraft weight, flap settings, length of haul, runway surface (wet or dry), runway gradient, presence of obstructions, and any imposed noise abatement procedures or other prohibitions. While the FAA does not have standards for runway lengths, FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance to determine the recommended runway length for an airport based on the above factors.

The process to determine recommended runway length begins by determining the landing weight of the Critical Aircraft and the aircraft anticipated to regularly use the Airport within the planning period. For aircraft weighing 60,000 pounds or less, the runway length is determined by family groupings of aircraft having similar performance characteristics (i.e. small and large airplanes). Small airplanes are defined by the FAA as airplanes weighing 12,500 pounds or less at Maximum Takeoff Weight (MTOW), while large airplanes in this context exceed 12,500 but weigh less than 60,000 pounds. For aircraft weighing more than 60,000 pounds, the required runway length is determined by aircraft specific length requirements.

[17] https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml#declination. January 13, 2021.

Table 4-2 shows the FAA recommended runway lengths for DYT computed using the guidance provided in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*. The runway lengths in AC 150/5325-4B are calculated based on the anticipated types of aircraft using the facility, the Airport elevation, and site meteorological conditions, such as the mean maximum temperature of the hottest month during the hottest month of the year. According to National Oceanic and Atmospheric Administration (NOAA), the mean daily maximum temperature for the City of Duluth, Minnesota is 74.7°F and occurs in July (see **Section 1.9.7.1**). The Airport has an elevation of 608.5 feet above mean sea level. The existing and anticipated Critical Aircraft for DYT is a Cessna 172, a RDC A-I Small aircraft, which is a small airplane weighing less than 12,500 pounds.

Table 4-2 – FAA Recommended Runway Lengths for Airport Design

Aircraft Type	Runway Length
Small Airplanes with Approach Speeds <30 knots	319’
Small Airplanes with Approach Speeds ≤50 knots	849’
Small Airplanes with Approach Speeds >50 knots	
Small Airplanes with <10 Passenger Seats	
95% of these Small Airplanes	**3,200’**
100% of these Small Airplanes	3,800’
Small Airplanes with ≥10 Passenger Seats	4,200’
Large Airplanes of 60,000lbs. or less	
75% of large airplane at 60% useful load	4,600’
75% of large airplane at 90% useful load	5,800’
100% of large airplane at 60% useful load	5,000’
100% of large airplane at 90% useful load	7,200’

Source: AC 150/5325-4B, Runway Length Requirement for Airport Design

DYT’s Critical Aircraft, Cessna 172, places the Airport in the group of Small Airplanes with approach speeds greater than 50 knots. Within this grouping of aircraft, FAA recommends choosing a runway length to accommodate 95% or 100% of Small Airplanes based on the airport’s location and the amount of existing or planned aviation activities. The “95% of Small Airplanes with less than 10 passenger seats” criterion applies to airports that are primarily intended to serve medium size population communities with a diversity of usage. It also applies to those airports that are primarily intended to serve low-activity locations, small population communities, and remote recreational areas. The “100% of Small Airplanes with less than 10 passenger seats” criterion applies to an airport that is primarily intended to serve communities located on the fringe of a metropolitan area or a relatively large population remote from a metropolitan area.

As a small to medium size community, Sky Harbor’s role is to serve smaller aircraft such as those found in 95% of the small aircraft fleet. The City of Duluth falls within the “95% of Small Airplanes with less than 10 passenger seats” category. Runway 14/32 is currently 2,600’ long and does meet the needs of 95% of small aircraft. As part of the Environmental Assessment process for the runway relocation/obstruction removal project (construction completed in 2020), the runway length needs of the existing and forecast critical aircraft (A-I/B-I) were evaluated in more detail. Because the users of the airport are small A-I/B-I aircraft, and do not include many of the aircraft

included in the 95% of small aircraft, the recommended runway length that serves 75% of small aircraft (2,600 feet) was selected as it meets the needs of the critical aircraft and provides sufficient length for a straight in GPS approach (See Section 1.5.3.2 of the Final Environmental Assessment). ***Therefore, no runway extension is recommended in the near-term.***

The Airport's existing zoning ordinance was adopted in April 1994 (see **Figure 1-7**). The Airport is currently zoned for a previous planned runway length of 3,350 feet for Runway 14/32. As part of the Environmental Assessment process for the relocation of Runway 14/32 (See **Section 1.3.3.1**) MnDOT indicated that a revised zoning ordinance for the new runway length and orientation was not required as the existing ordinance provided adequate protection. ***Therefore, no revisions are recommended for DYT's Airport Safety Zoning ordinance.***

4.2.6 Runway Width

Runway 14/32 is 75 feet wide, which exceeds RDC A/B-I Small standards with visibility minimums not lower than 1-mile standard of 60 feet. The MnDOT SASP recommends Intermediate Airports have a 75-foot-wide runway. ***Runway 14/32's width exceeds A/B-I Small FAA standards and meets the SASP recommendation; therefore, no change in runway width is recommended.***

4.2.7 Instrument Approach Procedures

Instrument approach procedures can be broken down into precision instrument or non-precision instrument approaches. Precision instrument approaches are those approaches that provide both vertical and horizontal guidance to the runway. An Instrument Landing System (ILS) is a common example of a precision approach. Most non-precision approaches have only directional guidance to the runway and can include any combination of the following types of approaches: localizer, RNAV/GPS (area navigation/global positioning system), RNAV/RNP (area navigation/required navigation), NDB (non-directional beacon), and VOR/TVOR (VHF Omni-directional range/terminal VHF Omni-directional range). A TACAN-A (tactical area navigation) is a circling approach with distance measuring (DME) information. The TACAN-A is used by military aircraft, although the DME information is available to civilian aircraft. The newest approach published at airports around the country is a Localizer Performance with Vertical Guidance (LPV) approach. An LPV approach is considered a non-precision approach, yet it provides both horizontal and vertical guidance to pilots. Most LPV approaches require non-precision design standards at an airport.

As previously discussed in **Section 1.9.4** and shown in **Table 4-3,** DYT has planned non-precision procedures for Runway 32. Runway 32 RNAV(GPS), LNAV and Circling, and Takeoff and Departure Procedures are expected to be published in December 2022.

Runway 14 is not currently served by an instrument approach procedure. Existing approaches and their associated visibility and ceiling minimums at DYT are summarized in **Table 4-3**.

Table 4-3 – Instrument Approach Procedures

Runway	Type	Category A Aircraft			Category B Aircraft		
		DA/MDA	VIS	HA/HAA	DA/MDA	VIS	HA/HAA
32	LNAV MDA	1000	1	391	1000	1	391
Circling approach		1100	1	491	1180	1	571

Notes: DA: Decision Altitude, MDA: Minimum Descent Altitude, VIS: Visibility Minimums, HAA: Height Above Airport,

Source: FAA

The MnDOT SASP recommends that DYT, as an Intermediate Airport, have a non-precision approach with vertical guidance on at least one runway end, such as an LPV approach. DYT has one planned basic non-precision approach providing vertical guidance to Runway 32. DYT meets the recommended SASP standards for instrument approaches. The existing runway and surrounding environment do not support reduction in approach minimums below 1-mile. In addition, users have not indicated a need to pursue improved approach minimums. ***As a result, improved approaches of ¾ mile or less are not recommended and additional instrument approach procedure improvements are not recommended.***

At the time the procedures for Runway 32 were requested, the FAA indicated it would only support an instrument approach to one runway end. If, users indicate a need for an instrument approach to Runway 14 in the future, this can be accomplished by requesting an instrument approach procedure (IAP) on the FAA Flight Procedures Information Gateway. It is recommended Runway 14 remain a visual runway.

4.2.8 Detailed Runway Design Standards

Runway design standards are based on the RDC of a runway. The existing and future RDC of Runway 14 and 32 is A-I Small, not lower than 1-mile visibility. **Table 4-4** lists the separation standards, safety area, and design criteria that are applicable to Runway 14 and 32. This table represents the guidance outlined in AC 150/5300-13B, *Airport Design* and should be used in designing future improvements at the Airport. The runway design standard for DYT is also shown in **Figure 4-1**.

Runway Safety Area (RSA) - RSA is a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the paved surface.

Runway Object Free Area (ROFA) – ROFA is an area on the ground that is centered on a runway and provides enhanced safety for aircraft operations by clearing the area of above-ground objects. Some objects are acceptable in the ROFA, including objects that need to be located in that area for air navigation or aircraft ground maneuvering purposes and must be frangible, or objects that are less than three inches tall.

Runway Obstacle Free Zone (ROFZ) - ROFZ is a volume of airspace intended to protect aircraft in the early and final stages of flight. It must remain clear of object penetrations, except for frangible NAVAIDs located in the ROFZ because of their function. The OFZ is comprised of, where applicable, the Precision OFZ (POFZ), the Inner-Approach OFZ, and the Inner Transitional OFZ.

Runway Protection Zone (RPZ) – The RPZ is a trapezoidal shaped area off of each runway end designed to enhance the safety and protection of people and property on the ground. It is desirable to clear the entire RPZ of all above-ground objects. Airport service roads that are directly controlled by the Airport operator are permissible within the RPZ; however, public roads are not. Additionally, in order to ensure that the RPZ is kept clear of incompatible uses, the FAA recommends that all land included in the RPZ should be controlled by the Airport sponsor, either by fee or easement. As shown in **Figure 4-3** all of the land within Runway 14/32's RPZ is owned or controlled by the Airport. ***The RPZ's are located over Airport property and Superior Bay. No land acquisition or land use changes are needed in the RPZs.***

Building Restriction Line (BRL) - The BRL is a line that runs parallel to the runway and offset at a distance that ensures new construction is below protected airspace, per 14 CFR Part 77 imaginary surfaces. The BRLs at DYT are calculated based on a 25-foot-tall structure and include the RPZs off the runway ends. As shown in **Figure 4-4,** all of the land within Runway 14/32's BRL is owned or controlled by the Airport, portions of Superior Bay are located within the BRL.

Table 4-4 – Runway Design Standards

Runway Design Code (RDC)	Existing Runway 14/32
	A-I (Small) Not Lower than 1 Mile
Runway Design	
Runway Width	75 ft
Shoulder Width	10 ft
Blast Pad Width	80 ft
Blast Pad Length	60 ft
Runway Protection	
Runway Safety Area (RSA)	
Length Beyond Departure End	240 ft
Length Prior to Threshold	240 ft
Width	120 ft
Runway Object Free Area (ROFA)	
Length Beyond Runway End	240 ft
Length Prior to Threshold	240 ft
Width	250 ft
Runway Obstacle Free Zone (ROFZ)	
Length Beyond Runway End	200 ft
Length Prior to Threshold	200 ft
Width	250 ft
Approach Runway Protection Zone (RPZ)	
Length	1,000 ft
Inner Width	250 ft
Outer Width	450 ft
Acres	8.035
Departure Runway Protection Zone (RPZ)	
Length	1,000 ft
Inner Width	250 ft
Outer Width	450 ft
Acres	8.035
Runway Separation	
Runway Centerline to:	
Holding Position	125 ft
Parallel Taxiway/lane Centerline	150 ft

Source: AC 150/5300-13B, Airport Design

4.2.9 Runway Orientation / Wind Coverage

A runway's orientation is its alignment in relation to magnetic north. The primary factor when determining runway orientation is the direction of the prevailing winds. Each aircraft has an acceptable crosswind component for takeoff and landing. Generally, the smaller the aircraft, the more it is affected. Per FAA AC 150/5300-13B, *Airport Design*, when the current runway system provides less than 95% wind coverage for any aircraft that use the Airport on a regular basis, a crosswind runway should be considered. The 95% coverage is computed on the basis of the crosswind not exceeding **10.5 knots for RDC A-I and B-I; 13 knots for RDC A-II and B-II**; 16 knots for RDC A-III, B-III, and C-I through D-III; and 20 knots for RDC A-IV through D-VI. For DYT, the runway configuration needs to accommodate at least A/B-II small aircraft, having a crosswind component of 13 knots.

Wind data collected through the National Oceanic and Atmospheric Administration (NOAA) at the actual airport site is the best source of information. NOAA collects wind data at DYT. The FAA requires wind data analysis to be completed with at least 10 years of consecutive data from the airport site or the closest available site. Wind data analysis was completed using data from DYT's AWOS for the period 2009 – 2019. **Table 4-5** shows the wind coverage for Runway 14/32.

Table 4-5 – Wind Coverage – Runway 14/32

		10.5 knots	13 knots	16 knots
Runway 14/32[1]	All	89.01%	93.58%	97.5%
	VFR	88.78%	93.42%	97.49%
	IFR	91.97%	95.67%	97.94%
Note[1]: Calculated based on a true heading of 143°.				

Source: Sky Harbor Airport AWOS. 2011-2020. Obtained from the National Climatic Data Center.

Runway 14/32 does not meet the minimum 95% wind coverage for A/B I Small aircraft. However, due to the limited space on Minnesota Point and the sensitive natural areas around the airport***, a crosswind runway is not recommended***.

4.2.10 Water Landing Strips

4.2.10.1 Runway 13W/31W and Runway 9W/27W

Runway 13W/31W is a water sealane 10,000 feet long by 2,000 feet wide and is located on Superior Bay, on Lake Superior between Park Point Peninsula and Wisconsin. The sealane is visual and has no markings.

Runway 9W/27W is a water sealane 5,000 feet long by 1,500 feet wide and is located on Superior Bay, on Lake Superior between Park Point Peninsula and Wisconsin. The sealane is visual and has no markings.

AC 150/5395-1B Seaplane Bases requires at least a 200-foot wide waterlane to accommodate both the sealane and runway safety areas, which both of DYT's existing sealanes do. The Seaplane Base AC also requires a minimum of 4 feet depth of water, and Superior Bay in the area of the sealanes exceeds that requirement.

State of Minnesota Public Seaplane Base licensing requirements currently state that the outline of that part of the area available for landing, takeoff, and taxiing when required in the interest of safety, shall be marked. No markers are required in the interest of safety at Sky Harbor. In addition, MnDOT Office of Aeronautics has not recommended markers in any previous licensing inspections.

Public Seaplane Base Licensing requirements, MN Rule 8800.1700, states that the body of water shall have a minimum usable length of at least one mile and shall be of sufficient width and depth to permit the safe operation of aircraft on the surface. All approaches to the landing area shall be sufficiently clear of obstructions to permit a 20:1 glide angle to the nearest point of the usable landing area, provided that if any structure on the land is located within 300 feet of the centerline of the approach path, such glide angle shall be computed to provide a clearance of at least 100 feet above such structure and 15 feet is added for the public access road to the airport, Minnesota Avenue. Runway 13W/31W meets these requirements. The proposed seaplane docks lie under the approach for Runway 9W/27W. Due to the length requirements, proposed seaplane docks, the clearances required for the approach, and the proximity of buildings to the runway end, Runway 9W/27W does not meet the state's seaplane base requirements. MnDOT Aeronautics has removed Runway 9W/27W from the Airport Directory. **Exhibit 4-1** shows the published sealane for DYT.

It is recommended the east/west sealane, Runway 9W/27W is removed from the FAA's Airport/Facility Directory.

Exhibit 4-1– Water Landing Areas

4.2.11 Taxiway System Recommendations

Runway 14/32 is served by a full parallel taxiway, Taxiway A, and three connector taxiways as shown in **Figure 1-3**. All taxiways are 25 feet wide.

Taxiway systems are designed to provide access to and from the runway(s), apron(s), hangars, and other aviation related areas on an airport. AC 150/5300-13B, *Airport Design*, provides basic taxiway system design principles, which include:

- Whenever possible, taxiways should be designed such that the nose gear steering angle is no more than 50 degrees.
- Turns should be 90 degrees wherever possible. For intersections, the preferred standard angles are 30, 45, 60, 90, 120, 135, and 150 degrees.
- Taxiway systems should use the "three-node concept." A pilot should have no more than three turn choices at an intersection, ideally, left, right, and straight ahead.
- Minimize runway crossings and limit runway crossings to the outer thirds of the runway.
- Avoid wide expanses of pavement. Wide pavements require placement of signs and edge lighting or markers far from the pilot's eye and reduces the conspicuity of visual cues.
- Taxiways should not provide direct access from an apron to a runway in order to reduce opportunity for human error.

4.2.11.1 Direct Access

The FAA recommends that all direct runway access points be redesigned to increase pilot situational awareness at an airport. Basic taxiway system design principles state that taxiways should not provide direct access from an apron to a runway in order to reduce opportunity for human error and minimize runway incursions. ***There are no direct access points at DYT. No taxiway reconfigurations are recommended at DYT.***

4.2.11.2 "High Energy" Intersections

Taxiway design standards as described in AC 150/5300-13B recommend limiting or removing "high energy" runway crossings. These are defined as taxiway intersections located in the middle third of the runway which provide a runway crossing. The FAA recommends runway crossings to be located in the outer two thirds of the runway, which would clear the portion of the runway where a pilot can least maneuver to avoid a collision. As shown in **Figure 1-3**, connector Taxiway A2 is located within the middle third of Runway 14/32. However, Runway 14/32 is only served by one parallel taxiway and runway crossings would not occur at Taxiway A2.

4.2.11.3 Taxiway Design

Taxiway system design criteria are based on the Airport Design Group (ADG) and Taxiway Design Group (TDG), these standards are shown in **Table 4-6** and **Table 4-7**.

ADG is determined by wingspan and tail height of the Critical Aircraft and ADG defines the Taxiway Safety Area (TSA), Taxiway Object Free Area (TOFA), and taxiway separation (to runway and parallel taxiway) standards. The ADG for the taxiway system at the DYT should be designed to ADG A-I standards to meet the demands of its Critical Aircraft, Cessna 172.

The TDG is determined by the undercarriage dimensions, overall Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance, of the most demanding aircraft projected to use the

airport. DYT's Critical Aircraft, a Cessna 172, has a TDG 1A. For a TDG 1A taxiway system, the taxiways' width must be 25 feet, and the pavement type and strength will be similar to the runway able to handle 12,500 pounds aircraft.

All DYT's taxiways are 25 feet wide, meeting TDG 1A standards, and have pavement strength of 12,500 pounds SWG (same as Runway 14/32). ***As a result, no taxiway widening, or strengthening is recommended. It is also recommended that any future improvements to the taxiway system should be designed to TDG 1A standards.***

Table 4-6 – Taxiway Design Standards – Airplane Design Group

Item	ADG I	ADG II
Taxiway Safety Area (TSA)	49 ft	79 ft
Taxiway Object Free Area (OFA)	89 ft	124 ft
Taxilane OFA	79 ft	110 ft
Taxiway Centerline to Parallel Taxiway Centerline	70 ft	101.5 ft
Taxiway Centerline to Fixed of Movable Object	44.5 ft	62 ft
Taxilane Centerline to Parallel Taxilane Centerline	64 ft	94.5 ft
Taxilane Centerline to Fixed of Movable Object	39.5 ft	55 ft
Taxiway Wingtip Clearance	20 ft	22.5 ft
Taxilane Wingtip Clearance	15 ft	15.5 ft

Source: AC 150/5300-13B, Airport Design

Table 4-7– Taxiway Design Standards – Taxiway Design Group

Item	TDG 1A	TDG 1B	TDG 2A	TDG 2B
Taxiway Width	25 ft	25 ft	35 ft	35 ft
Taxiway Shoulder Width[1]	10 ft	10 ft	15 ft	15 ft

Note: [1]Paved shoulders are optional for ADG II aircraft and smaller

Source: AC 150/5300-13B, Airport Design

4.2.11.4 Taxiway & Apron Pavement

The parallel taxiway was constructed in 2020 and has an assumed PCI of 100. It is recommended that routine maintenance, such as joint and cracking sealing, and slurry seal, should be performed on a scheduled basis to extend the life of the pavement. It is recommended that a taxiway pavement rehabilitation project be planned, as pavement conditions warrant, between 2035 and 2040.

As previously discussed in **Section 1.9.8** and shown in **Figure 1-4**, the 2018 MnDOT Airport Pavement Management Study Update found that the northwest portion of the apron as in Excellent condition with a PCI of 100 in 2017 (last reconstructed in 2016). The southeastern portion of the apron was last reconstruction/rehabilitated in 2016. In 2017 it had a PCI of 100. ***It is recommended that the southeastern portion of the apron area be reconstructed or rehabilitated around 2030-2035 as pavement conditions warrant. It is recommended that routine maintenance, such as joint and cracking sealing, and slurry seal, should be performed on a scheduled basis to extend the life of the pavement.***

4.2.12 Apron Flooding

Over the last 10+ years, Lake Superior water levels have been at higher than ordinary levels. Some projections indicate that lake levels will continue to rise while others indicate levels are at their peak and will begin to recede. These high lake levels affect the airport during high water events, strong north-northeast winds and heavy rainstorms. In these instances, lake water inundation becomes a concern in areas around the existing fuel pump and the middle of the apron area.

Photo 4-1 – Apron Flooding

Photo 4-1 and **Figure 4-7** shows where apron ponding that typically occurs following gale or heavy rain/wind events, the fuel pump and seaplane dock are located to the right, just outside of view. Water levels causing flooding can last for 1-2 days, depending on the duration of the storm. During large rain events or gale storms, resulting lake water inundation on the airport can remain for around 7 days. Drainage from the airfield is limited during these events since the bottom elevation in the swale area adjacent to the ramp is lower than the typical high-water elevation during events of high water. The Ordinary High-Water Mark, as shown on **Figure 1-7**, is 603.1 feet and during gale storm events, the water level can be much higher. Additionally, any opportunity for evaporation is lessened in the fall as evaporation rates are slow due to clouds and sun angle. Opportunities for infiltration is limited due to the high-water table. Although they don't occur annually, many of the previous five years have experienced one to two fall gale events.

To mitigate the effects of the high lake levels, it is important to prioritize the challenges that come with the apron flooding and prioritize resolving challenges that could pose a hazard to people, aircraft and/or property. Additionally, care should be given to ensure that any proposed solutions do not create new problems (i.e. Increase the likelihood of water and flooding impacting hangars). **Table 4-8** categorizes the various challenges and safety concerns experienced due to flooding events at the Airport.

Table 4-8 – Apron Flooding Challenges

Safety	Other concerns
Fuel pump is in an area that experiences standing water.	Unable to access several tiedowns
Foreign Object Debris (FOD) / sand	Impacts to pavement life span
Unsafe to taxi or drive vehicles through areas of standing water	Standing water is a nuisance to owners and users of the area
Wildlife attractant	

Long term exposure to standing water, or inundation, has adverse effects on pavements durability, strength, underlying materials, and overall life expectancy. Overtime, water will weaken the pavement surface and structural section, eventually causing cracks to form. The presence of cracks allows moisture into the pavement structural section which impacts the underlying materials and causes movement during freeze/thaw conditions, speeding up the deterioration for

the pavement life expectancy. Alternatives were developed to focus on mitigating the safety hazards as outlined above and include the preliminary following recommendations. Additional recommendations continue to be explored and researched.

Preliminary facility recommendations for the apron area in front of Hangar 1, adjacent to the existing fuel pump, include the following:

- Relocate the fuel pump outside an area that experiences inundation
- Evaluate the removal of impervious surface in areas of frequent inundation to improve drainage where standing water typically occurs
- Consider installation of concrete swales that encourage water to flow away from the aprons. Concrete swales would ensure water flows more freely than through vegetation, grass and sand. Some areas that would benefit from the installation of concrete swales may be considered wetlands and would require the associated permitting and mitigation.
- Focus future development to the east side of the apron where ground levels are higher
- Relocate the existing taxilane that connects the apron area to Taxiway A to improve drainage
- Install in-pavement drains to allow for water drainage throughout the apron area. Estimated costs range from $300 to $400 per linear foot depending on the price of steel. This could pose a challenge during frozen conditions, which could limit the ability for the drains to effectively drain water.
- The merits of changing the grade and elevation of the apron were discussed; however, it could result in water ponding in or near hangars or the need to raise hangar floor elevations. The current lowest floor elevation is 606 feet as required by the City of Duluth. Preliminary discussions indicate a large-scale apron redesign with higher grades would likely not provide sufficient benefit for the cost.

It is recommended that alternatives be evaluated to address apron flooding and shoreline resiliency options. **Chapter 5,** Alternatives Analysis will evaluate options to improve drainage and prevent apron flooding and address safety concerns, such as fueling in standing water.

4.2.13 Stormwater Treatment

The City of Duluth has a stormwater utility system, which charges a user of the system a fee for impervious surfaces. At Sky Harbor, the stormwater utility fee applies to the hangar and apron areas, while taxiways, taxilane and runways are exempt. The airport is classified as a Waterfront Property in terms of the City's stormwater utility. The airport can get up to 90% credit on the stormwater utility bill if stormwater controls are implemented on site.

It is recommended that the airport evaluate areas that could feasibly treat stormwater in order to get the 90% credit on the stormwater utility bill. Upon initial conversations with the City, it appears that there are likely feasible alternatives for the Airport to receive the reduction in the stormwater user fee.

It is proposed that 3 rock-ditch checks be installed along two existing drainage ditches to slow stormwater runoff, allow for settlement of suspended solids, and to filter water through the ditch checks to remove additional sediment. These ditch checks would be approximately 1-foot high and span the width of the bottom of the ditch. The existing ditches are three feet deep, so during a large rain event water will overtop the checks and continue downstream to the outlet in order to

avoid potential flooding hazards on the apron. By treating both ditches, 84% of the stormwater runoff that the City of Duluth is using to calculate the current utility bill will be treated prior to discharge into the St. Louis Bay. The remaining 16% is unable to be treated as it runs directly into the Bay. **Exhibit 4-2** shows the existing drainage ditches and the future location of the ditch checks.

Exhibit 4-2– Future Ditch Checks

Additionally, the Airport is continuously working with the city to identify the areas excluded from the fee which include taxiways, taxilanes and runways. Currently the City is billing the airport for the taxilanes through the apron area which, is recommended to be exempt. ***It is recommended the airport continue to work with the city to exclude the areas which are classified as taxiways, taxilanes and runways from the City's calculations.***

4.2.14 Airfield Lighting and Airport Visual Aids

Airport visual aids assist pilots in locating and landing at an airport. Runway 14/32 is a non-precision runway and is equipped with Medium Intensity Runway Lights (MIRLs). The existing MIRL lighting system is currently in excellent condition and was installed during the runway relocation project that was completed in 2020. Both ends of Runway 14/32 are equipped with Runway End Identifier Lights (REILs)[18] and PAPIs. The SASP recommends a minimum of Low

[18] REILs are synchronized flashing lights that identify the beginning of the useable runway.

Intensity Runway Lights (LIRLs), as well as REILs and PAPIs[19] be installed on primary runway for Intermediate Airports.

Currently, the apron area and all taxiways have MITLs installed at DYT. Advisory Circular (AC) 150/5340-30JJ, *Design and Installation Details for Airport Visual Aids* recommends Medium Intensity Taxiway Lights (MITLs) for taxiways and aprons at airports where a runway lighting system are installed. MITLs provide increased visibility to taxiing aircraft during nighttime and low visibility weather conditions. Additionally, the SASP recommends MITLs for all Intermediate Airports. ***As a result, no improvements are recommended to airfield lighting.***

The MnDOT SASP recommends a lighted wind cone and rotating airport beacon at an Intermediate Airport. DYT has both a rotating airport beacon and a lighted wind cone located on the airfield, as previously shown in **Figure 1-5.** It is likely the beacon was installed in the early 1990's and is in fair condition, the useful life of a beacon (NAVAIDs) is 15 years, ***it is recommended the beacon be replaced by 2035, or at the end of its useful life which may be sooner.*** At the time of replacement, a tip down style of beacon should be considered as it would provide for more convenient maintenance. An LED beacon should also be considered when replaced.

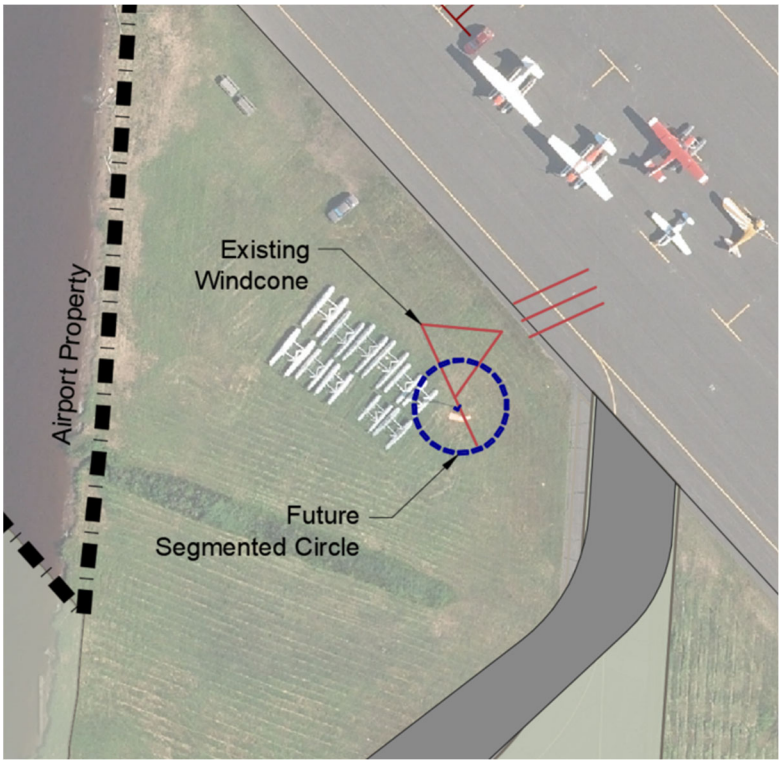
4.2.14.1 Airfield Right Traffic

Superior Airport (SUW) is located approximately 2.5 south southwest of DYT in Superior, Wisconsin. When aircraft are landing and departing on Runway 4 at SUW, the traffic pattern is extremely close to DYT's traffic pattern, and several stakeholders are concerned with the level of safety being maintained during peak summer days. It was indicated that Runway 32's traffic pattern should be over Lake Superior which would result in non-standard right-hand traffic pattern.

For an airport to have a non-standard traffic pattern a lighted segmented wind cone is required under 14 CFR Part 91. A segmented circle provides a centralized location for wind and traffic pattern indicators of the airport's runway. ***It is recommended that the Airport consider a change to a non-standard traffic pattern for Runway 32. If a non-standard traffic pattern is implemented, the installation of a segmented circle and an update to appropriate charts and the 5010 will be required.*** Chapter 5, Alternatives Analysis will discuss alternatives for the location. **Exhibit 4-4** shows a future location of the segmented circle, to be combined with the existing windcone.

[19] PAPIs provide color-coded descent guidance to a runway.

Exhibit 4-3 – Future Segmented Circle



No additional airport visual aids are recommended at DYT.

4.2.15 Pavement Markings and Airfield Signage

Runways 14/32 is currently marked as a non-precision runway with the anticipation of the published instrument approaches discussed in **Section 1.9.4**. Non-Precision Runway Markings include centerline, threshold, aiming point, and runway designator markings. Aiming point markings are only required on non-precision runways longer than 4,200' – Runway 14/32 is 2,602' and therefore does not require aiming point markings. ***No improvements to the runway markings are recommended.***

The taxiways are marked with a yellow centerline and aircraft holding position markings. ***No additional improvements to the taxiway markings are recommended.***

DYT is equipped with a standard airfield signage system. Standard airfield signage provides essential guidance information that is used to identify items and locations on an airport, as defined in AC 150/5340-1M8G, *Standards for Airport Sign Systems*. ***It is recommended that DYT monitor the condition of airfield signage for any fading or cracking to ensure pilot situational awareness is maintained at the Airport.***

4.2.16 AWOS

There is an Automated Weather Observation System (AWOS) located at the Airport. The AWOS is located east of the hangar area. The AWOS provides up to date weather observations and generates routine aviation weather reports. Information typically provided by an AWOS includes

wind direction and speed, sky conditions, visibility, temperature, and dew point. The AWOS is MnDOT owned and maintained. The existing AWOS was replaced and relocated in 2021 east of its former location to allow for further building area growth. The AWOS is shown in **Figure 4-2.** ***No improvements are recommended for the AWOS.***

4.3 Landside Facility Recommendations

After evaluating the inventory of the existing facilities of DYT and determining the future needs of the airport and users, the Master Plan includes the following landside facility recommendations:

- Construct additional hangar space to accommodate 95% of the forecasted 43 based aircraft by 2040 (**Section 4.3.1**).
- Eight additional tiedowns are recommended in the 20-year planning period (**Section 4.3.1.2**)
- Reconstruct the Seaplane Ramp to increase its integrity and longevity (**Section 4.3.3**)
- Install additional length or a 'T' to the current seaplane dock. (**Section 4.3.3**)
- Install aquatic invasive species warning signs near the seaplane base facilities (**Section 4.3.3**)
- The concrete pad under the door of Hangar 1 (DAA Owned) should be reconstructed to improve the integrity of the hangar (**Section 4.3.4**)
- Relocate the fuel tank outside of the TOFA. (**Section 4.3.5.1**)
- The Airport should install a Wi-Fi connection to the fuel pump to allow faster credit card authorizations and easier access to the system (**Section 4.3.5.2**)
- Continue to monitor the FAA's and EPA's progress for updated regulations and replacements for AvGas (**Section 4.3.5.3**).
- The Airport should consider installing an aircraft viewing area. (**Section 4.3.7**)
- An SRE/Maintenance Building should be constructed to house existing and future SRE vehicles and attachments (**Section 4.3.8**)
- An SPCC Plan should be completed for all fuel tanks to maintain the site's compliance with 40 CFR Parts 110 through 112 (**Section 4.7.4**)

4.3.1 Aircraft Hangar Storage

DYT hangar storage consists of 9 private hangar buildings that are individually owned with land leases. The existing hangar layout is shown in **Figure 1-5**. Currently, all DYT's 22 aircraft based are hangered (20 single-engine and two multi-engine, averaging 3 aircraft per hangar)[20]. The Airport currently reports a waiting list for aircraft parking space located in Hangar 1. This list currently has seven aircraft owners waiting with another five expected to be on the list by 2030.

Photo 4-2 – DYT Aircraft Apron

The MnDOT SASP recommends enough hangars to accommodate 100% of jet and turboprop aircraft and 95% of single- and multi-engine aircraft based at an airport. Hangar demand for the 20-year planning period was determined using the SASP recommendation and is

[20] BasedAircraft.com, January 15, 2019.

shown in **Table 4-9**. By 2040, it is forecasted that 39 aircraft will be based at DYT requiring approximately 37 hangar spaces (see **Section 2.8** for Based Aircraft forecast).

Table 4-9 – Hangar Capacity Needs

	Base Year (2020)	Forecasted			
		2025	2030	2035	2040
Based Aircraft	22	31	38	40	43
Existing Hangar Capacity	22	22	22	22	22
Estimated Hangar Demand (95%)	21	27	36	38	41
Estimated Hangar Surplus / Shortage	1	-5	-14	-16	-19

Source: SEH

It is recommended that DYT construct hangar space to accommodate 95% of based aircraft by 2040. Locations for additional hangars will be explored in Chapter 5, *Alternatives Analysis*. The based aircraft forecast is unconstrained. Due to the limited space at DYT and sensitive natural area surrounding the airport, there will likely not be able to accommodate the full hangar needs of forecasted based aircraft.

4.3.1.2 Covered Tie-Downs

Hangars are one way for aircraft owners to protect their aircraft from the sun, wind, rain, snow, ice, and hail. Tie-downs subject an airplane to these elements that a hangar offers protection from. Another option, which offers some of the benefits of a hangar, while still subjecting the aircraft to less environmental factors is a covered tie-down, which is like a hangar but without walls. Covered tie-downs provide some protection from the elements that on open air tie-down can't. This protection is depending on wind direction, as wind, rain and snow could still impact the aircraft.

Covered tie-downs at Sky Harbor have the potential to offer a unique leasing option for existing or perspective tenants who may not want to construct or lease a full hangar. Since there is limited development space at DYT, this may provide a different type of revenue without the need to construct hangars. These covered tie-downs could be constructed on the eastern side of the existing apron area and be leased. The covered tie-downs would need to remain clear of the existing ADG I taxilane object free area (TLOFA) and would likely reduce the total number of tiedowns due to the support structure needed to remain clear of the tiedown area. **Photo 4-3** shows an example of what a typical covered tie-down structure looks like.

Photo 4-3 – Example of a covered tie-down structure

The airport should consider offering covered tie-downs for both based and transient aircraft. If a covered tie-down structure was built, it should be located on the eastern edge of the existing apron outside of the ADGI taxilane object free area.

4.3.2 Aircraft Parking Apron and Tiedowns

The existing apron area is approximately 182,150 square yards with 31 aircraft tiedown positions for based and transient aircraft. Minnesota Administrative Rules 8800 require a minimum of three tiedown positions for the Airport to be licensed. The MnDOT SASP recommends that Intermediate Airports have at least enough tiedown space to accommodate all unhangared based aircraft and peak hour transient aircraft. Currently, all based aircraft are hangered at DYT. The airport reports increasing numbers of transient aircraft and marketing to the transient aircraft market is a focus area of the airport.

Calculations for the number of aircraft tiedown recommendations are shown in **Table 4-10**. The total number of tiedowns include those on the seaplane docks. Based on these calculations, ***eight additional tiedowns are recommended in the 20-year planning period***. However, future apron layouts are examined as part of the hangar development alternatives section in **Chapter 4.4**, *Alternatives Analysis*.

Table 4-10 – GA Aircraft Parking Space Needs

	2020	2025	2030	2040
Annual Transient Operations	2,055	1,424	2,585	1,904
Peak Month Transient Operations	386	455	485	545
Peak Day Transient Operations	13	15	16	18
Peak Day Transient Aircraft	6	8	8	9
Tiedown Tenants	23	25	26	30
Tiedown Demand	**29**	**33**	**34**	**39**
Existing Tiedowns (apron)	31	31	31	31
Existing Tiedowns (dock)	8	8	8	8
Surplus/Deficit	**10**	**6**	**5**	**0**

Source: SEH

4.3.3 Seaplane Dock & Ramp

Sky Harbor's seaplane base is served by two water runways on the waters of Superior Bay, a ramp and a seaplane dock. The ramp is located directly south of the A/D building and is 28 feet wide. The ramp leads aircraft past the fuel tank to the apron, the fuel tank is currently located in the OFA for ADG I aircraft. The ramp is in fair condition with cracked concrete and general wear on the surface. The existing plastic strips that protect aircraft floats from the concrete ramp should be replaced as they each reach the end of their useful life. The strips exposed to UV rays, those that are not continuously submerged, have cracked and should be replaced. ***It is recommended the ramp be reconstructed at the end of its useful life. Additionally, alternatives that consider relocation of the seaplane ramp will be evaluated in Chapter 5***

The seaplane dock is located 72 feet down the shoreline from the seaplane ramp. The dock is 120 feet long by 8 feet wide and can accommodate around eight seaplanes tied up at one time.

However, maneuvering this many aircraft onto the dock can be challenging. Stakeholders indicated that, during peak hours, the seaplane dock can get very busy and has limited space depending on the aircraft tied up to the dock. When larger aircraft are parked along the dock, the capacity decreases and increases the potential for damage to aircraft. Due to the location of fueling facilities, the ability to fuel seaplanes can be challenging during peak summer months. Because of the limited dock space, and the number of aircraft utilizing the space, float planes needing tiedown are removed from the water with the float cart and placed on the apron, taking up a parking space that could be utilized by a wheeled/amphibious aircraft. *Additional length to the existing dock would be valuable.* Additionally, a future second or third dock would provide improved tiedown capacity and separation of seaplane users (i.e.. sightseeing tours, transient, and longer-term tiedown). The additional future dock space could help minimize the needs to expand hard surface aircraft parking spaces. New or expanded docks will need a permit from the Minnesota Department of Natural Resources if it will be wider than 8 feet, does not allow free flowing water beneath it, or impacts a shoreline habitat. ***It is recommended an additional dock space be added.*** Alternatives will be explored in **Chapter 5, Alternatives Analysis**.

Minnesota's natural resources are threatened by a number of invasive species such as zebra mussels and Eurasian watermilfoil. Minnesota lake users can help prevent the introduction and spread of aquatic invasive species and proper notice is recommended at all access points of a Minnesota lake, including seaplane bases. ***It is recommended that aquatic invasive species warning signs be installed near the seaplane base.*** These signs can be obtained from the Minnesota DNR.

4.3.4 Arrival/Departure (A/D) Building

The existing designated A/D building has a footprint of approximately 5,200 square feet and includes a 3,600 square foot aircraft hangar, offices, meeting spaces, two single-user restrooms and a storage space that was previously used as a live-in apartment. There is a second level above the office, meeting, and storage space that provides an additional 1,600 square feet of space that is currently used for general storage, mechanical equipment, and an office space that is not utilized. These facilities are located on the north side of the main apron and is the only public facing building of the airport (See **Figure 1-5**).

The A/D building provides pilots with a lounge area, flight planning and restroom. A courtesy car and TNCs are available for transportation for airport users. The A/D Building was built in 1979 and does not meet ADA standards. According to the Facility and Condition Assessment completed by SEH in summer 2022, the building was found to be in overall fair condition with a sound structure but aged interior and exterior finishes, dated mechanical and electrical systems, and an inefficient overall building layout that does not suit the current needs of the users.

The building is well suited for a renovation project that could include updates to the interior layout to suit current and future anticipated needs, improve accessibility and provide more efficient mechanical and electrical system as well as provide a more visually appealing and inviting exterior façade. Additionally, through the course of airport staff/stakeholder discussion, it was noted that there is a desire for more revenue generating and public engagement opportunities to be provided at the A/D Building to take advantage of the higher volume of foot traffic in the summer season. These opportunities would need to work within the seasonal fluctuations of space, so they do not become financially burdensome in the winter months.

4.3.4.1 Building

- Building Structure
  - The building's foundations consist of cast-in-place concrete floating slab that appear to be in good condition showing no significant signs of settlement or deterioration.
  - The main structural system is a pre-engineering steel building including steel columns, open-web roof trusses, tapered roof beams, open-web joists that bears on a concrete masonry wall that runs the perimeter of the lower-level office area. The structural system is in good condition and shows no signs of differential settlement or being overstressed. The load bearing walls are in good condition where visible.
  - The building is insulated with fiberglass batts and a vapor barrier membrane that is 5-inches thick with several holes and areas of damage. ***Replacement or upgrades to the insulation system is recommended as part of a major building renovation to increase thermal performance and reduce energy costs.***
- Exterior Cladding
  - The roof system consists of corrugated metal panel system with gutters and downspouts for drainage. The roof is in fair condition, but well past its useful life. ***It is recommended the roof be replaced within the next 5 years***.
  - Exterior walls are corrugated metal panels that are in fair condition with no signs of water infiltration or damage.
  - Exterior windows are operable metal clad wood units with insulated glass that beyond their useful life. ***It is recommended the windows be replaced***.
  - Exterior walk-doors are steel doors set in steel frames that are aged and ***are recommended to be replaced as part of a major renovation to the building***.
  - The exterior bi-fold hangar door is operational and has been maintained well. Proper regular maintenance is recommended so the door will function as it should for several years. ***It is recommended the door's exterior cladding be replaced as part of a major building upgrade to match the remainder of the building.***
- Interior Finishes
  - The ceilings are acoustical panels suspended in a ceiling grid system. Walls are painted concrete masonry or gypsum board and flooring is vinyl tile or carpeting. The main entry / meeting area of the building have tongue and groove wood boards on the wall. ***Overall, the building's interior is aged, dated, and in poor condition and is recommended to be replaced.***
- Mezzanine Floor Level
  - The mezzanine floor level located above the first floor office areas is currently unoccupied and the use of the space is very limited given the low headroom from the sloping building structure, access to a single egress stair, and lack of accessible access for disabled persons. With modifications, the mezzanine could be used for a few private offices. ***It is recommended to limit the use to general purpose storage and mechanical equipment***.
  - The access of this level is via a wood framed stair accessed from the hangar portion of the building. The stair is not compliant with building codes for egress, does not have proper hand and guardrails, and is structurally in unsound condition. ***It is recommended that replacement of the wood stair be a high priority if access is to be maintained***.

- General Accessibility
  - The State of Minnesota code requires four main accessible elements to be included in a building renovation, accessible access to the building, accessible routes within the building to main use areas, and an accessible restroom and drinking fountain. Should the building be renovated, ***it is recommended to review the handicapped parking stalls, signage, and striping of the parking lot, verifying the main sidewalk entry approach, and the existing restrooms be renovated to provide at least one accessible facility with access to a drinking fountain***.

4.3.4.2 Building Systems

- Plumbing Systems
  - The plumbing system and fixtures are past their useful lives, and **it is recommended the system and fixtures be replaced as part of a major building renovation project**.
  - The water and waste piping system is the original to the building and is in poor condition. The fuel oil fired water heater is in poor condition. ***It is recommended the water, waste system, and water heater be replaced.***
  - The main building water supply is original to the building, in fair condition, and should be serviceable through the near-term.
  - The sanitary system is working but is approaching the end of its useful life. ***It is recommended the sanitary system be replaced.***
- Heating, Ventilation, and Air Conditioning Systems (HVAC)
  - The hangar has older infrared radiant heating at the ceiling and a newer high efficiency gas furnace blowing heat into the room. These systems work but are aged and ***it is recommended they be replaced with newer units***.
  - The office area is served by two old fuel oil fired furnaces with no air conditioning that are original to the building and beyond their useful lives. ***It is recommended the furnaces be replaced with modern, efficient heating units.*** The exhaust venting systems in the restrooms are original and ***it is recommended they be replaced as part of restroom improvements. It is also recommended fresh air ventilation system be installed to improve indoor air quality***.
- Lighting Systems
  - The hangar area has newer LED lighting and is in good condition. The office area has old florescent lighting which is inefficient and beyond their useful operating lifespan. ***It is recommended the office area's lighting system be replaced.***
- Electrical Power Systems
  - The power system is the original to the building with a small 120/240V single phase service with old panels, circuits, and devices. ***It is recommended the entire electrical power system be replaced.***
- Life Safety Systems
  - Only one exit sign with no emergency battery lighting is in the building. Emergency egress signs and lighting systems are inadequate, and ***it is recommended to replace and add proper egress lighting for building occupant safety.***
- Low Voltage Systems

- The low voltage consists of the telephone system which is older and approaching the end of its useful life. ***It is recommended the building data and wi-fi systems be fully integrated into the building***.
- The limited camera system is functional but is older. Future security needs should be determined by the DAA.

4.3.4.3 Space Needs Analysis

A critical component of determining a building project's feasibility is better understanding existing and anticipated space needs. SEH gathered this information through meetings with DAA staff to discuss current and anticipated future needs and brainstorm ideas for further enhancement of the airport and A/D Building. Using the data gathered, the needs were categorized into types of space and assigned a square foot allocation which has identified a total building program of approximate 2,000 square feet. The square foot allocations are shown below in **Table 4-11**.

Table 4-11 – Recommended Needs for Terminal Building

Component Description	Units	Net Square Feet
Pilots Lounge	1	400
Flight Planning Room	1	100
Staff Office	1	120
Meeting Room	1	225
Mechanical Room	1	100
General Storage	1	100
Janitorial Closet	1	70
Restroom	2	140
Exterior Amenity Support	1	150
Subtotal Net Square Feet		**1,405**
Partition & Circulation Factor		602
Total Gross Net Square Feet		**2,007**

4.3.4.4 Conceptual Design

SEH prepared two initial conceptual design options as part of the Building Assessment project based on all information gathered during the facility assessment and space needs analysis. These concepts range from renovations to the existing building to demolition and construction of a completely new addition to the aircraft hangar.

The conceptual design to renovate the existing structure focuses on maximizing the usability and accessibility of the existing building, providing improvements to the exterior façade, and incorporating a public access seating and vending area. The concept includes an interior layout that utilizes the existing space in a more efficient manner while adding features such as a meeting room, accessible bathrooms, and dedicated mechanical and storage spaces. This concept also includes a new interior floor, wall, and ceiling finishes, updated mechanical and electrical systems and new exterior cladding materials on the administration portion of the building. The hangar area would receive a new HVAC system and overall electrical service and panels would be replaced.

The conceptual design to building a new terminal structure proposes removal of the existing terminal structure (leaving the hangar in place) and a new addition to the existing hangar that includes a lounge, office, flight planning and meeting spaces along with mechanical, storage and accessible restroom support spaces. An outdoor seating area along with an interior retail or vending area are also included to support seasonal revenue opportunities. This option provides a more efficient layout because it is not constrained by the existing exterior building shell. The hangar area would receive a new HVAC system and overall electoral service and panels would be replaced.

The Airport desires to include revenue producing space and a meeting room in the future terminal building. These spaces are ineligible for FAA funding. Funding support from MnDOT could be pursued for these spaces.

Appendix C includes the full Terminal Building Study report.

4.3.5 Aviation Fuel

Sky Harbor has a self-service fuel system located southwest of the A/D building. The fueling system consists of one 3,000-gallon aboveground tank containing Aviation Gas (AvGas, 100LL) that was installed in 2008 and are registered with the Minnesota Pollution Control Agency (MPCA). The DAA owns the fuel tank and manages the fueling operations.

4.3.5.1 Fuel Capacity and Demand

Since 2008, the DAA has been filling up the 100LL tank (one 3,000 gallon) an average of five times a year. The area around the fueling facility is in a high congestion area of the apron. As shown on **Figure 1-5**, the fueling facility is in the direct path of the seaplane ramp and right in front of the A/D Building. This location can cause congestion with aircraft entering or exiting the seaplane ramp, fueling at the tank, or parking near the A/D/ Building, or taxing to any near hangars. Additionally, the existing fuel tank is located in the Taxilane Object Free Area (OFA) of the taxilane leading from the apron to the seaplane ramp. ***The fuel tank should be located outside of the TOFA when the fuel tank is replaced at the end of its useful life in 2028.*** The relocation of the fuel tank, seaplane dock and ramp alternatives will be evaluated in **Chapter 5**.

Airport management indicated that the current tank size limits the fuel load the airport can purchase. The need for a larger tank size should be evaluated when the tank is replaced and/or relocated. As part of that analysis, the cost/benefit of various sizes should be evaluated to determine if the additional cost of a larger size would generate sufficient long-term financial or other benefit. While maintenance or replacement of tanks at the end of their useful life is not AIP eligible, supplemental tanks to meet fuel demand is an AIP eligible project. **Chapter 5** will evaluate different size fuel tanks that will provide the most benefit to the airport.

The airport does not currently sell Jet A fuel. Due to the runway length, aircraft that typically utilize Jet A are not likely to be frequent users. Aircraft that utilize Jet A and have or may utilize the airport periodically include Cessna Caravan and Quest Kodiak (wheeled, float and amphibious). A new Jet A fuel system can cost around $400,000-$600,000. FAA funding may be available to cover 90% of the project costs. However, since a fuel system is a revenue generating project, all airside needs must be met for the following three years to use FAA funding. Alternatively, arrangements with the DLH FBO could be made to contract fuel truck services at DYT.

It is recommended that the Airport continue to discuss fuel needs including Jet A with airport users. At this time, it is not recommended that a separate JetA tank be installed at the Airport due to the low demand and high cost of a new fuel system.

4.3.5.2 Aviation Fueling System

The fuel pump at DYT is located adjacent to the seaplane dock and allows both wheeled and amphibious aircraft to fuel in a centralized location. The fuel pump system is connected to the terminal via a dial-up phone line, which is used to update the price and to authorize credit card purchases. Due to the limited availability of dedicated phone lines to access the fuel pump terminal via the modem, the Airport Manger must travel to the Duluth International Airport (DLH), which is also owned by the Duluth Airport Authority, to make any changes to the system. Additionally, the Airport Manager mentioned that the card reader is unreliable and continuously has trouble accepting various magnetic strips. ***It is recommended that Airport upgrade their current fueling system to allow for a Wi-Fi connection to the fuel pump to allow faster credit card authorizations and easier access to the system.***

The existing fueling system as discussed above is located adjacent to the existing apron pavement near the Terminal Building. The fuel tank is located on the north side of the apron and approximately 150’ of underground fuel lines supply the fuel pump located south of the tank near the existing seaplane dock. As discussed in **Section 1.9.7**, Lake Superior water levels continue to be at an all-time high. Reports indicate a varying outlook on the water levels; however, the high-water levels have the potential to impact the underground piping, especially with the freeze/thaw cycles the airport experiences.

There are several options if the fuel tank was relocated including below grade storage and an above grade exposed tank. The fuel tank should be located where there is adequate space, considerations given to the water table, access for maintenance, environmental leak-detection, and the cost to construct the tank. The design and construction of a below grade option may present challenges due to the high-water table as the tank will need mitigate the buoyancy of the tank as well as the freeze/thaw cycle. Above grade storage allows for better leak detection and mitigation compared to below grade. It should be noted that all systems would have leak-detection, however the above ground options benefit from visual checks from staff and are easily accessible for repairs if needed. ***It is recommended that the aviation fuel storage tank remain above grade.***

The fuel piping design will either be above or below grade. Key design considerations include location, water table and the depth of frost. If the piping is running a short distance with no obstacles in the way, then above grade routing could be considered. However, if piping is required over a long distances and/or above grade piping would present a challenge to airport operations, then below grade piping should be considered. Below grade piping would need to consider the water table and 60” deep frost. The selection of above grade or below grade piping depends largely on location and facility layout. Based on the water table and frost depth, below grade piping for the fuel system is possible but a detailed design evaluation is needed. Due to the limited above ground space and required object free areas surrounding taxiways and taxilanes, ***it is recommended that the aviation fueling system piping be located below grade.*** **Chapter 5**, Alternatives Analysis, will evaluate apron area alternatives and consideration will be given to the aviation fuel piping system which currently is below grade.

Several State and Federal codes to consider when designing a fuel system include '2020 MN Mech and Fuel Gas Code', 'ANSI/ASRAE 62.2-2016 and 154-2016', 'NFPA 30 – Flammable and Combustible Liquids Code', 'UL 142 – Steel Above ground Tanks for Flammable and Combustible Liquids'.

4.3.5.3 AvGas Replacement

AvGas is the only transportation fuel that still contains lead. Lead is a toxic substance that can be inhaled or absorbed in the blood stream. The FAA is supporting the research of alternate fuels and is working with the aircraft and engine manufacturers, fuel producers, the EPA, and industry associations to overcome technical and logistical challenges to developing and deploying a new unleaded fuel. The FAA is also working with the EPA to make a smooth transition from leaded to unleaded aviation fuels and to ensure the supply of aviation gasoline is not interrupted so that all aircraft can continue to fly.[21] ***It is recommended that DYT continue to monitor the FAA's and EPA's progress for updated regulations and replacements for AvGas, such as the 100LL currently sold at DYT. The airport could consider the addition of a second fuel tank to support a new alternative fuel type. In the future when 100LL is fully phased out, two tanks could be piped together to provide additional fuel capacity which is a desire of the airport.***

4.3.5.4 Chip Credit Card Reader

EMV[22] credit cards are smart cards which store data on computer chips versus magnetic strips. Due to recent and numerous large-scale data breaches and increasing rates of counterfeit card fraud, U.S. card issuers are migrating to this new EMV technology to protect consumers and reduce the costs of fraud. As of October 1, 2015, due to the implementation of the EMV, the fraud liability shifted from the financial institutions to the merchants (except automated fuel dispensers). On April 1, 2021, the fraud liability shift will take effect for transactions generated from automated fuel dispensers. ***It is recommended when the airport replaced the fuel pump and card reader system to allow for a more secure and faster Wi-Fi connection, that the Airport work with the fuel pump manufacturer to ensure the card reader is capable of accepting EMV credit cards.***

4.3.6 Automobile Parking and Access Roads

4.3.6.1 Automobile Parking

There are approximately 70 parking spaces located around DYT, 30 on airport property and 40 off airport property. There are six designated airport parking spaces, all other parking spaces are shared with the public beach access located to the north of the airport. Based on Minnesota's 2020 Accessibility Code, at least one (1) parking space should be reserved for accessible parking near the A/D building

The spaces are paved and in fair to poor condition. The MnDOT SASP recommends one automobile parking space for every based aircraft plus 25% to account for transient users. However, discussions with Airport Management indicated that the majority of the based aircraft owners park their vehicle inside or near their hangar.

[21] Aviation Gasoline. http://www.faa.gov/about/initiatives/avgas/
[22] EMV stands for Europay, MasterCard and Visa, the three companies that originally created the standard.

Based on existing user trends at DYT, it is estimated that the required number of parking spaces is approximately 10% of based aircraft and 100% of peak day transient aircraft. **Table 4-12** shows the number of forecast based aircraft, peak day transient aircraft, flight training, and corresponding recommended number of parking spaces at DYT for the planning period. ***Using these calculations, DYT currently does not need additional parking spaces.*** The aviation activity forecasts were unconstrained and the ability to meet these recommended parking spaces will likely not be completely fulfilled. It should be noted that the majority of based aircraft owners, who have a hangar, typically park their vehicles in their hanger. Additionally, there is no designated airport parking spaces on Minnesota Point and during peak summer months the beaches along the north side of the point can get busy with additional people parking. Parking spaces within airport property are not designated for airport use during peak summer months.

Table 4-12 – Automobile Parking Needs

	2020	2025	2030	2040
Based Aircraft	**22**	**29**	**34**	**38**
Peak Day Transient Aircraft	21	24	26	29
Recommended Parking Spaces	**28**	**36**	**42**	**47**
Existing Parking Spaces	70	70	70	70
Parking Space Surplus/Shortage	**+42**	**+34**	**+28**	**+23**

Figure 4-6 shows the automobile parking along Minnesota Avenue, both on airport property and off the property.

It is recommended that the Airport work with the City to perform needed pavement repairs for both the general public and Airport visitors.

4.3.6.2 Electric Vehicle Charging

Vehicle (EV) charging at can be offered for visitors, the public and transient pilots. EV charging technology and the costs associated with providing charging stations continue to evolve with innovative technology and more EVs on the roadways. Purchases of EVs are increasing throughout the United States and approximately 2% of all vehicles sold in the United States in 2018, 2019 and 2020 were electric vehicles. As early as 2014, at least 37 airports in the United States were providing EV charging stations, most commonly in short-term or long-term parking facilities. Most airports were not charging a fee for charging[23].

There are three types (levels) of electrical vehicle charging which are classified by Level 1, Level 2 and Level 3. **Table 4-13** below summarizes the different level chargers and their capabilities

Table 4-13 – Summary of EV Charging

Vehicle Charing	Level 1 Chargers	Level 2 Chargers	DC Fast Chargers
Estimated miles of range added per hour (RPH) of charging[1]	2-5 miles	10-20 miles	150+ miles
Panel Requirements	120V	208V or 240V	480V
Compatible vehicles	All	All	Select vehicles

Source: Drive Electric Minnesota, Minnesota Power

[23] ACRP Synthesis 54, Electric Vehicle Charing Stations at Airport Parking Facilities

Level 1 charging stations are generally found in long term parking locations. In most cases the slow rate of Level 1 charging is sufficient for owners if they plan to leave their car for several days. However, the majority of Level 1chargers are not connected to the internet and drivers could return home from a trip and find their vehicle was unplugged and their battery is low, if not dead.

Most Level 2 chargers are connected to the internet and can provide alerts to drivers on the state of their vehicle and battery. Level 2 chargers are generally preferred because most drivers will prefer to get a faster charge. Drive Electric Minnesota recommends Level 2 chargers in locations where people will spend two hours or more.

Level 3 chargers are meant for the rapid charging of an EV and are typically found along highways and frequent transit routes. Level 3 chargers may require investment in additional infrastructure due to their energy requirements. Additionally, not all EV's can use Level 3 chargers due to the various adapters in the United States. The cold temperatures in Duluth could pose a challenge for utilizing Level 3 chargers following a trip, or after a car is parked in the cold for a long duration, because EV batteries need to be warm before being able to utilize Level 3 rapid charging.

Extreme temperatures can have a negative impact on an EV's battery. As discussed in **Section 2.13**, Duluth's average low in the winter (January) is 1.6 degrees and, in the summer (July), the average high is 76.3 degrees. Freezing weather can reduce the range of an EV since batteries are most efficient between 60- and 80-degrees Fahrenheit. Batteries should always stay between 20 and 80% charged in extreme temperatures. These temperatures should be considered when evaluating the type of charging infrastructure needed at the Airport. DC fast charging (Level 3) should also be limited when experiencing extreme temperatures[24].

According to the Minnesota Department of Transposition (MnDOT) Electric Vehicle Dashboard[25], there are 138 battery electric vehicles (BEV) and 120 plug-in Hybrid vehicles registered in St. Louis County. There is also a total of 31 Level 2 chargers and 7 DC fast chargers in the County. According to the dashboard there are several Level 2 and Level 3 chargers located in the Duluth Area including the Holiday Inn downtown and University of Minnesota Duluth. A Tesla Supercharger is located at the Holiday Inn (downtown Duluth) and most other chargers located in the City are on the ChargePoint Network. Additionally, there are several electric vehicle chargers located at the northwest end of the Canal Park business area, these Level 2 vehicle chargers are located approximately 5 miles to the northwest of Sky Harbor.

According to ACRP Synthesis 54, *Electric Vehicle Charging Stations at Airport Parking Facilities*, most Airport sponsors will install a small number of electric vehicle charging stations based on the amount of funding and grant money available and locate the charging stations in an area where there is potential to expand. Most airports do not charge for EV charging if the chargers are in paid lots. Due to the cold winters in Duluth, Level 1 EV chargers may not provide enough power to keep the batteries warm during the winter. Level 3 chargers may provide more power than needed for long-term vehicle parking since Level 3 chargers are generally recommended where passengers stay for less than 24 hours.

If the airport were to consider the installation of EV chargers at the Airport***, it is recommended the airport install a Level 2 vehicle charger.*** Since the Airport shares parking with the public

[24] https://www.chargepoint.com/blog/5-tips-ev-charging-hot-weather/
[25] https://www.dot.state.mn.us/sustainability/electric-vehicle-dashboard.html

beach there may be an opportunity to attract both beachgoers and airport clients. A pricing structure should be explored that encourages vehicle charging while visiting the airport and beaches but discourages long dwell times.

If the Airport decides to install EV charging stations at the Airport, the Airport should coordinate with the local utility company to explore potential rebates and incentives. The City of Duluth installed several electric vehicle chargers at a public lot with the coordination of Minnesota Power.

4.3.6.3 Access Roads

The Airport is located approximately 5 miles east of the downtown district located on Minnesota Point. The Airport is accessed via Minnesota Avenue, which is owned and maintained by the City of Duluth. Minnesota Ave enters the airport property on the northwest side of the airfield as shown in **Figure 1-3**. It has been noted by several stakeholders that during high water events, similar to the ones discussed in **Section 4.2.12**, Minnesota Ave experiences flooding. ***No additional access road improvements are recommended for Minnesota Ave leading into the Airport.***

4.3.7 Community Outreach Opportunities

The Sky Harbor Airport is located in a unique area, as it is situated on the shoreline of Superior Bay, there is beach access to Lake Superior and a hiking trail that runs behind the airport to the point. During several Stakeholder Advisory Committee (SAC) meetings, it has been mentioned that the Park Point Community Club, members of the community and visitors to the Duluth area have utilized the path behind the airport, beach access, and have watched aircraft take off from DYT. Activity in these areas is higher in the summer months, but the winter can see lighter traffic along the trail. The Sky Harbor Airport has a unique opportunity to optimize the location and attraction to the airport. Airports in the region have implemented various outreach opportunities and are discussed below for consideration.

4.3.7.1 Observation and Seating Deck

DYT has community members using the Park Point Trail behind the airport and the beaches on Lake Superior, just northwest of the trail entrance. This creates an opportunity for the community to gather at the airport and view aircraft and airport operations. Love Creamery, a locally owned and operated hand-crafted ice cream business, leases space in the airport hangar (to park an ice cream cart) and frequently parks their ice cream cart near the A/D building entrance in the summer months. The ice cream cart attracts many airport users, beachgoers, and trail users. Constructing a deck and seating area to the west and south sides of the A/D building not only creates a positive community perception and allows for airport hosted events but gives aviation enthusiasts a designated viewing spot away from moving aircraft. There is an existing gate from the parking lot to the aircraft apron and a fence is recommended to surround the deck to prevent the public from accessing airside areas. ***It is recommended that Airport consider the construction of a publicly accessible deck or patio in front of and around the sides of the A/D building in an effort to create a welcoming and safe environment and improved user experience.***

As food and beverages generally attract wildlife, additional monitoring should be increased to ensure that food and waste are properly disposed of in the aircraft view and public areas. It is recommended that any needed wildlife mitigation efforts be increased to deter additional wildlife

hazards. Perch spikes could be installed in areas out of public reach to deter birds from perching in these public viewing and accessible areas.

Exhibit 4-4 shows the potential location and layout of a deck attached to the A/D Building.

Exhibit 4-4 – A/D Building Deck or Patio

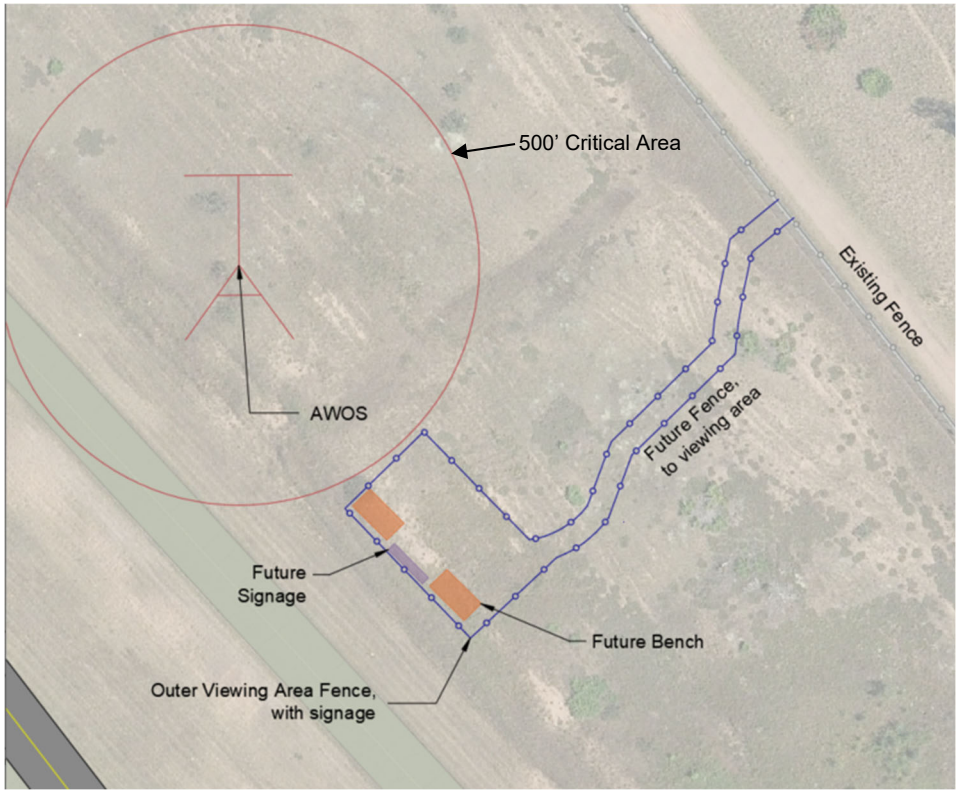
4.3.7.2 Aircraft Viewing Area

Implementing a designated area for members of the community to gather and watch aircraft activity at Duluth Sky Harbor as well as using signage as a vessel of information helps open the airport to the public. DYT has a lot of interesting history with both an asphalt runway and a seaplane base and the unique environmental features. An aircraft viewing area with educational signage about the history of the airport, runway relocation project and environmental features of the sandbar could benefit the airport, aviation in general and get people interested in the airport. ***It is recommended that a future viewing area be included in the A/D building deck area (see 4.3.7.2Exhibit 4-5) or consideration be given to a location near the AWOS.***

The Park Point Community Trail runs right behind the airport property, along the airport fence line providing walking access to a potential viewing area. **Exhibit 4-5** shows a potential location of an airport viewing area. The location is outside the 500' Critical Area, so the area does not need to conform to AWOS Siting Criteria, however further coordination with MnDOT Office of Aeronautics NAVAID division will be required, due to the proximity of the AWOS. Adequate fencing would be required to ensure public safety and protection of the AWOS equipment.

Appendix D shows examples of conceptual view boards that could be placed in the aircraft viewing area depicted below.

Exhibit 4-5 – Aircraft Viewing Area



4.3.8 SRE & Maintenance Equipment

The Airport owns and operates a pick-up with a snowplow attachment and a New Holland tractor with a snowplow attachment (Snow Wing 12/18 Plow) for snow removal operations. The DAA provides personnel for snow removal and maintenance (e.g. mowing) at the Airport. The equipment is currently being stored in the DAA's hangar, limiting the space for needed aircraft storage.

According to the FAA's SRE and maintenance equipment calculations (see **Table 4-13**), DYT is eligible for federal funding to acquire one sweeper and one hopper spreader to meet snow removal needs. For general aviation airports, the ADO typically recommends one carrier unit with associated attachments to cover the majority of an airport's snow removal needs. The carrier unit could include the attachments noted above, such as a blower, sweeper, and plow.

Based on stakeholder and airport feedback, an SRE building is preferred to accommodate SRE equipment and remove it from the existing hangar. The SRE building will be sized based on airport needs and in accordance with FAA design criteria related to the existing SRE that will be stored in the building. ***It is recommended that an SRE Building be constructed to house existing and future Airport equipment if eligible SRE is acquired using federal funds***

Table 4-13 – SRE and Maintenance Equipment Needs

Type	Existing	Eligible for FAA Funding	Recommendations
Plow	2	0	None
Snow Blower	1	0	None
Sweeper	0	1	***Acquire Attachment***
Hopper Spreader	0	1	***Acquire Attachment***
Front End Loader	0	0	None

Snow Removal Equipment buildings are intended to protect the AIP funded snow removal equipment and materials. SRE buildings funding is limited for non-primary airports to a facility that is 1,600 square feet. If the Airport wishes to construct a larger SRE building, portions will likely be considered ineligible for AIP funding and MnDOT funding may be requested. Design and site selection guidance is laid out in Advisory Circular 150/5220-18A. **Chapter 5**, **Alternatives Analysis**, will evaluate the needed size and the preferred location for an SRE building.

4.3.9 Airport Fencing

The Airport has 10-foot chain link fencing located around the existing hangars and along the Park Point Trail (which is outside of the fence) that is parallel to the airport property to the north, as shown in **Figure 1-3**. The fence is also located along the airport access road to separate automobile parking from the airfield and ends at the water edge. An electric vehicle gate and a pedestrian gate are located next to the A/D building which allow tenants to access their hangar. Minnesota Administrative Rules and the MnDOT SASP requires all licensed airports to have sufficient fencing around the Airport property to prevent people who are not engaged in aviation activities from accessing the aircraft movement areas. The FAA recommends a 10-12-foot chain-link fence topped with 3-strand barbed wire outriggers to minimize deer accessing aircraft movement areas. In certain cases, an 8-foot chain link fence with 3-strand barbed wire outriggers may be sufficient to prevent deer access. However, the FAA will not fund a project to construct a fence that is lower than 10 feet in total height (fence plus barbed wire). A 4-foot skirt may be buried along the outside of the fence to prevent mammals from digging under the fence and to mitigate the effects of frost heaving and the chance of wash out. ***No additional perimeter fence is recommended.***

4.3.10 Customs and Border Protection Facilities

Sky Harbor is currently a Port of Entry airport and provides U.S. Custom and Border Protection (CBP) services to aircraft arriving from international airports. CBP currently provides their services by using a mobile vehicle to drive from the Port of Duluth to Sky Harbor Airport. CBP servicers are typically provided though a Federal Inspection Services (FIS) area and is referend to as a General Aviation Facility (GAF) for DYT sized airports. CBP requires these facilities to be free space, requiring that the agency pays nothing to construct, own or operate the facility. This free space requirement is strictly enforced by CBP.

The 20-year forecast anticipates no more than 40 aircraft annually requesting CBP services at the airport. Historically, annual passenger numbers and aircraft have varied, however, recently the sole business operator at DYT pulled out leaving no businesses at DYT that would require

CBP services. Wheeled and float aircraft utilize CBP services at DYT; float aircraft are considered vessels by CBP and can operate under different requirements than wheeled aircraft. **Table 4-14** shows the historical and forecasted number of aircraft that need CBP services at DYT. Due to the recent commercial operators vacating operations at DYT, the forecasted numbers reflect the change in operation based on conversation with the Airport Manager and anticipated tenant uses of CBP services. It should be noted that, due the runway length and facilities at DYT, the majority of persons clearing Customs at DYT will likely be returning from Canada and will likely have fewer than 10 passengers onboard. Based on past passenger trends, passengers are typically United States Citizens.

Table 4-14 – Historical and Forecasted CBP Aircraft and Passenger Counts

	2016	2017	2018	2019	2020*	2025*	2030*	2035*	2040*
Annual Flights	69	79	54	68	40	43	46	46	48
Annual Passengers	270	305	209	279	*Difficult to predict future passenger volume*				

Notes: Forecast passenger numbers is difficult in the future years due to the lack of data provided
*Forecasted years using the general aviation growth rate

Source: Customs and Border Protection, Port of Duluth

The forecasted numbers for 2020 and 2021 are not representative of normal use different than the normal. Halfway through 2020, two flights were cleared through customs at DYT. The border between the United States and Canada was closed due to the COVID-19 pandemic from March 21, 2020, through November 9, 2021, for all non-essential travel.

Based on several conversations with CBP Port of Duluth and CBP Regional Staff three recommendations were identified and are discussed below.

4.3.10.2 Continued Use of Mobile CBP Services

CBP currently provides services to DYT by using a mobile vehicle to drive from the Port of Duluth to Sky Harbor to clear aircraft. CBP has previously indicated that the use of the Reporting Offsite Arrival – Mobile (ROAM) system is not feasible at DYT per their current standards.

Airport management has indicated that around 40 flights are expected to be cleared through CBP per year. At this level of activity, the CBP Regional Port Director deemed this an acceptable level for the continuation of mobile services at DYT (per records from a 2022 meeting between DAA and CBP). If flights increase to numbers *substantially* over 40 per year, a GAF facility will be required to be constructed. CBP could not provide a specific number at which a GAF would be required.

Historically, DYT had business operators utilizing CBP services, however that business is no longer operating. As the commercial operator no longer operates out of Sky Harbor frequency and type of services needed change. CBP indicated that if the airport decides to pursue a commercial operator with anticipated international traffic or if one came to DYT, a GAF facility will be required to be constructed regardless of the anticipated number of operations.

4.3.10.3 Construct a General Aviation Facility

CBP typically requires the construction of a General Aviation Facility (GAF) to provide services out of at airports that are similar in size to DYT. To meet the requirements of CBP standards, the GAF requires facilities such as a pre-processing passenger waiting area, CBP processing area,

interview room, search room, hold room, general office area and network storage areas Each of these required rooms has a recommended square footage allocation outlined by CBP.

In May of 2022, Customs and Border Protection provided a space matrix based on their 2018 General Aviation Facility Design Standards (GAFDS) design standards. This space matrix outlines their required facilities and needed space to provide services at Sky Harbor inside a General Aviation Facility (GAF). This space matrix estimates 1,585 square feet of needed space. The Port of Duluth requested that the GAF plan for a maximum of 10 passengers per flight. While this space matrix provides the ability to develop a cost estimate, the Airport will need to work with CBP at the time of construction to reevaluate the space matrix and the GAF will need to be developed to the current GAFDS at the time of construction.

CBP's Design Standard Documents outline the required square footage and construction requirements of the facility. In addition, Port of Duluth Staff were able to identify the needed facilities for a GAF at DYT and provide information technology (IT) requirements that would likely be required for a GAF. **Table 4-15** provides high-level cost estimates for the construction of a GAF at DYT. It should be noted that CBP would not be fully supportive of the Airport building a GAF if it is not going to be financially feasible for the airport to construct.

Table 4-15 – Cost Estimations for a General Aviation Facility at DYT

	Construct New Facility	Renovate Existing Facilities
Technology Costs[1]	$25,000	$25,000
Building and Infrastructure	$920,000	$408,000
TOTAL:	**$945,000**	**$433,000**

Notes: Amounts are in 2022 Dollars; costs are also developed using the space matrix provided in 2022 based on the 2018 AFDS and is subject to change. Building and infrastructure cost includes new mechanical and electrical systems for the portion to be used by CBP, no exterior upgrades beyond new windows and doors are included.

[1]CBP estimates an additional $750 per year in technology maintenance costs.

Source: SEH, Port of Duluth CBP Staff

4.3.10.4 Close the Port of Entry at Sky Harbor

If the airport decided to close the Port of Entry, a letter of intent from the DAA indicating this request is necessary to be submitted to CBP Regional Staff. At the time the letter is received, CBP would cease providing customs services to the airport.

The request to close the Port of Entry would then be sent through the proper governmental channels, which also includes review by various representatives and senators within the State and Federal governments. If the Airport does not wish to construct a GAF or flight numbers exceed the threshold set by CBP, it was recommended from Port staff to engage congressional delegations early in the process. It was indicated that this process would likely take several years to get all necessary documentation through, however the airport would immediately be taken off the list of international airports. There are no costs associated with closing a port of entry.

4.3.10.5 Recommendation for Customs and Boarder Protection Services at DYT

Following the desire of the DAA to continue to provide these services at DYT, it was agreed that the DAA and CBP will continue to monitor flight activity at DYT and that mobile processing should

continue. As discussed, mobile services at DYT are approved with the existing activity levels of international flights at the airport. A substantial increase international activity or the start of a commercial operator intending to provide operations to Canada, CBP would require a GAF.

If a GAF is required in the future and is found to not be feasible by the Airport at the time of requirement, the Port of Entry would be closed. Any proposed action by the airport would need to be approved by the Regional Port Director or a higher position within the agency.

It is recommended the airport continue with mobile Customs and Border Protection services and that the Airport continue to have conversations with CBP on the status of activity and future airport growth.

4.3.11 Building Fire Suppression and Building Floor Evlations

4.3.11.1 Fire Suppression

Three key factors in determining the required fire suppression for proposed building structures is occupancy (purpose of structure), hazard classification (materials planned to be stored in structure), and type of construction. SEH coordinated with the City of Duluth Construction Services, Fire Marshal, and Planning Department early on, during the Pre-Review Meeting conducted in September of 2022 to the SRE Building design. That meeting agreed to the following:

- Snow Removal Building (SRE) – Since the SRE is for storage of equipment only; the building would be deemed a S-1 occupancy, Light/Ordinary Hazard, and Type II-B Single Story Building with Non-Combustible Construction Materials. Knowing the three key elements, helped determined what would be required for DAA on this project.

Based on the agreed classification of S-1 for the building and MN Fire Code 903.2.9 Group S-1 conditions -- The fire marshal agreed the proposed structure did not have any of the conditions and determined the building did not require an automatic sprinkler system.

903.2.9 Group S-1.

An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 fire area exceeds 12,000 square feet (1,115 m^2).
2. A Group S-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2,230 m^2).
4. Group S-1 fire area is used for the storage of commercial motor vehicles where the fire area exceeds 5,000 square feet (464 m^2).

903.2.9.1 Repair garages.

An *automatic sprinkler system* shall be provided throughout all buildings used as repair garages in accordance with Section 406.8 of the *International Building Code*, as shown:

1. Buildings having two or more stories above grade plane, including *basements*, with a *fire area* containing a repair garage exceeding 10,000 square feet (929 m^2).
2. Buildings not more than one story above grade plane, with a *fire area* containing a repair garage exceeding 12,000 square feet (1115 m^2).
3. Buildings with repair garages servicing vehicles parked in *basements*.
4. A Group S-1 *fire area* used for the repair of commercial motor vehicles where the *fire area* exceeds 5,000 square feet (464 m^2).

2020 MN Fire Code – Chapter 9

https://codes.iccsafe.org/content/MNFC2020P1/chapter-9-fire-protection-and-life-safety-systems

With the proposed building being non-sprinklered, the airport needed to confirm and verify that there was enough water supply for the Fire Department. The Fire Marshal agreed during the Pre-Review meeting with the City of Duluth, Airport and SEH, that the airport could combined tested flow results from the wet & dry hydrants alike to meet the Code requirements.

Based on the **MN Fire Code – Chapter 5: an *approved* water supply capable of supplying the required fire flow for fire protection shall be provided to premises on which facilities, buildings or portions of buildings are hereafter constructed or moved into or within the jurisdiction**. The project worked to confirm what fire flow was provided at the airport and meeting the following requirements:

507.3 Fire flow.

Fire flow requirements for buildings or portions of buildings and facilities shall be determined by an approved method. If no municipal water supply exists, the minimum water flow and duration requirements for new buildings, portions of buildings hereafter constructed, or buildings moved into or within the jurisdiction shall be as specified in Table 507.3.

TABLE 507.3 MINIMUM FIRE FLOW REQUIREMENTS

HAZARD CLASSIFICATION[1]	SPRINKLERED BUILDING[2]	UNSPRINKLERED OR PARTIALLY SPRINKLERED BUILDING	DURATION (minutes)
Light Hazard	100 gpm available for fire department use	250 gpm available for fire department use	30
Ordinary Hazard	250 gpm available for fire department use	500 gpm available for fire department use	60
Extra Hazard	500 gpm available for fire department use	750 gpm available for fire department use	90
High Piled Combustible Storage	Hose stream demand from sprinkler installation standard (NFPA 13) or 500 gpm, whichever is larger	1,000 gpm available for fire department use	120
Other Group H Occupancies	Hose stream demand from sprinkler installation standard (NFPA 13, MSFC Chapter 57, etc.) or 500 gpm, whichever is larger	1,000 gpm available for fire department use	120

1. Light, ordinary, and extra hazard are as defined in NFPA 13, Standard for the Installation of Automatic Sprinkler Systems.
2. In sprinklered buildings, when a fixed water supply is used for the sprinklers, the hose stream available for fire department need not come from the fixed source (i.e. tank).

2020 MN Fire Code – Chapter 5
https://codes.iccsafe.org/content/MNFC2020P1/chapter-5-fire-service-features

With the airport having private watermain that connects to the City of Duluth system and private hydrants located on the airport, flow testing was conducted on the existing (2) wet and (1) dry hydrants. The private watermain & wet hydrants provided a flow rate of less than 150 gpm (gallons per minute), which was completed by Viking Sprinkler Systems on October 6, 2022, with DYT and City of Duluth Fire Marshal present. The dry hydrant was tested on December 12, 2022, by Northern DeWatering Inc., which resulted in estimated rates of 1,000 – 1,500 gpm. for a duration of 1.5 hours (See attached results report). With this testing information, it was determined that the airport can supply enough fire flow to meet both Light/Ordinary Hazard minimum fire flow requirements.

Additionally, with the City of Duluth adopting Appendix B of the MN Fire Code, the provided water supply at the airport had to meet the requirements listed below based on the factors listed prior:

TABLE B105.1(2) REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2

FIRE-FLOW CALCULATION AREA (square feet)					FIRE FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	

2020 MN Fire Code – Appendix B (see below link for full table)
https://codes.iccsafe.org/content/MNFC2020P1/appendix-b-fire-flow-requirements-for-buildings

Dry-Hydrant Operation

As seen above, the dry hydrant provides adequate flow rates for the City of Duluth Fire Department and ensuring water supply is available in the event of a fire at the Airport. The City of Duluth Fire Marshal agreed that the dry hydrant is a necessary operation to provide flow for the

airport, as the City of Duluth water pressure near the end of the Harbor is extremely low. Improvements to the watermain is not seen in the foreseeable future and would be an unreasonable cost for the Airport to encounter. The Fire Marshal indicated that if the Airport flushes & tests the dry hydrant by a 3rd party, the Fire Department agreed to conduct yearly training exercises at the airport. This verbal and informal agreement (via phone call on December 21, 2022 with SEH) will allow the Fire Department to keep up to date on dry hydrant operations, exercising for fire fighters and allow the dry hydrant to be continuously clean of any build-up of debris for future. This would result in minimizing flushing that the airport may have to encounter.

Future Development for Fire Suppression

Moving forward on future development projects, the proposed building(s) would need to work through the similar process and determining the factors for the structure.

Based on discussion with City of Duluth officials, it is expected the dry hydrant would provide adequate fire flow for structure(s) beneath the threshold shown in the requirements. In the likelihood of the proposed structure area increasing; the Fire Marshal agreed that if the airport elected to install another dry hydrant on the property, it would be approved, supported, and accepted as a way to supply water for the Department.

4.3.11.2 Floor Elevations and other Shoreland/Floodplain Regulations

During the Pre-Design Meeting, it was determined that a follow-up meeting (held on September 26, 2022) with SEH and the City of Duluth Planning Department was needed to elaborate more on potential issues with the proposed building. With the location of the Sky Harbor Airport, the City of Duluth has Unified Development Chapter requirements projects must follow and indicated the airport is located within a shoreland and FEMA flood zone. This originally resulted in the City requesting the finished floor elevation be elevated 2-feet above the Base Flood Elevation (BFE) – 605.00', to meet the Regulatory Flood Protection Elevation (RFPE) of 607.00', that is established by FEMA. This would have resulted the SRE Building being raised by 1-foot, which was not feasible due to location of the proposed structure and the whole airport being below the RFPE.

The City understood the difficulties in having the airport meet the requirement put forth in the UDC and supplied additional guidance on how the City would apply regulations for Sky Harbor Airport. Working with the City of Duluth Planning Department, the attached memorandum provided guidance on proposed buildings at the airport.

Additionally, after following conversations after further evaluation of the memorandum. SEH was provided clarity on the following paragraphs from the Shoreland and Floodplain Memo provided by the City of Duluth (November 16, 2022).

- The structure must be adequately anchored to prevent flotation, collapse or lateral movement of the structure and shall be designed to equalize hydrostatic flood forces on exterior walls;
- Any mechanical and utility equipment in a structure must be elevated to or above the Regulatory Flood Protection Elevation or properly floodproofed;

The statement implies that proposed structures must be floodproofed. One proposed solution, provided by SEH to the City) for the DYT SRE Building was to wet-floodproof the building (FP-4). Wet-floodproofing the building would result in:

- Raising the building foundation wall 1-foot above the RFPE

- Installing all equipment inside above the foundation wall
- Installing flood gates/vents inside the foundation wall to equalize the hydrostatic flood forces on exterior walls
- Increasing concrete floor thickness to prevent flotation of the structure

4.4 Airspace and Obstructions Recommendations

DYT is in Class G Airspace, which extends up to but not including 700' AGL. Class E airspace beings at 700' above ground level (AGL). Class G airspace allows for the transition between IFR and VFR traffic and to be separated to avoid any traffic conflicts. Class G is the least restrictive airspace and Class E allows for ATC services to be offered[26]. Class E begins at 700' AGL and extends upward to 18,000 above mean seas level (MSL).

14 Code of Federal Regulations (CFR) Part 77 defines and establishes the standards for determining obstructions to an airport's imaginary surfaces. Imaginary surfaces are geometric shapes that are in relation to the Airport and each runway, as defined in 14 CFR Part 77. The size and dimensions of these imaginary surfaces are based on the category of each runway for existing and planned airport operations. The five imaginary surfaces are the Primary, Approach, Horizontal, Conical, and Transitional. Objects that penetrate these surfaces are considered an obstruction and therefore affects navigable airspace and should be removed.

After taking inventory of the existing airspace of DYT and determining the future needs, the Master Plan has developed the following landside facility recommendations:

- Routine maintenance on the obstruction lights and wind cone, such as replacing the light bulb when needed (**Section 4.4.2.3**)

4.4.1 Part 77 Imaginary Surfaces

The size and dimensions of each imaginary surface is based on the category of each runway. In respect to 14 CFR Part 77, Runway 14/32 is considered a "Utility Runway" with planned non-precision instrument approaches to Runway 32.

The five imaginary surfaces and their dimensional criteria for DYT's existing conditions are defined below.

Primary Surface - The Primary Surface is an imaginary obstruction-limiting surface that is specified as a rectangular surface longitudinally centered about a runway. The Primary Surface extends 200 feet beyond each end of the runway. Runway 14/32's existing Primary Surface is 500 feet wide and 3,000 feet long.

Approach Surface - The Approach Surface is an imaginary obstruction-limiting surface that is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance upon the type of available or planned approach by aircraft to a runway. Runway 14's approach surface expands uniformly from the Primary Surface to a width of 1,250 feet at a distance of 5,000 feet. Runway 32's approach surface expands uniformly from the Primary Surface to a width of 2,000 feet at a

[26] Controlled airspace is a portion of airspace that may be subject to air traffic control when operating under Instrument Flight Rules (IFR). There are no communication requirements to operate within Class E Airspace, but a pilot can request traffic advisory services from ATC.

distance of 5,000 feet. Both runway approach surfaces have a slope of 20 feet horizontally to 1 foot vertically.

Horizontal Surface - The Horizontal Surface is an imaginary obstruction-limiting surface that is specified as a portion of a horizontal plane surrounding a runway and is located 150 feet above the established airport elevation. The perimeter of which is constructed by swinging arcs of a specified radii from the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by lines tangent to those arcs. Runway 14/32 has an arc radius of 5,000 feet.

Conical Surface - The Conical Surface is an imaginary obstruction-limiting surface that extends from the edge of the horizontal surface outward and upward at a slope of 20 feet horizontally to 1 foot vertically for a horizontal distance of 4,000 feet.

Transitional Surface - The Transitional Surface is an imaginary obstruction-limiting surface that extends outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 feet horizontally to 1 foot vertically from the sides of the primary and approach surfaces.

4.4.2 Part 77 Obstructions

Per 14 CFR Part 77, obstructions are defined as any object of natural growth, terrain, permanent or temporary construction equipment, or permanent or temporary manmade structure that penetrates an imaginary surface. Prior to any airport development, a Part 77 evaluation must be conducted, regardless of project scale, to verify that there will be no hazardous effect to air navigation due to construction.

An obstruction survey was completed in May 2021 as part of this Master Plan to determine if there are any obstructions to Runway 14/32's existing Part 77 Imaginary Surfaces. Per Grant Assurance 20, the Airport must "*take appropriate action to assure that such terminal airspace as is required to protect instrument and operations to the airport […] will be adequately cleared and protected by […] mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards*." Additionally, the State of Minnesota requires a clear Primary Surface and Approach surface in order to maintain a Public Airport License.

4.4.2.1 Runway 14 End

Using the latest obstruction data, the Part 77 Approach Surface to the existing Runway 14 end was evaluated for obstructions. The existing Part 77 Approach Surface (Visual, 20:1) and the corresponding obstructions are depicted in **Figure 4-8**.

There are no obstructions to the runway's 20:1 approach surface.

4.4.2.2 Runway 32 End

Using the latest obstruction data, the Part 77 Approach Surface to the existing Runway 32 end was also evaluated for obstructions. The existing and future Part 77 Approach Surface (1-Mile, 20:1) and the corresponding obstruction are depicted **Figure 4-9**.

There are no obstructions to the Runway's 20:1 approach surface.

4.4.2.3 Part 77 Transitional Surface

Prior to the runway relocation project, there were several trees that penetrated the Part 77 transitional surface and were marked with obstruction lighting as recommended by FAR Part 77. Using the latest obstruction data, the Part 77 transitional surface was re-evaluated for obstruction to the new location of Runway 14/32. This was done to evaluate the need for the obstruction lights that are currently installed to the north of the airport.

There are obstructions to the Part 77 transitional surface: areas of trees and one wind cone. The wind cone currently has an obstruction light on the top, continued replacement of the light is recommended. The trees are near the end of Runway 32 impact the surface, however there are currently obstruction lights along the fence line that the trees are between. Since this area of vegetation and trees are environmentally protected, the removal of the trees is not possible. The existing and future Part 77 transitional Surface (7:1) and the corresponding obstructions are depicted on **Figure 4-10**. Obstruction lighting requirements will be discussed in **Chapter 5**.

4.4.3 Terminal Instrument Procedures (TERPS) Surfaces

The Terminal Instrument Procedures (TERPS) (Order 8260.3C) prescribes the criteria for the creation, approach, and publishing of approach and departure procedures to an airport. TERPS criteria specifies the minimum elevation for obstacle clearance to supply a satisfactory level of vertical protection for aircraft from obstructions. The standards for a TERPS approach surface were determined using FAA Engineering Brief No. 99 dated September 20, 2018.

Runway 14's existing Approach Surface is visual and future TERPS Approach Surface uses Surface 1 within Table 3-2 of AC 150/5300-13B, shown on **Figure 4-12**. Runway 32's existing and future TERPS Approach Surface uses Surface 1 and Surface 2 of Table 3-2 of AC 150/5300-13B, shown on **Figure 4-13**.

Both Runway 14 and 32 TERPS Departure Surfaces use Surface 7 of Table 3-2 of AC 150/5300-13B, shown on **Figure 4-15.** The TERPS Departure Surface standards has two sections. Section one has an inner width the same of runway and expand uniformly to a width of 3,756 feet at a distance of 12,152 feet, with a slope of 40:1. Section two has an inner width of 1,000 feet and expands uniformly to a width of 7,512 feet at a distance of 12,152 feet.

There are no obstructions to the TERPs Approach or Departure surfaces, therefore no recommendations are required.

4.4.4 Obstruction Analysis and Obstacle Action Plan (OAP):

An Obstacle Action Plan (OAP) was developed for all unmitigated obstacles to maintain clearance of existing Approach and Departure surfaces at DYT. The OAP summarizes and details unmitigated obstacles and identifies how and when the surfaces will be cleared and maintained cleared. The OAP identifies obstacles as defined in: Table 3-2, Table 3-4 and Table 3-5 of AC 150/5300-13B, *Airport Design (9/28/2012); FAA Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS)*; and 14 CFR Part 77 Imaginary Surfaces. As shown in **Figure 4-14**, there are seven obstructions to the Part 77 Transitional Surface. These obstructions include one windcone and six trees. No formal Obstacle Action Plan was included in the scope of this project.

Based on the 7460-1 Submittal case number 2021-AGL-11834-NRA***, it is recommended that the obstruction lights remain and routine maintenance to the lights continue as well as the wind cone*.

4.4.5 Runway 32 Approach – Anchorage Area

The anchorage area located in Superior Bay in the Runway 32 approach is a potentially incompatible land uses if used by tall vessels which penetrate the protected airspace surfaces for Runway 32. The anchorage area is not currently dredged to a usable depth. The USACE is responsible for dredging the anchorage area for suitable use and the area is not currently dredged to suitable depths, and the area is not listed for dredging in the future.

As part of the Environmental Assessment process for the runway relocation, the United States Army Corps of Engineers (USACE) in coordination with the United States Coast Guard (USCG) agreed to issue a Notice to Navigational Interests indicating that a portion of the anchorage area is unusable. Currently, there is no Notice to Navigation Interest issued for the anchorage area or notes listed on navigational charts on the unsuitable anchorage area. Therefore, ***it is recommended that the United States Army Corps of Engineers issue a Notice to Navigational Interest on the unusable anchorage area in the Runway 32 approach.***

The Airport, during the Environmental Assessment process, indicated intentions to pursue permanent deauthorization of either a portion of or all of the anchorage area, permanently eliminating the potential incompatible use***. It is recommended the Airport seek permanent deauthorization of the anchorage area, or at a minimum, the portions that would be incompatible based on anticipated ship heights.***

4.5 Airport Property, Acquisition, and Easement Recommendations

Any airport property, when described in a grant or listed in the Exhibit A Property Map, is considered to be “dedicated” or obligated property for airport purposes only and is subject to all FAA Airport Sponsor Grant Assurances. Airport Grant Assurances, in relation to airport property, require airport sponsors, such as DYT, to hold a good working title (#4), preserve all rights and powers (#5), ensure compatible land uses (#21), and to keep an updated Airport Layout Plan (ALP) showing boundaries of the Airport, all existing and proposed airport facilities, location of all existing and proposed non-aeronautical use areas (#29). When non-aeronautical uses exist on an airport but are not properly documented and are not approved by the FAA they are considered encroachments to airport property. The following sections list the possible encroachments to airport property and the recommendations for those encroachments.

The Airport currently owns 82.13 acres in fee, and an additional 2 acres in Avigation easements.

An update to the Exhibit A property map was not included in the scope for this project and a large effort was taken following the runway reconstruction project discussed in **Section 1.3.3.1**.

4.5.1 Section 163 Land Release

As discussed in **Section 1.3.3.1**, the Duluth Airport Authority (DAA) has worked in consultation with many federal and state agencies since 2007 after the DAA identified obstructions to the Runway 32 approach surface to shorten the runway to 2,600 feet and rotate the runway onto new fill material in Superior Bay. This effort was complete to relocate the runway approach outside of

the DNR Scientific and Natural Area (SNA), as shown on **Figure 4-16**. The relocated runway was opened in 2020 and protects the valuable resources within the SNA.

As part of this project, it was anticipated that the sale of 10.35 acres with approximately 1,350 trees would become part of the SNA, since the land was no longer needed for an aeronautical purpose. The DNR has been involved since the inception of this project and supports the acquisition of the land. DAA continues to pursue funding of a purchase of airport land no longer needed for aeronautical use and conversations are still ongoing.

As shown in **Figure 4-16**, Parcels 14, 15, 18 and portions of parcels 19 and 20 on the current Exhibit A are no longer needed for an aeronautical purpose and ***it is recommended that the DAA pursue a Section 163 Determination for these listed parcels.***

An FAA Section 163 determination will be required prior to any development. This determination will allow the FAA to concur that the site is not needed for the safe operation of aeronautical activity and allow the site to be developed for non-aeronautical purposes.

4.5.2 Concurrent Use Agreement

As discussed in the previous section (**Section 4.5**), any airport property, when described in a grant or listed in the Exhibit 'A' Property Map, is considered to be "dedicated" or obligated property for airport purposes only and is subject to FAA Grant Assurances. Proposed nonaeronautical uses of airport property should be discussed with the FAA at their earliest conception to determine applicable federal requirements. FAA approval is required to release any land from dedicated aeronautical use on airport property. Many of the recommendations above recommend the Airport seek approval from the FAA for a concurrent use. A concurrent land use can be an appropriate compatible land use, to meet Grant Assurance 21, if the aeronautical land is to remain in use for its primary aeronautical purpose but may also be used for a compatible revenue producing non-aeronautical purpose. Concurrent land use means that the land can be used for more than one purpose at the same time (aeronautical and non-aeronautical). For example, portions of land needed for clear approach surfaces could also be used for agriculture purposes at the same time. Concurrent use requires FAA approval, but no formal release of land is necessary. Any funds received by the airport (e.g. rent) for a concurrent use should be based on fair market rent and are considered airport revenue (Grant Assurance 25).

Any release, modification, reformation or amendment of an airport agreement between the airport owner and the United States must be based on a request made in writing and signed by a duly authorized official of the public agency that owns the airport with full concurrence of the airport owner. Evidence of such authorization must accompany the request. The FAA is not required to grant a land release or approve concurrent use. As described in Chapter 22 of Order 5190.6B, *FAA Airport Compliance Manual*, for a concurrent use request to the FAA, the Airport Sponsor will need:

1. Cover letter explaining why the land was originally purchased (such as protection) and that the proposed use will not interfere with the original "use" of the property, and explain the benefits of the proposed concurrent use;
2. Plat of the lease with a boundary description;
3. Summary Appraisal that includes a statement of fair market rent;
4. Draft copy of the lease agreement;

5. Copy of letter approving airspace study; and
6. National Environmental Policy Act (NEPA) Clearance.

There are currently no concurrent uses at Sky Harbor, ***therefore, no recommendations are needed.***

4.6 Zoning Recommendations

Minnesota Administrative Rules, Chapter 8800 requires all licensed airports to have Airport Zoning. There are two parts to the Airport Zoning requirements: Air Space Obstruction Zoning and Land Use Safety Zoning. These are discussed further in the sections that follow.

4.6.1 MnDOT Clear Zones

MnDOT Aeronautics requires airports to have adequate Clear Zones in place to restrict land uses that may be hazardous to the operational safety of aircraft and to protect life and property in the runway approach areas. To meet MnDOT Aeronautics' Clear Zone requirements, the recommended Clear Zones for existing runway conditions are shown in **Table 4-16**. Runway 14 is a visual runway and Runway 32 isa non-precision utility runway with planned less than 1-mile approaches. Nearly all the land within Runway 14/32's MnDOT Clear Zones is owned or controlled by the Airport, as shown in **Figure 4-5**. Areas not controlled included Superior Bay. **No changes to land ownership within the Clear Zone is recommended.**

Table 4-16 – MnDOT Clear Zone Requirements

Runway	MnDOT Clear Zone	Inner Width	Length	Outer Width
Existing and Future Runway 14	Visual Utility	500'	1,000'	675'
Planned Runway 32	Non-Precision Utility (≥1 mile)	500'	1,000'	800'

Source: MnDOT Office of Aeronautics Policy Statement No.1: Clear Zone Requirements, October 2005

4.6.2 Minnesota Airport Airspace Obstruction Zoning

The purpose of the Airspace Obstruction Zoning is to ensure that no objects penetrate the 14 CFR Part 77 imaginary surfaces, except, when necessary, to airport operations. Any object which penetrates these surfaces is considered an obstruction and affects navigable airspace and must be removed.

Duluth Sky Harbor Regional Airport Zoning Ordinance was adopted by the City of Duluth in 1994. Existing dimensional criteria and use restrictions for DYT's Airspace Obstruction Zones are described in **Table 4-17**. At the time the zoning ordinance was adopted, it consisted of the runway length of 3,500 feet for Runway 14/32. All zones prescribed in the ordinance below meet the criteria of the MnDOT zoning requirements.

Table 4-17 – DYT Airspace Obstruction Zoning Standards

Airspace Zones	Existing Dimensional Criteria	Ultimate Dimensional Criteria
Primary	RW 14/32: 500' x 3,000'	Determined as part of the Alternatives Analysis in **Chapter 5**.
Approach	RW 14/32: 500' x 10,000' x 3,500'[1]; 20:1 Slope	
Horizontal	Arc Radius of 6,000'[2]	
Conical	4,000' from Horizontal; 20:1 Slope	
Transitional	Slope of 7:1	

Note[1]: Inner Width by Length by Outer Width
Note[2]: 150 feet above airport elevation (608.5.0'); from the center of each end of primary surface and connecting the adjacent arcs by the lines of tangent.

Source: Duluth Sky Harbor Regional Airport Zoning Ordinance, 1994

The Airport is currently zoned for a previous planned runway length of 3,350 feet for Runway 14/32. As part of the Environmental Assessment process for the relocation of Runway 14/32 (See **Section 1.3.3.1**) MnDOT indicated that a revised zoning ordinance for the new runway length and orientation was not required as the existing ordinance provided adequate protection. ***Because no changes are recommended to the existing runway, no revisions are recommended for DYT's Airport Safety Zoning ordinance.***

4.6.3 Minnesota Airport Safety Zoning

The purposes of the Land Use Safety Zones are to ensure that the areas around the Airport are clear of incompatible land uses, enhancing the safety of pilots and aircraft, as well as protecting people and property on the ground. There are three types of safety zones: A, B, and C.

Duluth Sky Harbor Airport Zoning Ordinance was adopted by the City of Duluth in 1994. A copy of DYT's 2018 Zoning Ordinance can be found in **Appendix B**. The zoning ordinance is based on runway length of 4,400 feet for Runway 14/32. Safety Zone Standards are described in in **Table 4-18**.

Table 4-18 – DYT Safety Zone Standards

Safety Zone	Existing Dimensional Criteria	Use Restrictions
A	RW 14/32: 500' x 2,230' x 1,168'[1]	Shall contain no buildings, temporary structures, exposed transmission lines, or other similar above-ground land use structural hazards and shall be restricted to those uses which will not create, attract, or bring together an assembly of persons thereon. Permitted uses may include agriculture (seasonal corps), horticulture, animal husbandry, raising livestock, wildlife habitat, light outdoor recreation (non-spectator), cemeteries, and auto parking.
B	RW 14/32: 1,168' x 1,120' x 1,504'[1]	Land included in Zone B shall be restricted in use as follows: a. Each use shall be on a site whose area shall not be less than three acres. b. Each use shall not create, attract, or bring together a site population that would exceed 15 times that of the site acreage. c. Each site shall have no more than one building plot up which any number of structures may be erected. d. A building plot shall be a single, uniform, and non-contrived area, whose shape is uncomplicated and whose area shall not exceed the minim ratios with respect to the total site area.
C	All that land within the perimeter of the Part 77 horizontal surface, which is not included in Zone A or Zone B. Radius of 6,000'[2]	No use shall be made of any land which creates or causes interference with the operation of radio or electronic facilities on the Airport, makes it difficult for pilots to distinguish between airport lights and other lights, results in glare in the eyes of pilots using the Airport, impairs visibility in the vicinity of the Airport, or otherwise endangers the landing, taking off, or maneuvering of aircraft.

Note[1]: Inner Width by Length by Outer Width

Note[2]: From the center of each end of primary surface and connecting the adjacent arcs by the lines of tangent.

Source: Duluth Sky Harbor Airport Zoning Ordinance, 1994.

No recommended changes are needed for the Airport Safety Zoning.

4.7 Environmental and Sustainability Recommendations

As indicated in **(Section 1.18)**, no specific sustainability plan has been developed for the Airport. There can be many benefits of airport sustainability planning, including reduced energy consumption, reduced noise impacts, reduced hazardous and solid waste generation, reduced greenhouse gas emissions, improved water quality, improved community relations, and cost savings. The following discussion focuses on the sustainability recommendations regarding hazardous and solid waste generation.

Under the current facility operations, waste generated by hanger users is looked at as separate from the waste generated in the public-accessed facilities and, as a result, the Airport has little control over the hangar waste. Under the recommendations outlined below, that control does not

change; however, the proposed programs are meant to educate and promote proper waste management methods for all airport users.

The purpose of the proposed recommendations is to ensure waste generated at the Airport is managed in compliance with environmental regulations and reduce land disposal of waste as stipulated under Minnesota Statute §115A.02. Given the small amount of waste generated at the facility, the hazardous and solid waste sustainability efforts will probably not represent a cost savings to the Airport. Because the quantities of saleable materials generated at DYT is anticipated to be low, it is most cost effective to utilize the convenience of WLSSD programs to manage recyclable materials. As a result, the hazardous and solid waste sustainability efforts will not generate additional revenue based on recyclable commodities. A summary of the environmental and sustainability recommendations is listed below and reference the section it is further discussed in.

- It is Recommended that communication with WLSSD to create and implement a 3-step waste reduction, education, and recycling plan.
  - These programs should be evaluated annually and discussed with the WLSSD Administrator to determine if the waste reduction efforts are adequate, if there have been any regulatory changes and whether any modifications are necessary.
- An SPCC Plan should be completed for all tanks on the DYT property to maintain the site's compliance with 40 CFR Parts 110 through 112. ***(Section 4.7.4)***

4.7.1 Waste Reduction

The Minnesota Waste Management Hierarchy (Minn. Stat. §115A.02) gives highest preference for waste reduction and reuse. Any efforts to reduce waste generation at a facility not only reduces the volume of waste requiring land disposal, it reduces the overall volume of waste generated to begin with. Waste reduction is generally recognized by packaging reduction, office paper reduction, composting, and material re-use.

Four areas have been identified to establish and meet potential waste reduction goals for the Airport:

1. Promote the use of multiple use beverage containers for water, coffee, etc.
2. Upgrade notifications to airport users from paper to electronic media using electronic mail, website notifications, etc.
3. Utilize WLSSD to identify potential re-use or proper disposal of site materials and equipment. Options should be explored to reduce solid waste generation through logistical changes, purchasing policies, or recycling efforts for any unique waste materials generated routinely or as part of special construction projects.
4. Explore the possibility of implementing a recycling program at DYT.

Once implemented, the programs should be evaluated annually and discussed with the WLSSD Administrator to determine if the waste reduction efforts are adequate, if there have been any regulatory changes, and whether any modifications are necessary.

4.7.2 Waste Education

Waste education can be the most important way to encourage proper management of hazardous and solid waste. The WLSSD and the MPCA has resources available to residents and

businesses to help with waste education through brochures. People who are aware of the impacts that waste can have on the environment are more likely to seek out and use waste abatement programs.

Two areas have been identified to establish and meet potential waste education goals for DYT:

1. Obtain and display for airport users published brochures from the WLSSD and/or the MPCA to promote proper waste management activities. Particular efforts should be made in the proper management of maintenance waste including antifreeze, tires, vehicle batteries, oil filters, and used oil.
2. Establish site-specific airport waste abatement goals and prepare signage or notifications for airport users to assist the facility in meeting the goals.

Once implemented, the programs should be evaluated annually and discussed with the WLSSD Administrator to determine if the waste reduction efforts are adequate, if there have been any regulatory changes, and whether any modifications are necessary.

4.7.3 Waste Recycling

Recycling in the form of source separation has become the backbone for waste management programs. However, knowledge and convenience remain the driving force behind successful recycling programs. Knowledge in the form of waste education recommendations is presented above in **Section 4.7.2**. Convenience and availability are addressed here.

Three areas have been identified to establish and meet waste recycling goals for DYT:

1. Provide easy access, recycling bins on-site for basic recyclable material (newspaper, cardboard, cans, glass, and plastic) in order to promote recycling in areas with highest waste generation (like the Terminal building) and the self-service fueling areas.
2. Provide centralized indoor storage area for the storage of problem materials, particularly those banned from land disposal including fluorescent lamps, electronics, appliances, HHW, used motor oil and motor oil filters, tires, lead acid, nickel-cadmium, and vehicle batteries.
3. Assign duties to airport personnel to monitor recycling bins and the problem material storage area and make arrangements, as necessary, to transport materials to appropriate recycling and/or drop-off locations. Records should be kept on the volume of material transported for recycling and compared to the volume of waste material generated in order to document the amount of waste that has been diverted from land disposal on an annual basis.

Once implemented, the programs should be evaluated annually and discussed with the WLSSD Administrator to determine if the waste reduction efforts are adequate, if there have been any regulatory changes, and whether any modifications are necessary.

4.7.4 Other Regulated Environmental Activities

Because of the storage of certain materials on-site, the Airport activities fall under environmental regulatory requirements. The United States Environmental Protection Agency (U.S. EPA) has established regulations for oil pollution prevention in the Code of Federal Regulations, Title 40

(40 CFR), Parts 110 through 112. The three primary criteria for facilities requiring an SPCC Plan are as follows:

- The facility must be non-transportation related and engaged in drilling, producing, gathering, storing, processing, refining, transferring, distributing, using, or consuming oil and oil products.
- The facility must have an aggregate aboveground storage capacity greater than 1,320 gallons or below ground storage capacity greater than 42,000 gallons.
- There must be a reasonable expectation that, due to its location, the facility could discharge oil into or upon the navigable waters or adjoining shorelines of the United States.

DYT stores a 3,000-gallon Aviation gas AST, approximately 0.05 miles north of Lake Superior. Thus, the facility meets all the primary criteria requiring an SPCC Plan.

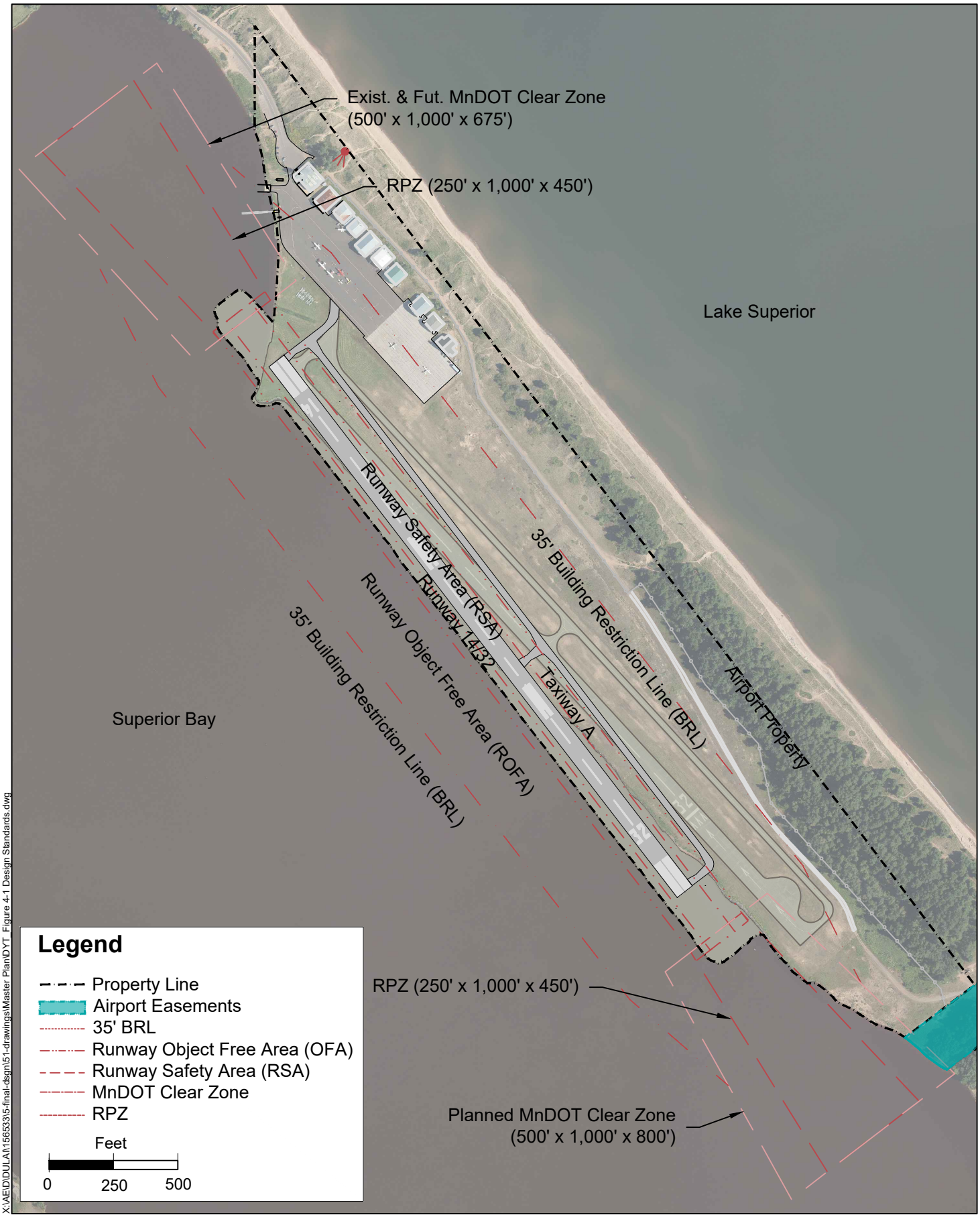
The Airport has indicated that an SPCC Plan has not been prepared for the property. ***An SPCC Plan should be completed for the DYT to maintain the site's compliance with 40 CFR Parts 110 through 112.***

Building Area Planning Study

Figure 4-1

Sky Harbor Regional Airport
Duluth, Minnesota

Existing Design Standards
01/2021; DULAI 156533



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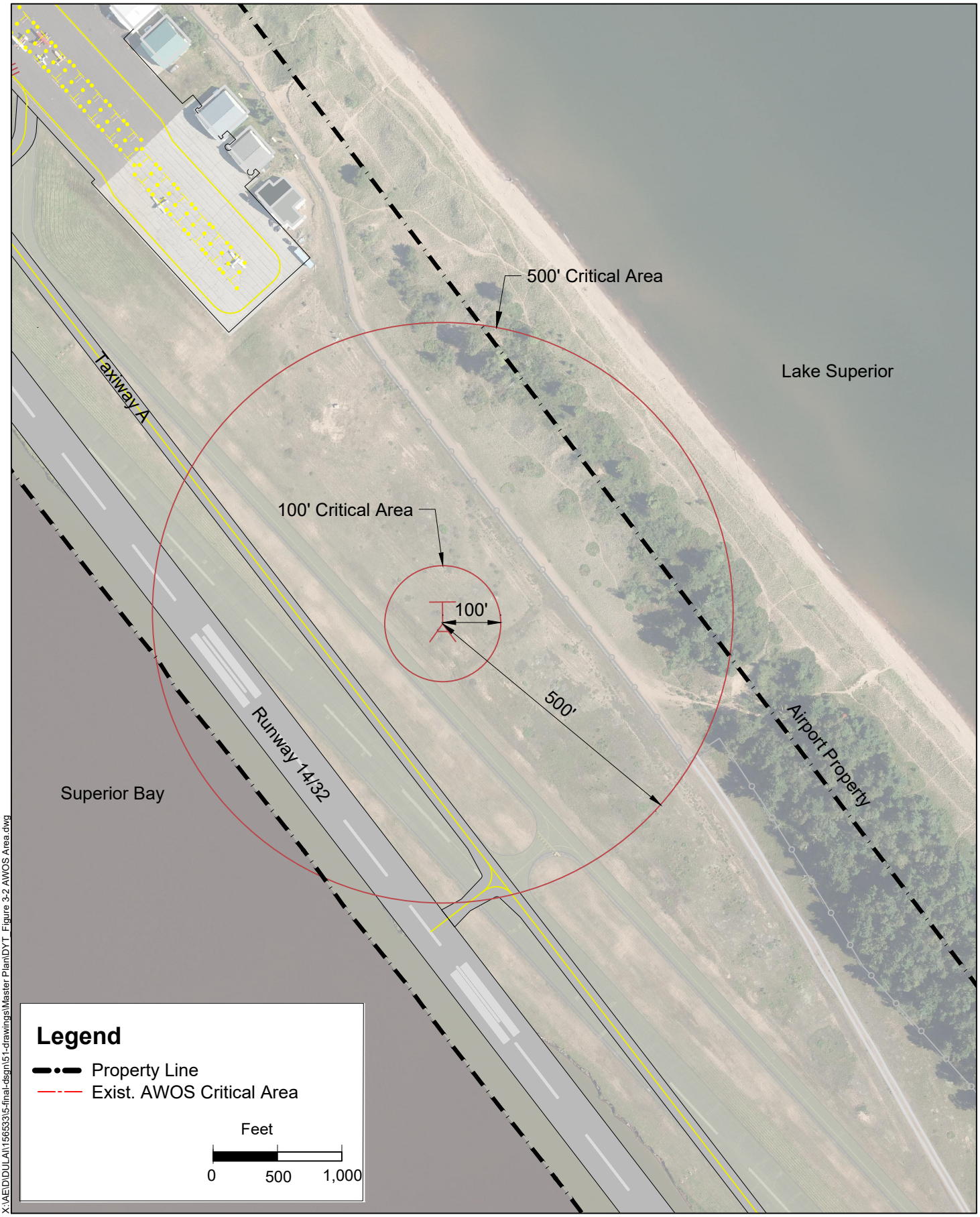
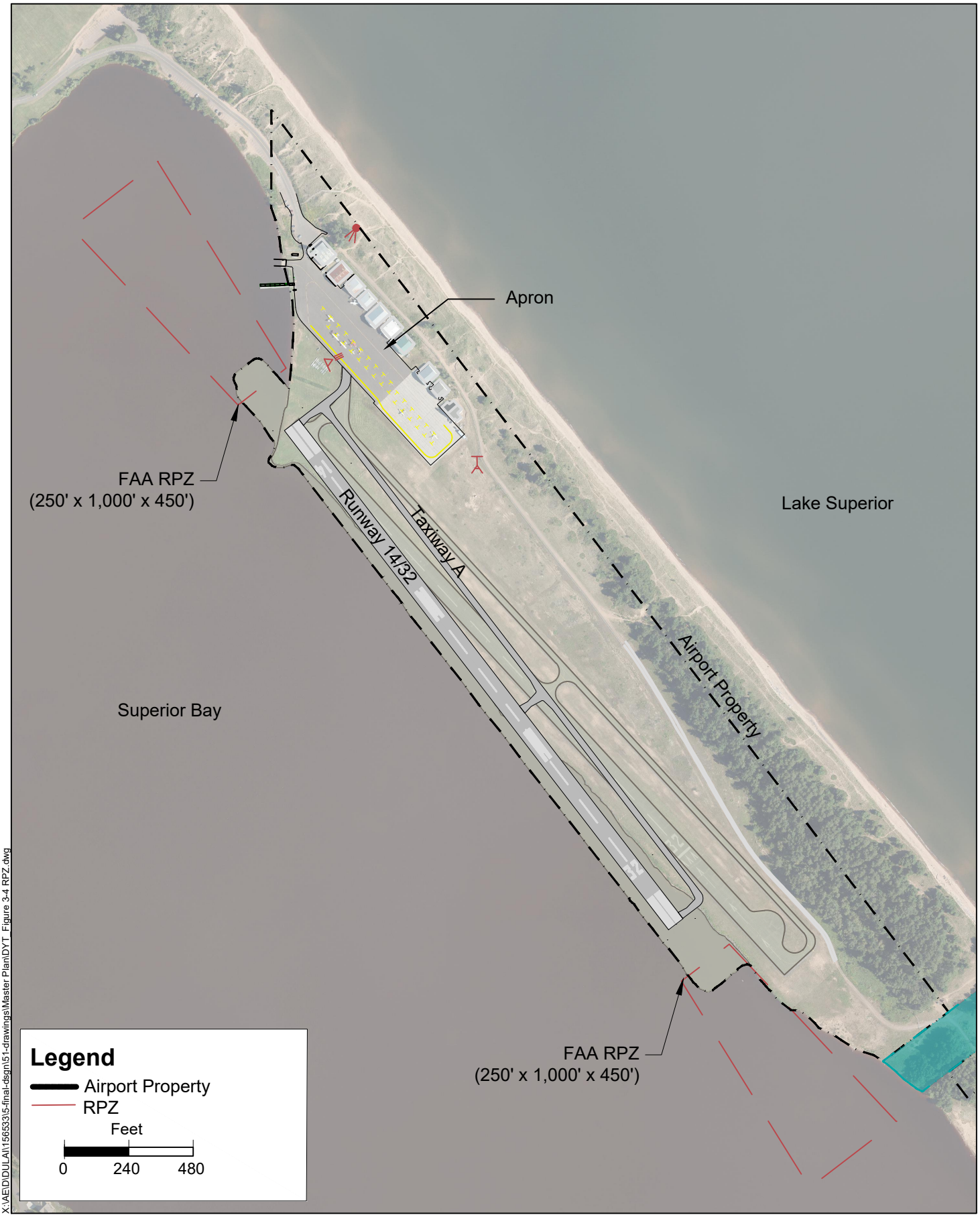


X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\Master Plan\DYT_Figure 3-2 AWOS Area.dwg



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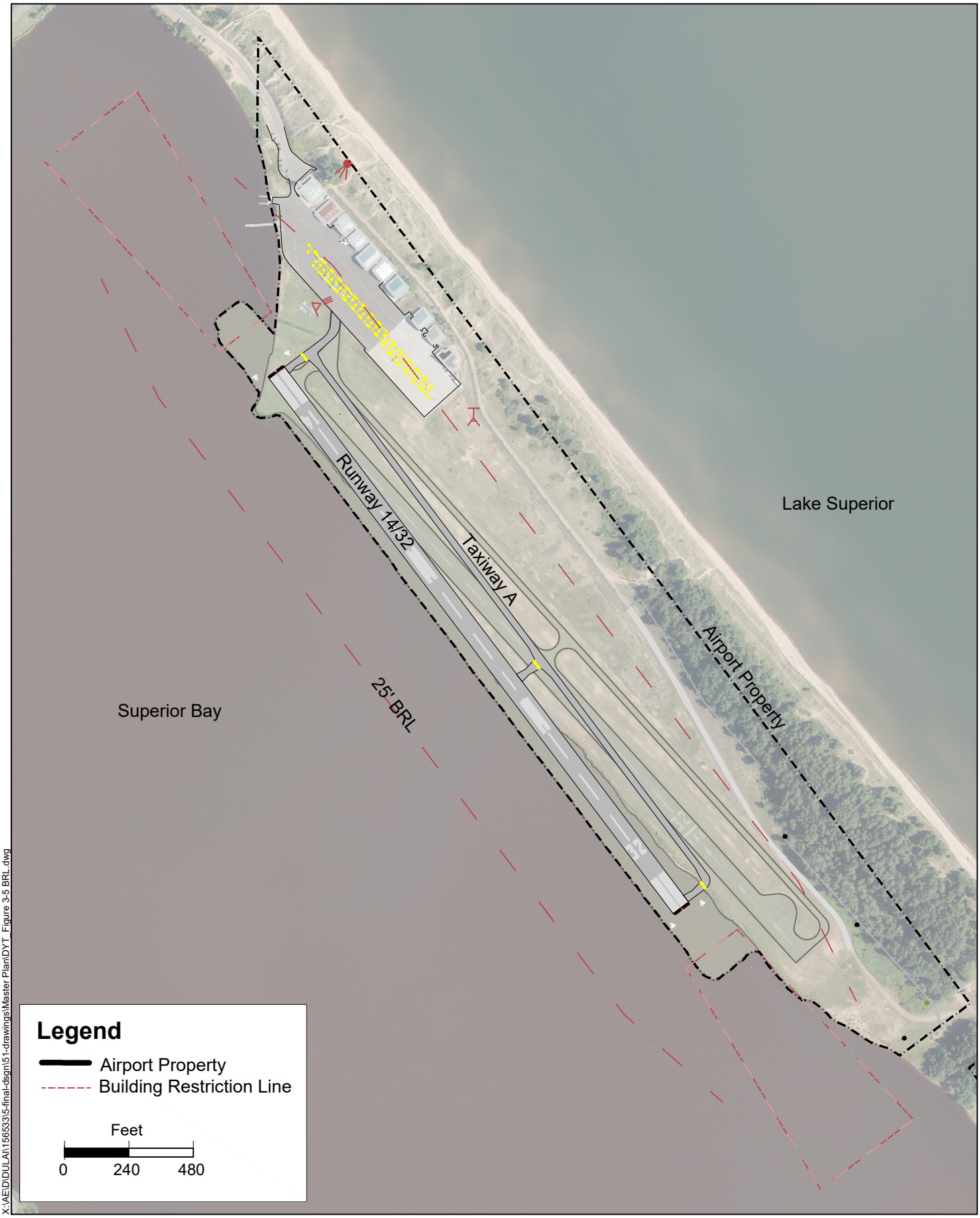
Building Area Planning Study

Figure 4-4

Sky Harbor Regional Airport
Duluth, Minnesota

Building Restriction Line
02/2021; DULAI 156533



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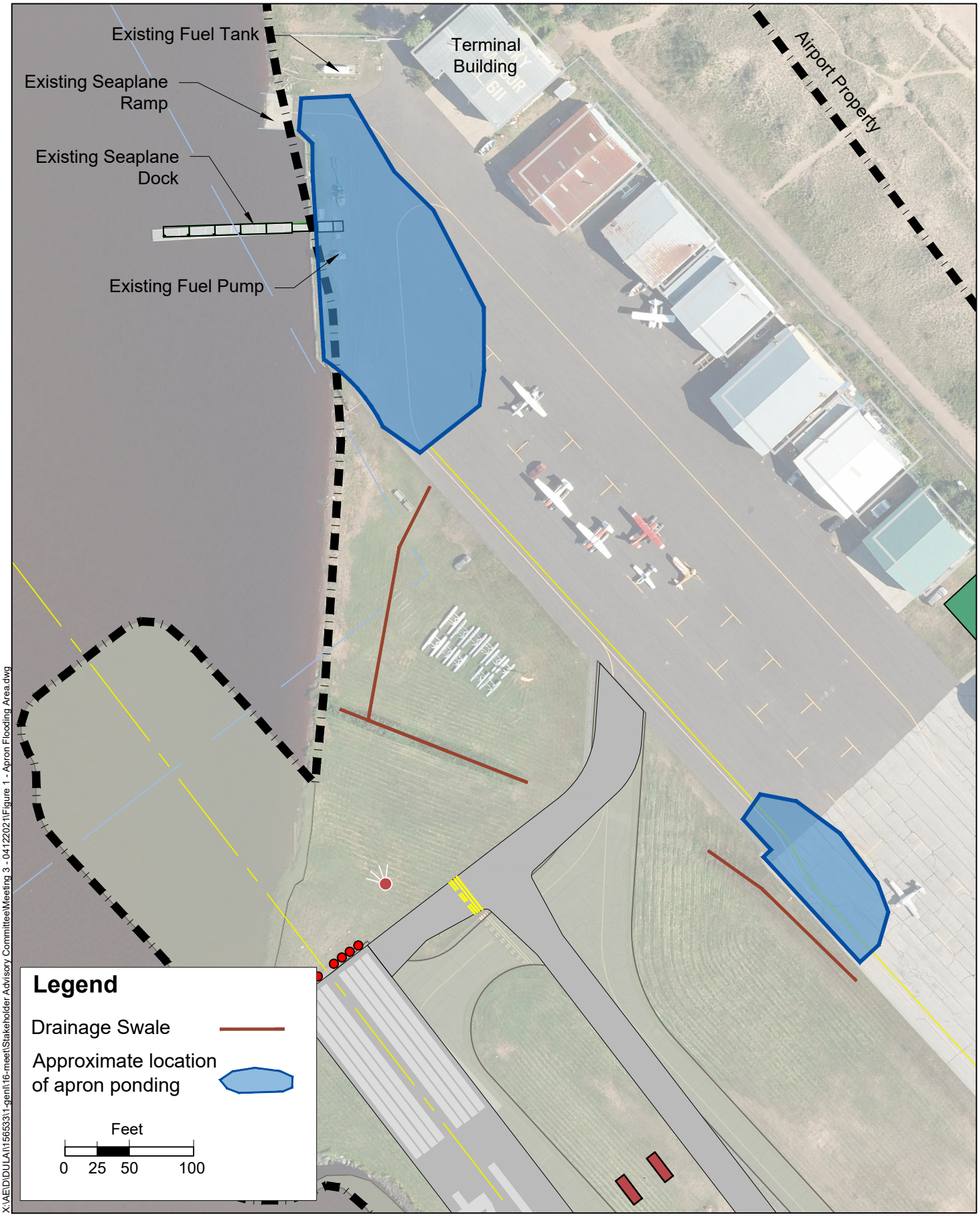
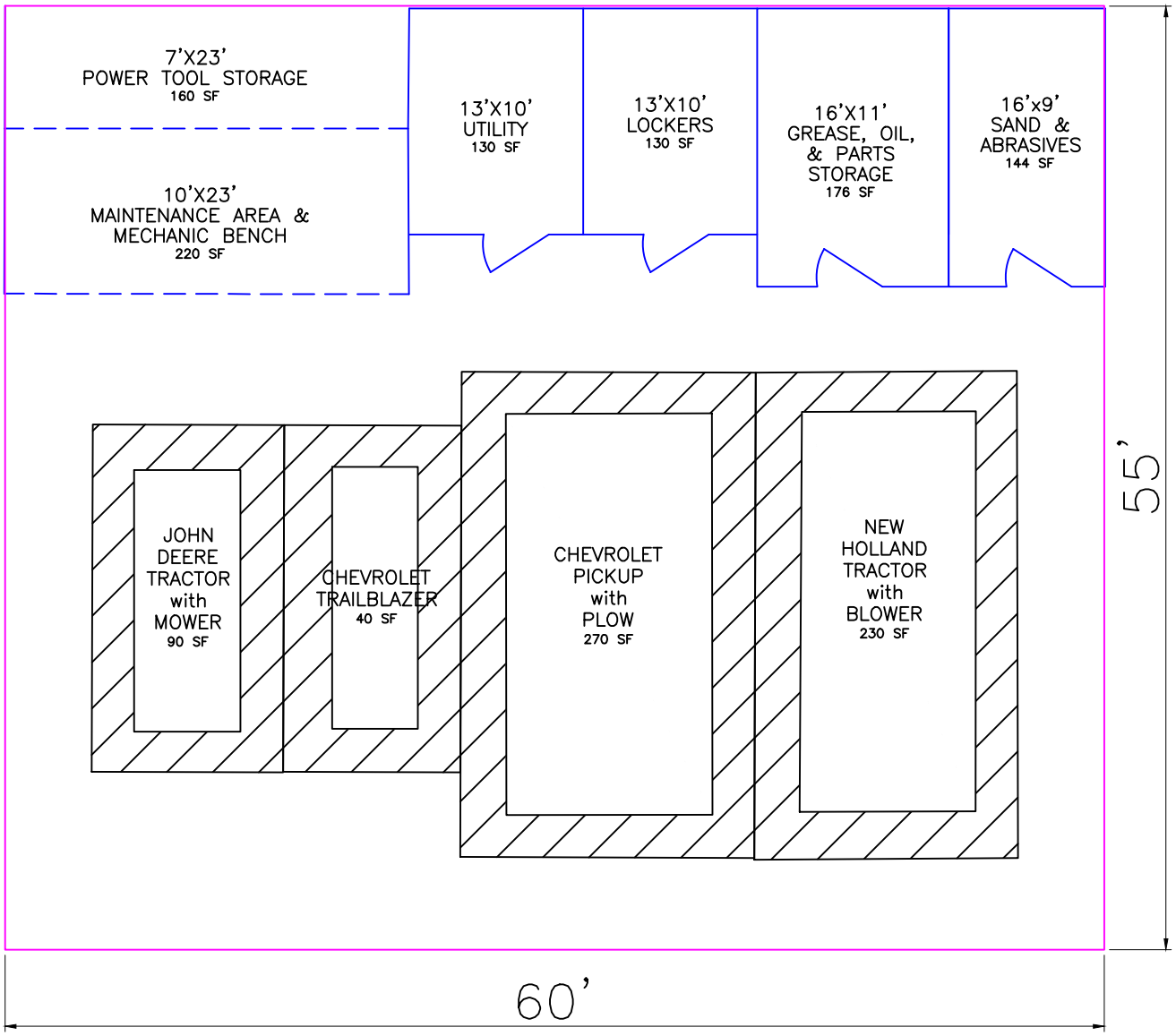
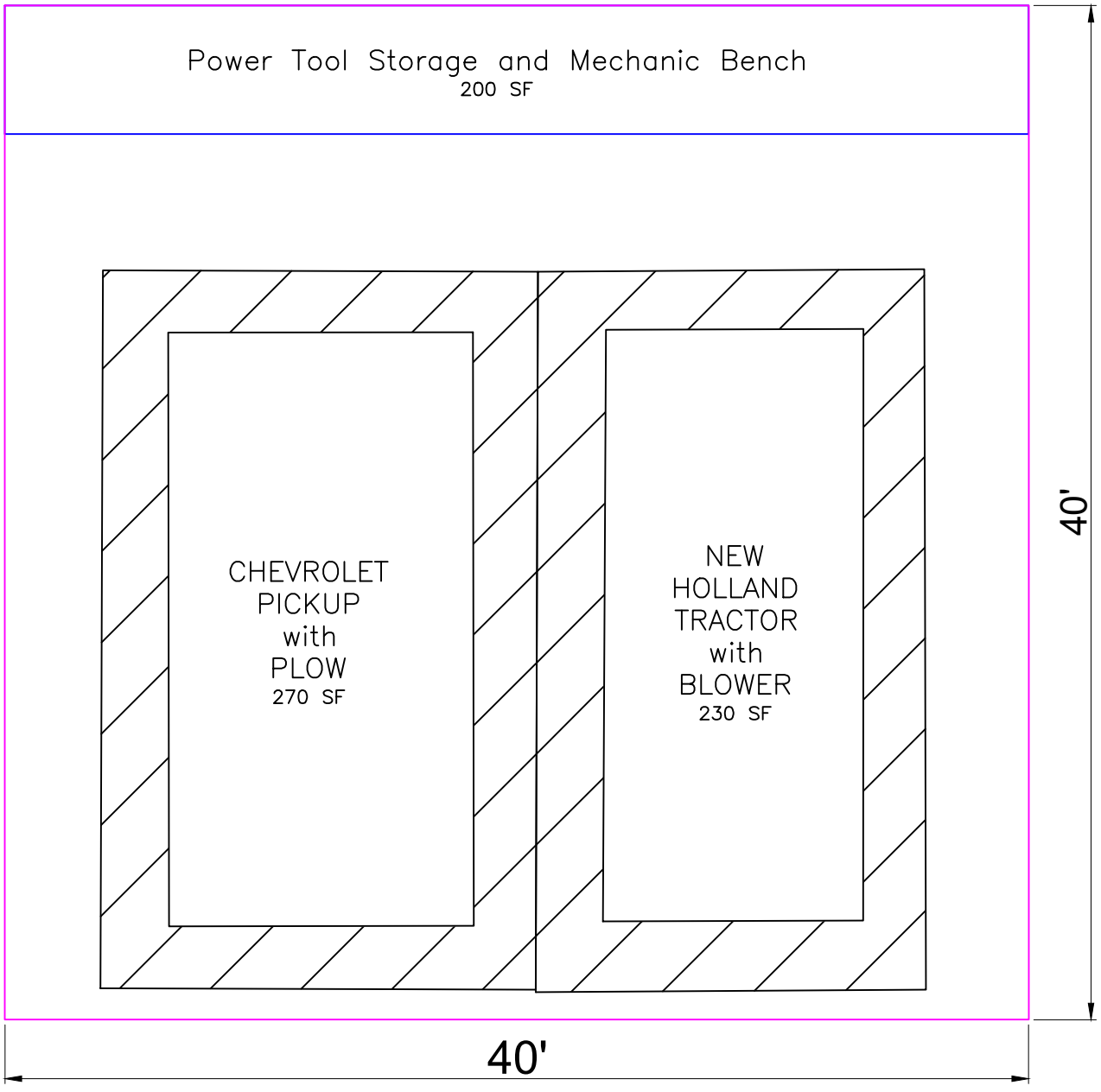
X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\Master Plan\DYT_Figure 4-5 MnDOT ClearZone.dwg

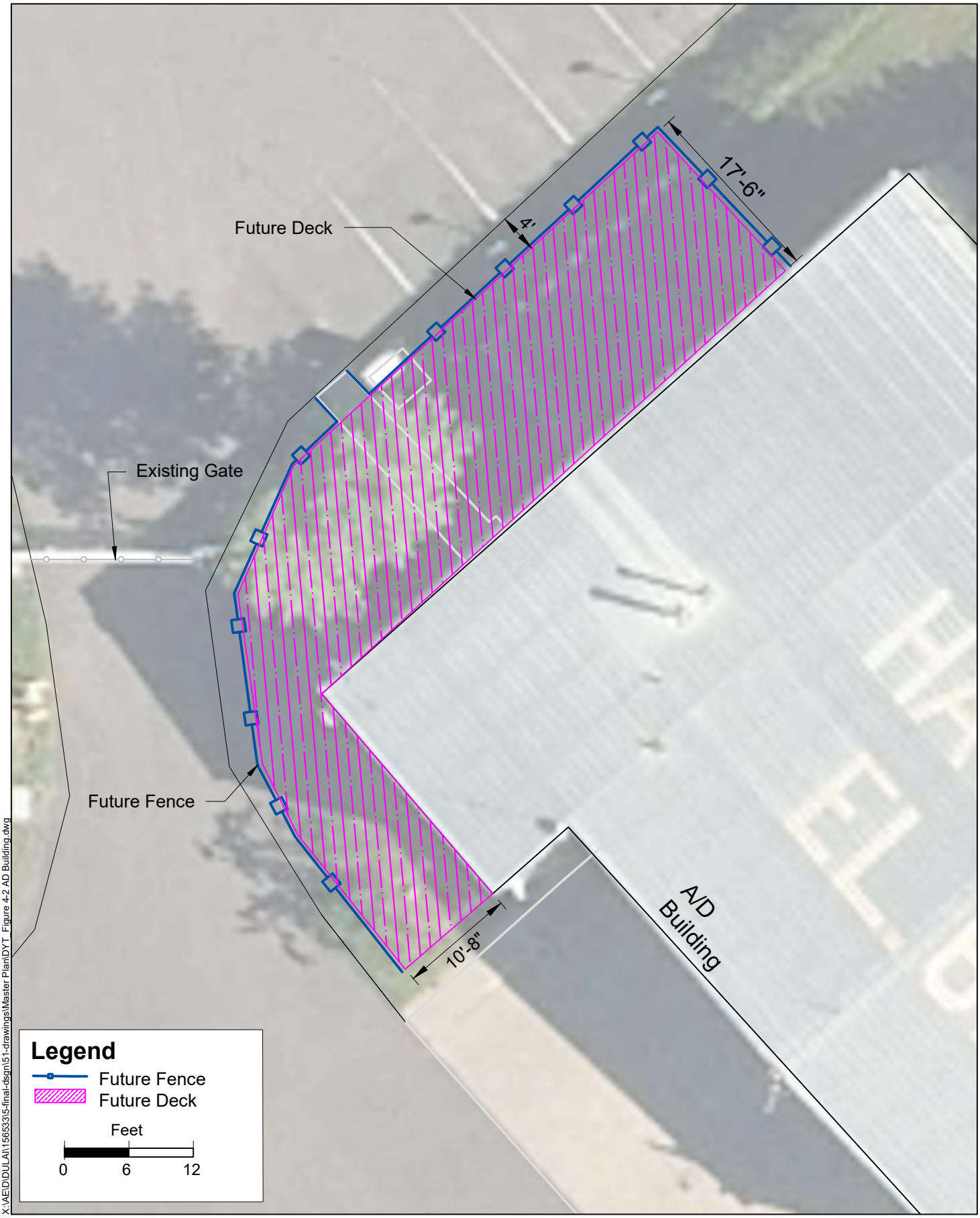
X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\Master Plan\DYT_Figure 4-6 Parking.dwg

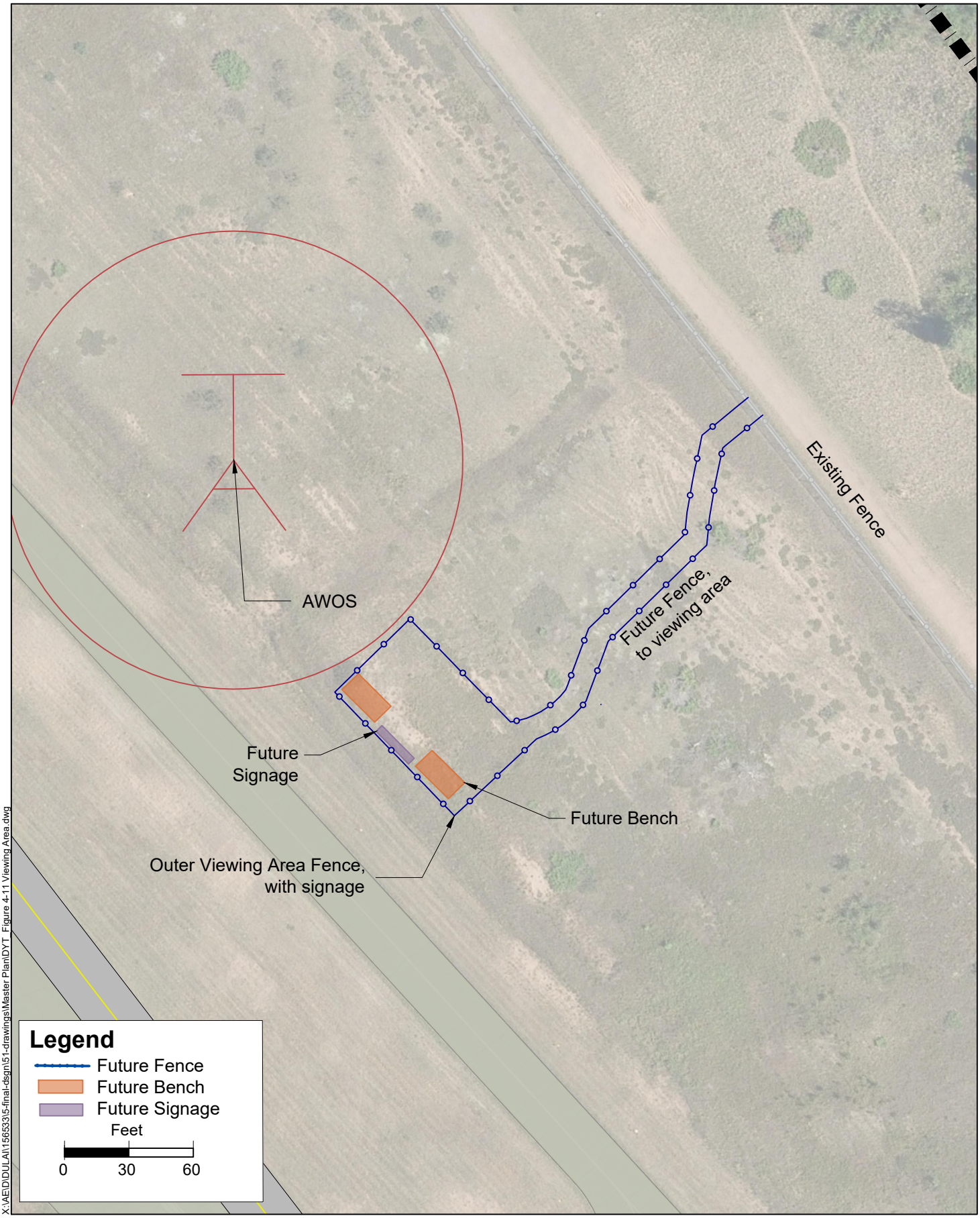


X:\AE\D\DULAI\156533\1-gen\t\16-meet\Stakeholder Advisory Committee\Meeting 3 - 04122021\Figure 1 - Apron Flooding Area.dwg



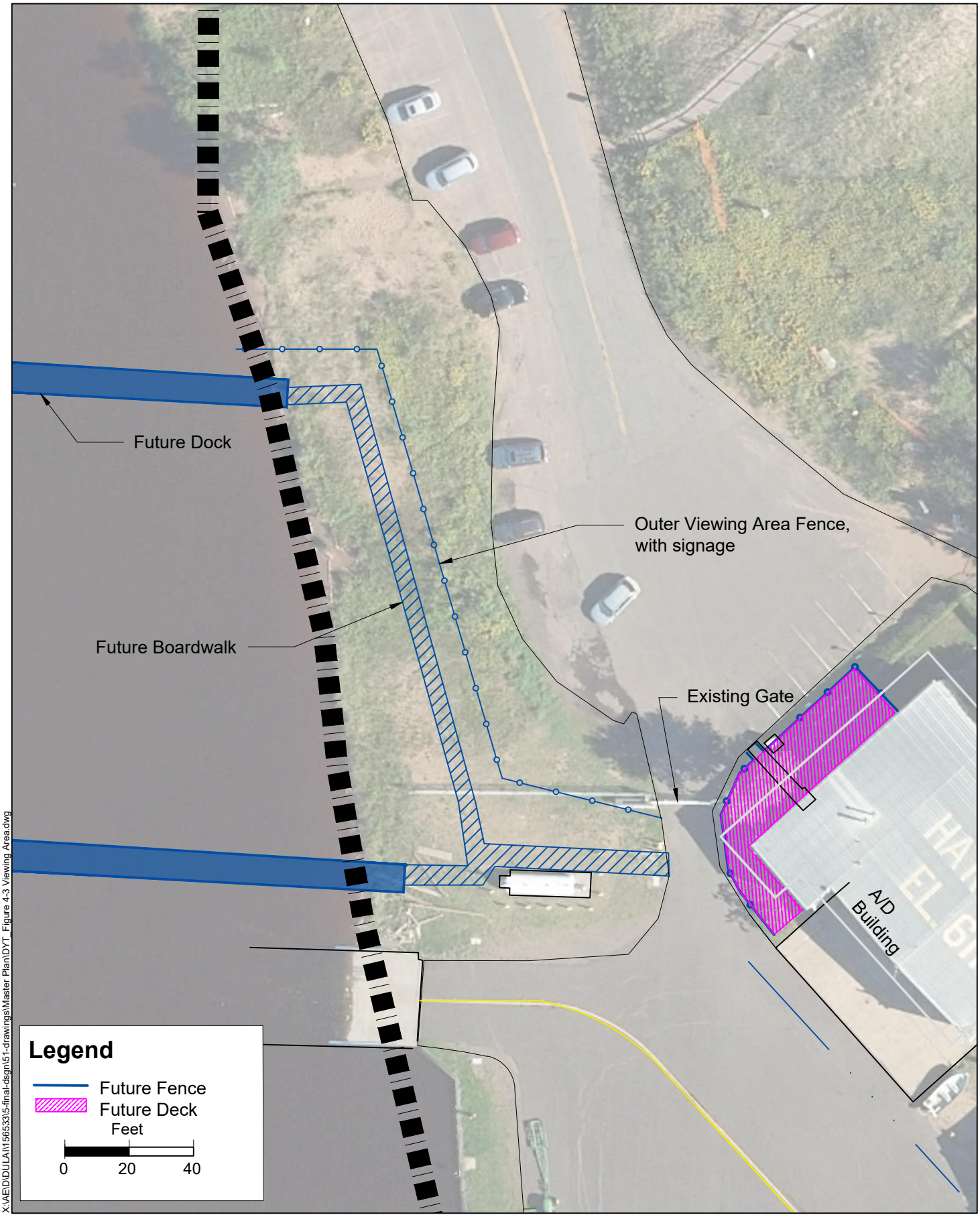



Future Deck
4'
17'-6"
Existing Gate
Future Fence
10'-8"
A/D Building
Legend
Future Fence
Future Deck
Feet
0
6
12
X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\Master Plan\DYT_Figure 4-2 AD Building.dwg



X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\Master Plan\DYT_Figure 4-11 Viewing Area.dwg

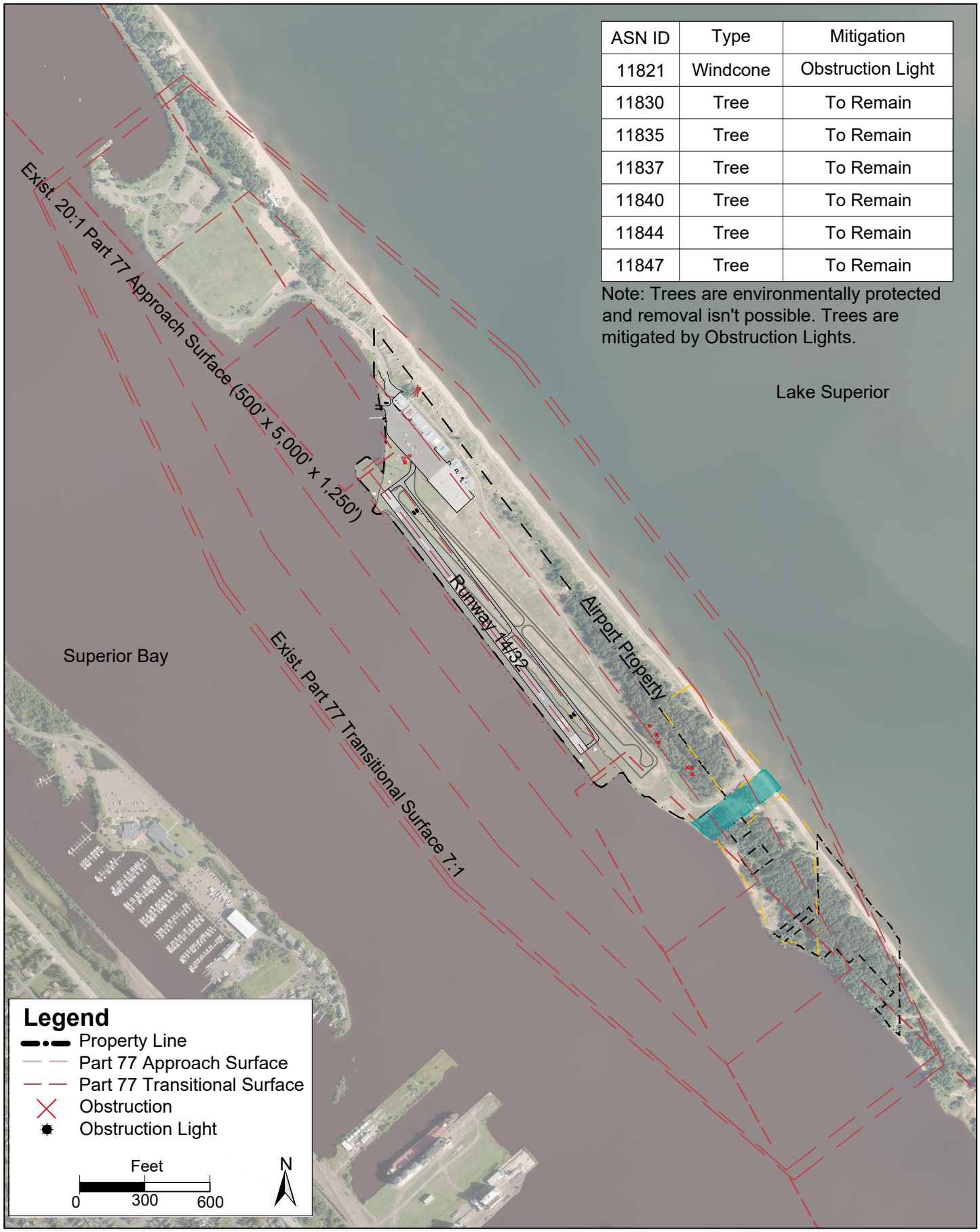

Future Deck
17'-6"
4'
Existing Gate
Future Fence
10'-8"
A/D Building
Legend
Future Fence
Future Deck
Feet
0
6
12
X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\Master Plan\DYT_Figure 4-10 AD Building.dwg



X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\Master Plan\DYT_Figure 4-3 Viewing Area.dwg

X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\Master Plan\DYT_Figure 4-13 Runway 14 Obstructions.dwg

X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\Master Plan\DYT_Figure 4-13 Runway 32 Obstructions.dwg



ASN ID	Type	Mitigation
11821	Windcone	Obstruction Light
11830	Tree	To Remain
11835	Tree	To Remain
11837	Tree	To Remain
11840	Tree	To Remain
11844	Tree	To Remain
11847	Tree	To Remain

Note: Trees are environmentally protected and removal isn't possible. Trees are mitigated by Obstruction Lights.

X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\Master Plan\DYT_Figure 4-14 Transitional Surface.dwg

X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\Master Plan\DYT_Figure 4-15 TERPS Departure.dwg

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5 Alternatives Analysis

There are several key areas at Duluth Sky Harbor Airport (DYT) where improvements may be made to meet existing standards and to accommodate the existing and projected aviation demand.

Goals of the following development alternatives include:

- Comply with current FAA Design standards given in Advisory Circular (AC) 150/5300-13B, *Airport Design*
- Be compatible with other existing and proposed uses on and off the Airport
- Minimize negative environmental impacts
- Be cost effective
- Seaplane Base
  - Alleviate congestion between the seaplane ramp and fuel pump
  - Evaluate shoreline resiliency options to address continued high lake levels
  - Increase seaplane parking with additional dock space
- Building Area
  - Increase hangar space
  - Identify a location for an SRE building

5.1 Alternatives Analysis 1 - Seaplane Base Development and Apron Congestion Reduction

The existing seaplane ramp was constructed in 2008. Useful life for this type of ramp structure can average 20-30 years. Airport staff and stakeholders have noted that the general area of the seaplane base can occasionally be congested with aircraft, vehicle, and pedestrian traffic. In addition, the existing fuel tank (3,000 gallon installed in 2008) is located within the Taxiway Object Free Area (TOFA) for ADG I aircraft entering and existing the seaplane ramp. The seaplane ramp is regularly used by ADG I (critical aircraft for the ramp) and occasionally ADG II aircraft. It was also noted that more dock space is needed for the safe operation of seaplanes.

Preliminary facility recommendations include:

- Additional dock space is needed for 2-3 additional aircraft in the near-term. Long-term expansion should also be planned for.
  - The second dock should be located to the north, outside of the RPZ.
  - The existing dock is approximately 22 years old. The dock is outside of all surfaces for Runway 14, including the RPZ, Clear Zone, and approach surfaces.
- The seaplane ramp (constructed in 2008) has a typical useful life of 20-30 years. Replacement should be planned as early as 2028. The HDPE plastic strips on the seaplane ramp should continue to be replaced when damaged.
- A standard TOFA should be provided for the seaplane ramp entry and exit route.
- Installation of invasive species management signs should be added to the seaplane base facilities
- The congestion around the seaplane ramp is discussed below in the congestion analysis section

5.1.1 Apron Congestion

Sky Harbor Airport is space constrained for improvements, especially in the northwest corner of the apron near Hangar 1. All alternatives seek to improve the flow of aircraft transitioning from the seaplane ramp to the apron area as well as from the apron area to the taxiway network.

Several of the improvements listed below have the potential to also address the apron flooding challenges described above by reducing the amount of pavement located in areas that often see flooding.

- Evaluate the addition of a bypass taxilane near the existing fuel pump to allow aircraft to taxi past fueling aircraft
- Separate pedestrian traffic from areas with frequent aircraft movement by reducing excess pavement around Hangar 1 (attached to Terminal Building) and the fuel pump
- Plan for an additional taxilane to connect the apron area to Taxiway A
- Evaluate the need for an additional fuel tank and pump for use by wheeled aircraft located on the southeast edge of the apron.

Table 5-1 describes the alternatives considered. The alternatives are summarized in the following sections.

Table 5-1 – Seaplane Base Alternatives

Item	Alternative 1A	Alternative 1B	Alternative 1C
Net Tiedowns	28 (-3)	28 (-3)	28 (-3)
Added Dock Space	4	10	10
Impervious Surfaces	0.5 Acres	0.5 Acres	0.4 Acres

5.1.2 Alternative 1A

Alterative 1A (**Figure 5-1**) shows an expansion to the end of the existing dock to create a 'T', the removal of pavement in the apron area, and the relocation of the fuel tank.

The current Taxilane Object Free Area (TOFA) for the seaplane ramp is 79 feet wide which locates the fuel tank inside the TOFA. This alternative shows the fuel tank being moved closer to the existing fence to be located outside of the TOFA. Since the removal of pavement creates a larger distance from the exiting fuel pump to the edge of the taxilane, an additional fuel pump is added in the grass berm for wheeled aircraft.

As discussed in **Chapter 4, Facility Recommendations**, Lake Superior water levels have increased, and continue to increase. To mitigate the effects of the high lake levels, it is important to prioritize the challenges that come with apron flooding and prioritize resolving challenges that could pose a hazard to people, aircraft and/or property. Additionally, care should be given to ensure that any proposed solutions do not create new problems (ie. Increase the likelihood of water and flooding impacting hangars). This alternative includes removal of apron pavement from the seaplane ramp down to the aircraft tiedowns, leaving a taxilane in front of the terminal building. The removal of impervious surface and the addition of a grass berm has the ability to increase drainage and aid in the mitigation of apron flooding. During the removal of the

impervious surfaces, there is the ability to install an additional fuel system to fuel wheeled aircraft and aid in the congestion around the existing fuel system.

This alternative has a few challenges including the difficulty of seasonal removal of the ‘T’ at the end of the dock due to increased water depth in the area. The addition of the ‘T’ to the south is also underneath existing Part 77 Approach Surface and TERPS Approach Surface to Runway 14. Aircraft at the south end of the T would be limited to a height above water of less than 19 feet- 5 inches tall. Current float or amphibious based aircraft range from 6’7”’ to 12’2” above water as well as the majority of ADG I or ADG II float or amphibious aircraft that could use DYT in the future.

5.1.3 Alternative 1B

Alternative 1B (**Figure 5-2**) shows the addition of two seaplane docks along the shoreline to the north of the existing seaplane ramp, pavement removal in the apron area, and the relocation of the seaplane ramp to the southwest.

The two additional seaplane docks along the shoreline to the north allow for increased seaplane activity and docking space for aircraft. These docks would be clear of all Runway 14 surfaces. These docks are shown with 129 feet of separation between them as the wingspan of the Critical Aircraft (Cessna 172) is 36 feet and a minimum of 50 feet is required between maneuvering aircraft. In addition to the docks, this alternative includes fence line adjustments to encompass the new docks. It also includes a pedestrian walkway, or boardwalk, between the additional docks, inside of the new fence line to be constructed over the sandy terrain. This area was surveyed by the SEH Environmental Team for protected (state and federal listed plant species) in summer 2022 and no species were found near the planned docks.

Similar to Alternative 1A, this alternative includes the removal of apron pavement to allow for apron flooding mitigation. In Alternative 1B, apron pavement is also removed from the existing seaplane ramp to the aircraft tiedowns, leaving a taxilane in front of the terminal building. This includes removing the current seaplane ramp and relocating the ramp further south along the shoreline, beyond the area of pavement removal. This relocation allows for seamless seaplane traffic from the water into the apron next to the tiedowns. Additionally, this allows for safe pedestrian activity between the seaplane docks, A/D building, and the gate to the parking lot. The water depth is approximately two feet in the location of the seaplane ramp in this alternative, compared to over five feet in the location of the existing seaplane ramp This alternative may require minor dredging to accommodate additional water depth.

Future fuel pumps are included near the additional docks and along the grass berm, one for seaplanes and one for wheeled aircraft. The addition of the dock fuel pump allows for less traffic for seaplanes on the apron and the ramp if they are remaining on the dock and do not need to be tied down on the apron. The addition of the fuel pump near the grass berm allows for some extra separation of seaplanes and wheeled aircraft, congestion mitigation, and increased safety of pedestrians. Since the current seaplane ramp would be relocated and the taxilane does not start until the A/D building, this alternative allows for the fuel tank to remain in its current position as it would no longer be within a TOFA.

5.1.4 Alternative 1C

Alternative 1C (**Figure 5-3**) includes the addition of two seaplane docks along the shoreline to the north, pavement removal in the apron area, and the relocation of the seaplane ramp to the southwest along the shoreline.

This alternative is similar to Alternative 1B; however, apron pavement is removed from the existing seaplane ramp to the aircraft tiedowns, leaving a taxilane in front of the terminal building. Less pavement is removed in this alternative as a turnaround area is added for fuel pump access, allowing aircraft to maneuver between seaplane ramp, terminal building, and tiedowns. This alternative benefits aircraft activity and mitigates congestion as there is traffic flow between fueling, the apron and taxilane network. An additional future fuel pump is added near the grass berm, resulting in one for seaplanes and one for wheeled aircraft. The addition of the dock fuel pump allows for reduced seaplane traffic on the apron and the ramp if they are remaining on the dock and do not need to be tied down on the apron. The addition of the fuel pump on the grass berm allows for extra separation of seaplanes and wheeled aircraft, congestion mitigation, and increased safety of pedestrians. This alternative allows for the fuel tank to remain in its current position since the current seaplane ramp would be relocated, and the taxilane OFA does not impact the location of the fuel tank.

5.2 Alternatives Analysis 2 - Aircraft Hangar Development

Sky Harbor Airport is space-constrained due to its unique location of the airport. Hangar and building area development opportunities seek to provide the best use of space, provide development to accommodate the forecasted growth of based aircraft while protecting the sensitive natural environment.

If unlimited space were available to meet demand, the forecasts indicate that the based aircraft could grow to 38 over 20 years, an addition of 16 aircraft. ***Additional hangar space to accommodate 95% of the forecasted 38 based aircraft by 2040 is recommended (36 total aircraft).***

Several stakeholders indicated that a paved roadway should be evaluated to provide access to the southeast end of the apron area. Due to the sensitive natural environment, consideration of the public trail, and the high pedestrian activity along the Park Point Nature Trail, a roadway along the rear of hangars was not considered further. The airport had previously considered the merits of an FBO building located on the southeast end of the apron area; however, space is limited, and auto access and parking space would not be sufficient.

Hangar and building area recommendations include:

- Construction of an SRE / Maintenance storage building (sizing is still to be determined)
- Consideration was given to preserving apron space for hangar development
- Maximize hangar development and airport revenue potential while minimizing environmental impacts

Table 5-2 compares the three building area alternatives.

Table 5-2 – Building Area Alternatives

Item	Alternative 2A	Alternative 2B	Alternative 2C
Net Tiedowns	28	24 (-4)	31 (+3)
Added Hangar Space	3 - 40'x40' Box Hangars 1 - 40'x45' Box Hangar	2- 200'x32' Ranch Hangars	1 -160'x32' Ranch Hangar 1 - 40'x40' Box Hangar 1 - 40'x50' Box Hangar
Additional Pavement	4,143 Square Feet	3,390 Square Feet	18,830 Square Feet
Hangar Height Restrictions[1]	Max Hangar Height 20'	Max Hangar Height 20'	Max Hangar Height 20'
Protected Species Impacts	1.85 acres	1.29 acres	2.4 acres
Additional aircraft accommodated	4 to 10	10	10

Note 1: Hangar height is restricted to 20 feet if penetrates the AWOS critical area. Max hangar height for other hangars is 30 feet.

5.2.2 Alternative 2A

Alternative 2A (**Figure 5-4**) includes the construction of a taxilane to the south of the apron area, which provides access to three additional 40'x40' hangars, a 45'x40' hangar on the far western corner of the apron area, and the construction of a 1,600 square foot SRE building on the east corner of the apron.

All structures/objects within the 500-foot critical area of the AWOS must be at least 15 feet lower that the height of the sensor. Based on this guidance, the furthest east hangar has a maximum height of 20 feet since it is within the 500-foot AWOS critical area. All obstructions within 1,000 feet of the sensor must be at least 10 feet lower, therefore, the other hangars along the future taxilane have a maximum hangar height of 30 feet. Because the hangars are expected to be ADG I hangars, the hangar heights should be 30 feet or less.

In addition to the AWOS restricting development further east/southeast of the apron, there are also topographic challenges. The grade changes create challenges in building development, the elevation further away from the apron. In addition, there is habitat suitable for state listed protected plant species including the likely presence of Hudsonia Tomentosa and American beach grass (Ammophila breviligulata) that can be found throughout the sand dune habitat of the airport. **Figure 5-4** depicts the locations of these protected species including in the areas of the hangar area alternatives. The proposed location of the hangar development would result in a takings of the state-threatened American beach grass, which will require a Takings Permit from the Minnesota Department of Natural Resources. Mitigation for the taking will be required, which may consist of a fee payment, salvage/replanting of plants, or other activity to be defined during the permitting process. The future hangar space would accommodate an additional four (4) to ten (10) aircraft, depending on the size of aircraft and ultimate hangar use.

The prevailing winds come from the west, and when wind is combined with snow, ice, rain, or sand, west facing hangars are less preferred by hangar owners. Therefore, the SRE is shown on the northeast corner of the apron, with a west facing door, instead of a future hangar.

This area of hangar and taxilane development is currently used as snow storage and the airport would have to identify a new area for snow storage. **Figure 5-4** shows future snow storage areas

that could be utilized such as parallel to the apron on the south side and to the east beyond the taxilane and hangars. This alternative also includes seaplane float storage to the south of the future taxilane with a gravel road to the storage area.

5.2.3 Alternative 2B

Alternative 2B (**Figure 5-5**) includes the removal of apron pavement on the east end of the apron to allow for the construction of a taxilane which provides access for two 200'x32' ranch style hangars on either side of the taxilane. Past discussions with users interested in hangars space in the Duluth area indicate that this is a desired hangar type for many.

Several challenges with Alternative 2A are similar in Alternative 2B. These challenges include the height restrictions due to the AWOS critical area and grade changes beyond the apron area. In addition, there is similar impacts to state listed protected species. **Figure 5-5** includes locations of these protected species in the area of the alternative. Similar to Alternative 2A, the proposed location of the hangar development would result in a takings of the state-threatened American beach grass, which will require a Takings Permit from the Minnesota Department of Natural Resources. Mitigation for the taking will be required, which may consist of a fee payment, salvage/replanting of plants, or other activity to be defined during the permitting process. The future hangar space would accommodate an additional ten (10 aircraft).

A section of the apron would have to be removed to accommodate the additional aircraft storage. This includes the removal of four tiedowns; however, there is more demand for hangar space than tiedowns. Hangar development also has higher revenue producing potential than tiedowns. This area of hangar and taxilane development is currently being used seasonally as snow storage, and the airport would have to locate a replacement area for snow. **Figure 5-5** includes potential future snow storage locations. This alternative also includes an area for seaplane float storage to the south of the future south ranch hangar with a gravel road to the storage area.

5.2.4 Alternative 2C

Alternative 2C (**Figure 5-6**) includes an apron area added to the southeast corner of the existing apron with three additional tiedowns, a taxiway connecting Taxiway A and the apron, a taxilane in front of a 160'x32' ranch hangar, a 1,600 square foot SRE building, and a 40'x50' hangar south of the SRE building, facing west.

Several of the challenges highlighted in Alternative 2A, are echoed in the alternative. These challenges include the height restrictions due to the ASOS critical area. The south ranch hangar has a maximum height of 20 feet as it impedes the AWOS critical area.

The alternative also includes expansion into the area of grade change. In addition, there is similar impacts to state listed protected species. **Figure 5-6** and **Figure 5-5** includes locations of these protected species in the area of the alternative. Similar to Alternatives 2A and 2B, the proposed location of the hangar development would result in a takings of the state-threatened American beach grass, which will require a Takings Permit from the Minnesota Department of Natural Resources. Mitigation for the taking will be required, which may consist of a fee payment, salvage/replanting of plants, or other activity to be defined during the permitting process. The future hangar space would accommodate ten (10) additional aircraft.

This alternative includes an additional connector taxiway from Taxiway A to the apron, which would aid in flow of traffic to and from the runway and reduce congestion around or near the seaplane ramp, fuel facilities, A/D building, and taxiing aircraft to tiedowns.

The 40'x50' hangar on the east edge faces west, which brings potential downfalls with weather events. This area of hangar and taxilane development is currently being used as snow storage, and the airport would have to identify a new snow storage location. **Figure 5-6** includes future snow storage options. This alternative also shows seaplane float storage to the south of the future apron.

5.2.5 Selected Alternative

The Stakeholder Advisory Committee reviewed the alternatives and selected ***Alternative 1C*** as the preferred alternative for the Seaplane Base and selected ***Alternative 2B*** as the preferred alternative for the Building Area. These preferred alternatives are shown in **Figure 5-7**. This alternative maximizes the existing areas for future hangar area and seaplane base development. The apron alternative chosen maximizes the tiedowns available on the existing pavement while mitigating flooding hazards with the removal of pavement. This allows for the addition of fueling facilities and maneuverability around the fuel system, A/D building, and seaplane ramp.

5.3 Development of Aviation Support Facilities

5.3.1 Snow Removal and Equipment (SRE) Building

The Duluth Sky Harbor Airport has 195,000 square feet of runway pavement and is classified as a small airport. The current equipment is stored in the Airport's hangar (Hangar 1). The existing snow removal equipment and attachments' dimensions are shown below.

- Chevrolet Pickup (19'x 6.5'x 6')
- New Holland Tractor (19'x 10'x 11')
- Chevrolet Trailblazer (14.5'x 6'x 5')
- John Deer Tractor with Mower (15'x 5'x 6')
- Snow Wing 12/18 Plow (12'x 4')
- 102" Rotating Drum Blower (4'x 10')
- Rescue Boat (5'x14')

5.3.2 Equipment Storage Area

The size of the building was determined using standards defined in Advisory Circular 150/5220-18. The length and width of the New Holland tractor with the blower attached is 23ft x 10ft. The John Deere tractor with the mower attached is 15ft x 6ft. The Chevrolet pickup with the plow attached is 23ft x 12ft. The Chevrolet Trailblazer is 15'ft x 5ft. The airport also has a rescue boat that is 5ft x 14ft. With a 5ft safety zone around the tractors and attachments included, the total allocated space is 1,506 square feet. To allow for maneuverability and safety, all of the attachments are shown in designated locations 10 feet away from the tractors and 5 feet away from the wall.

5.3.2.1 Storage for Materials

A dedicated room has been allocated for sand and abrasives due to the recommendation to be stored separately to maintain material condition. The space determined is 144 square feet, which

falls within the range of Table 3-2. “Typical Storage Allocations for Material Storage Items” in AC 150/5220-18 recommending 150-500 square feet.

5.3.2.2 Storage for Support Items

The parts storage room, lockers, mechanic bench, maintenance area, and grease and oil storage were all determined based off of Table 3-3. “Typical Storage Space Allocations for Support Items”. The parts storage room and grease and oil storage room were combined, in this case, to be a 180 square feet. This falls within what the table allocated at 600 square feet for the parts area and 100-150 square feet for the lubrication, oil, grease storage.

5.3.2.3 Maintenance Area

The maintenance area and mechanic bench were also combined for a total of 220 square feet. This was based on the Repair Bay space allocation of 600 square feet and the mechanic bench allocation of 100 square feet in Table 3-3.

5.3.2.4 Power Tool Storage

A power tool storage area was included for power tools, regular tools, and air compressors. This space is given 160 square feet which falls within the recommended 100 to 200 square feet in Table 3-4.

5.3.2.5 Locker Space

Although there will not be a requirement for restrooms in this facility, the locker space allocation of 130 square feet was based on the Lockers/Restrooms support area in Table 3-3, allowing 300 square feet. A utility room was also allocated 130 square feet for heat, water, and electricity utilities. There is no recommendation of square feet for the utility space in Table 3-3, but Figure 2 in AC 150/5220- 18 shows the utility room as eligible.

5.3.3 FAA Funded Space Allocation

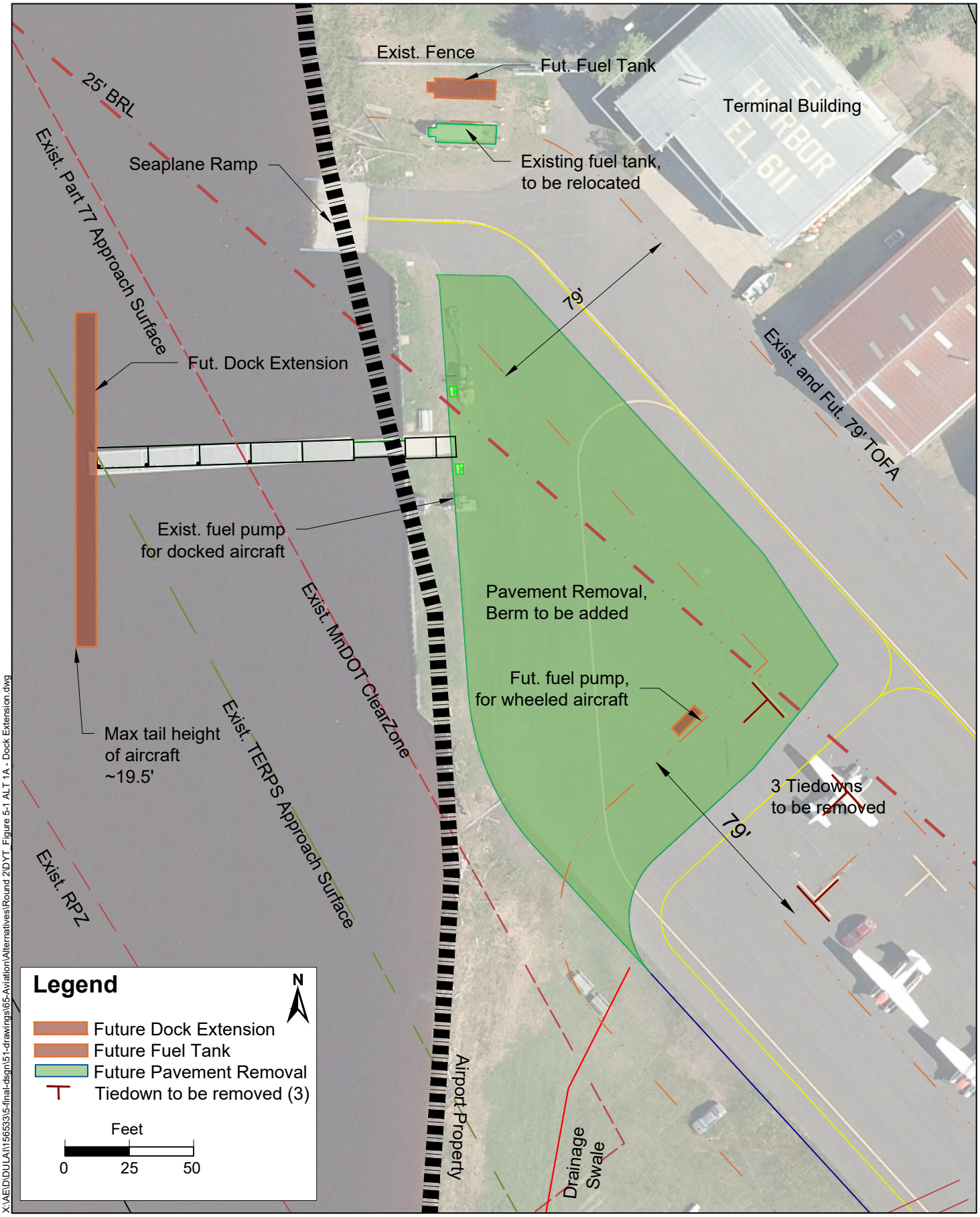
The FAA’s AIP Handbook limits funding of an SRE building at a GA airport to 1,600 square feet. Any square footage planned beyond that is considered ineligable and is the Airport Sponsor’s responsibilty to fund. **Figure 4-9** shows the equipment layout in a 1,600 square foot building.

5.3.4 SRE Building Analysis Recommendation

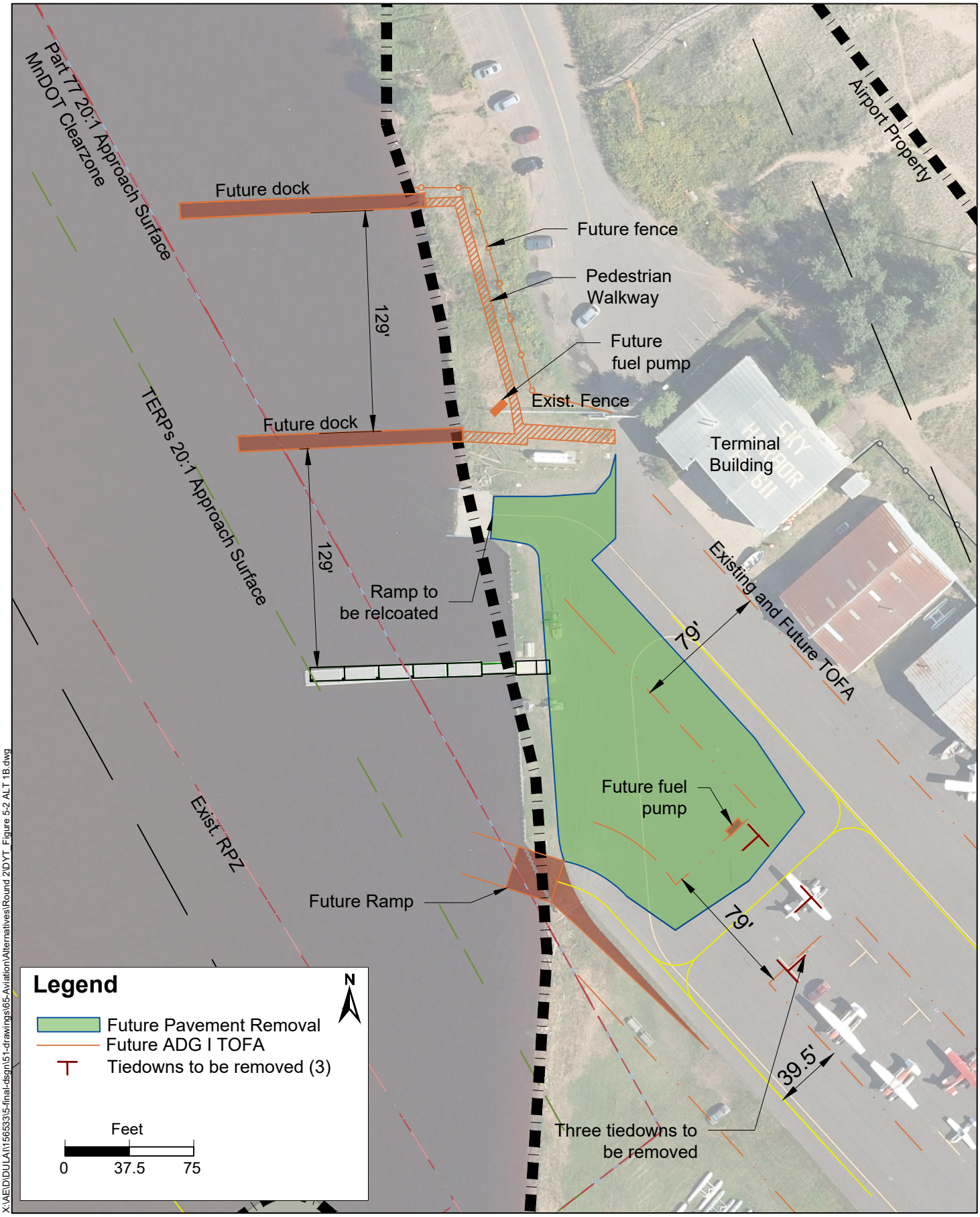
The combined space described above, and shown on the space allocation figure equals approximately 3,490 square feet, or a building with dimensions 60ft by 60ft. The layout of the SRE building is shown in **Figure 4-8**. ***An SRE building is recommended to be constructed to the 1,600 square feet that is eiligible for FAA funding***. If the airport chose to construct an SRE facility exceeing 1,600 SF, the additional spacewould be ineligible for FAA funding and would need to be funded with state and local funds (typically 70% state funding, 30% local funding).

Because the SRE building is located a long distance from the AD Building and airport offices, an auto parking space should be provided alongside the SRE building.

A detailed eligibility analysis for the SRE building will be completed as part of the SRE building design which is underway in the last half of 2022. The SRE building is expected to be funded and constructed in 2023.



X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\65-Aviation\Alternatives\Round 2\DYT_Figure 5-1 ALT 1A - Dock Extension.dwg



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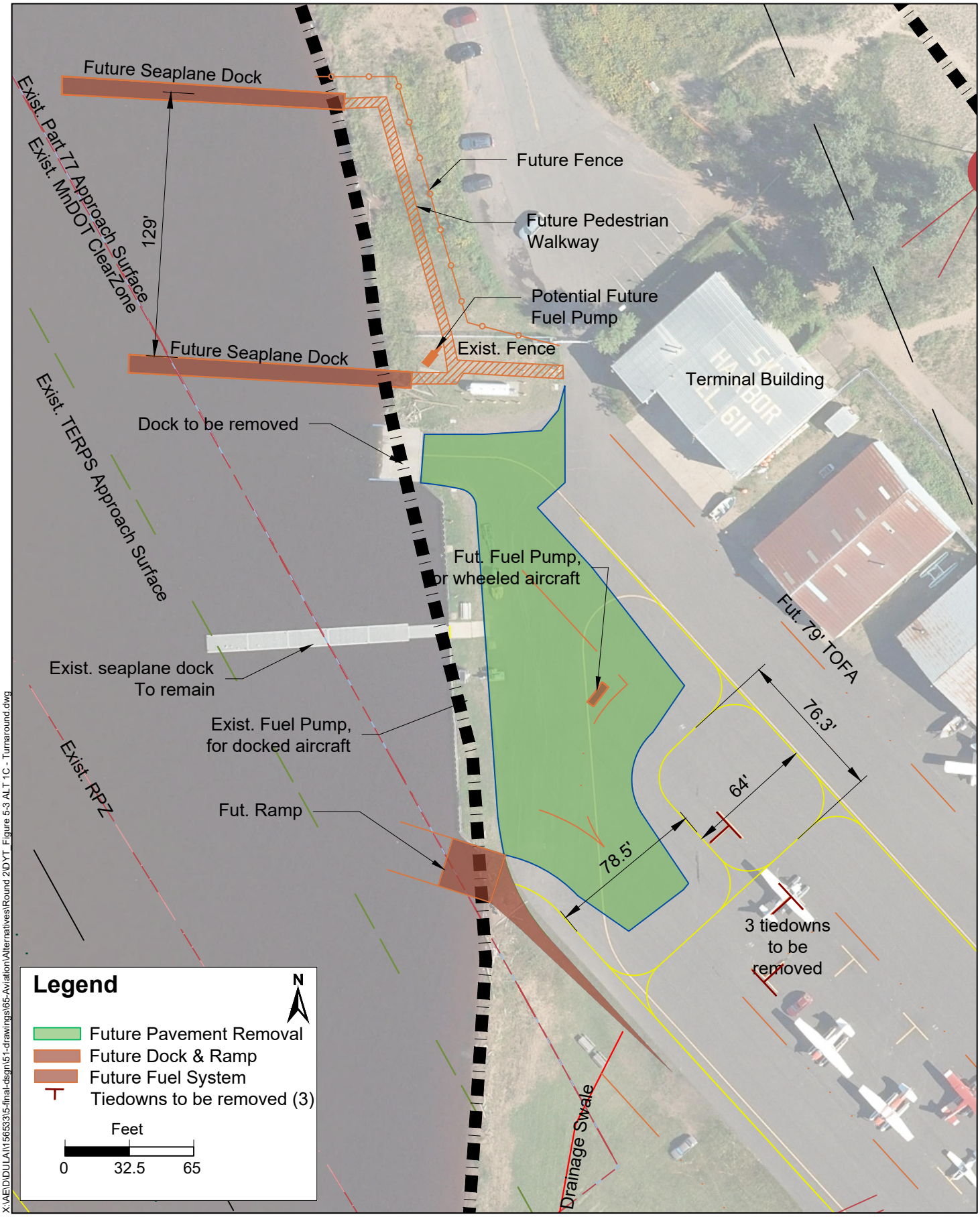
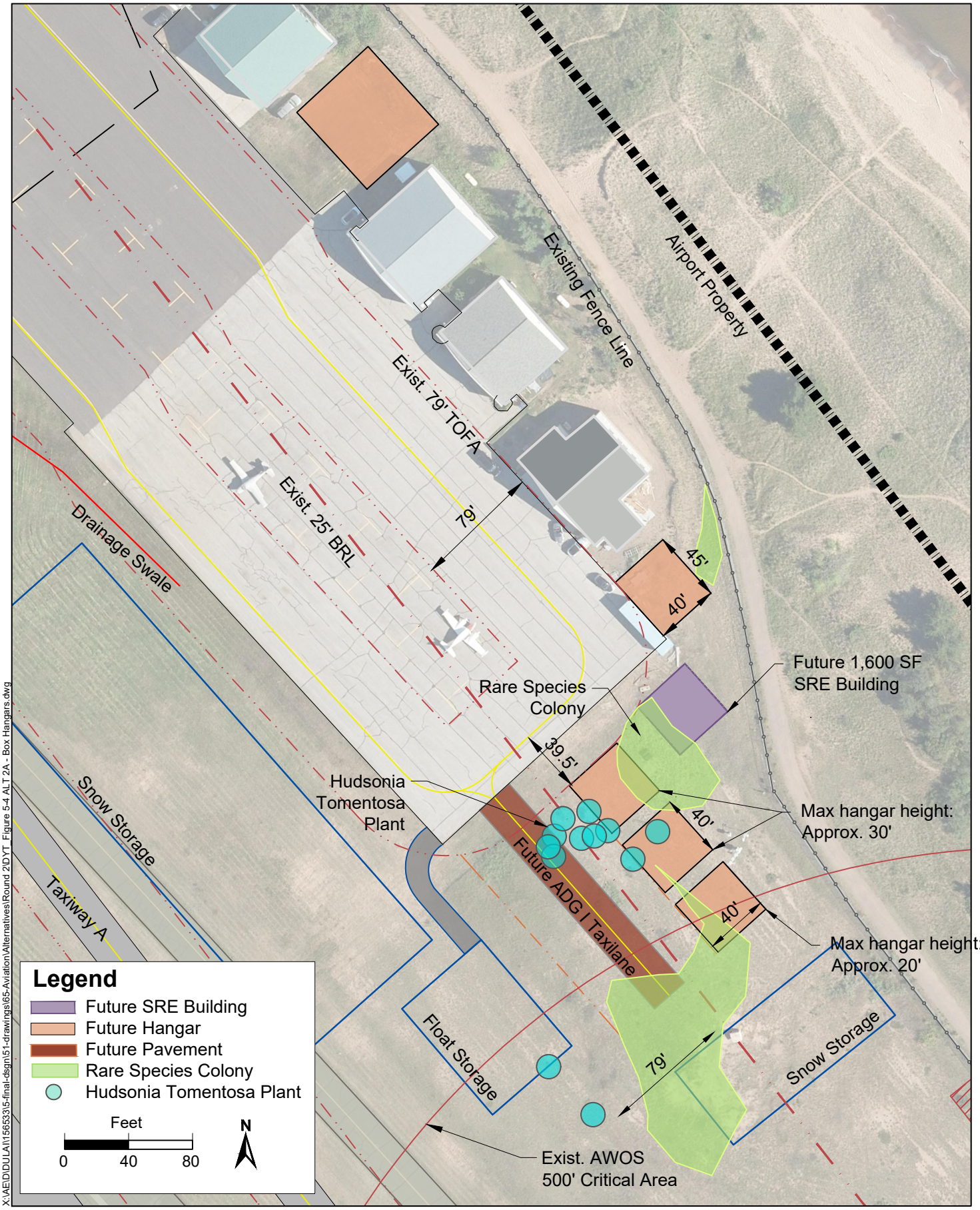
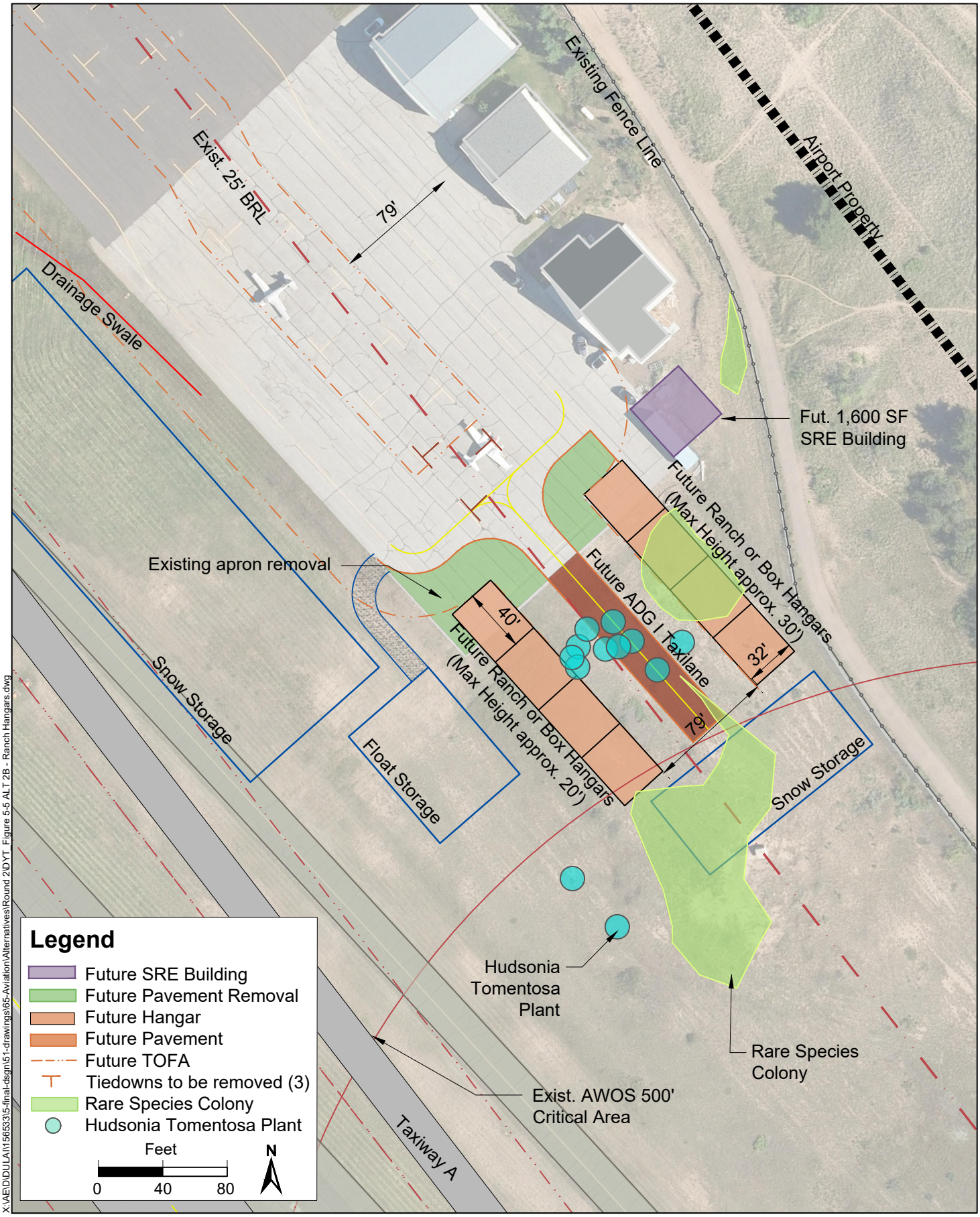


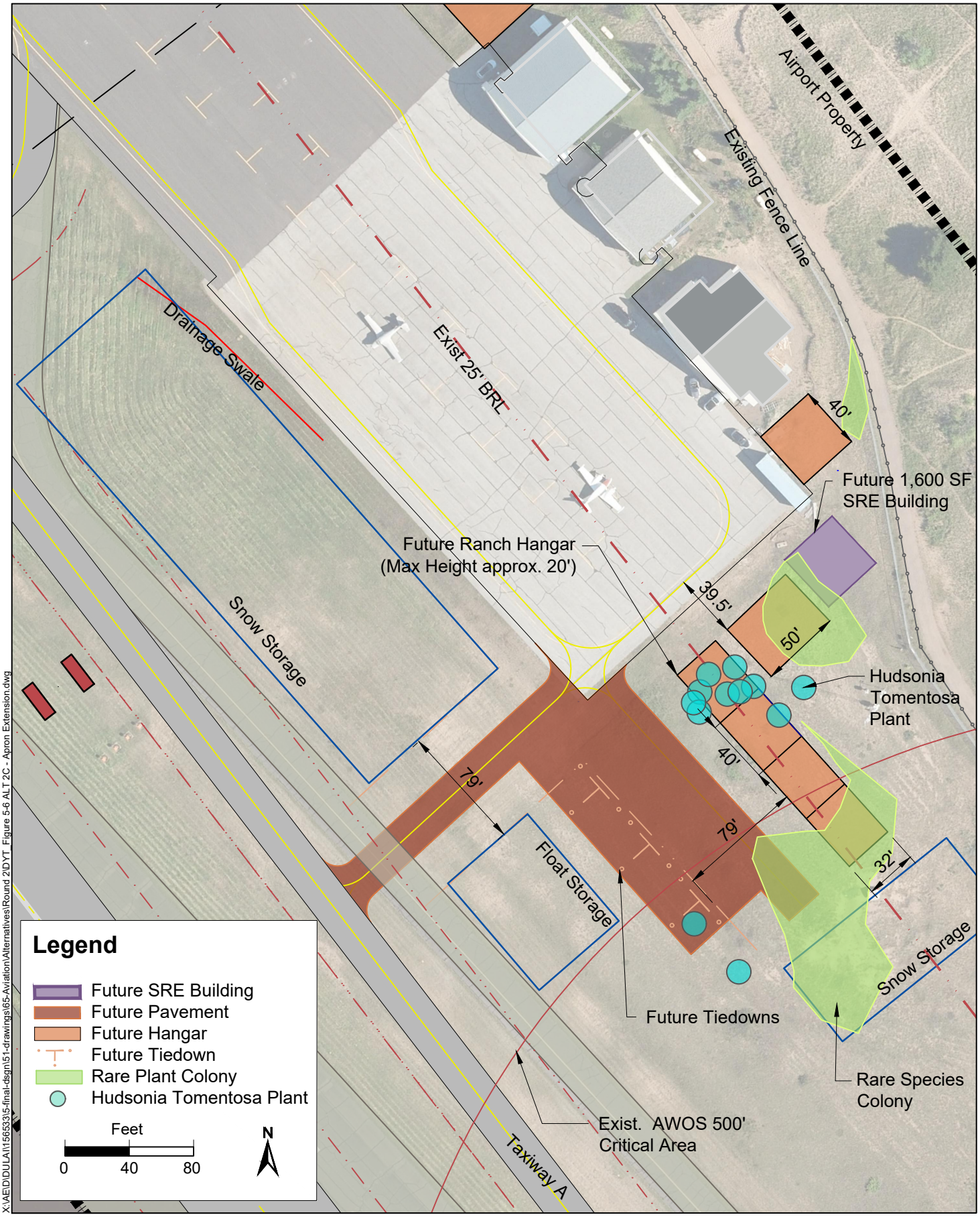
X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\65-Aviation\Alternatives\Round 2\DYT_Figure 5-3 ALT 1C - Turnaround.dwg



X:\AE\D\DULAI\156533\5-final-dsgn\5-1-drawings\65-Aviation\Alternatives\Round 2\DYT_Figure 5-4 ALT 2A - Box Hangars.dwg



X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\65-Aviation\Alternatives\Round 2\DYT_Figure 5-5 ALT 2B - Ranch Hangars.dwg


Airport Property
Existing Fence Line
Exist 25' BRL
Drainage Swale
Snow Storage
Future Ranch Hangar
(Max Height approx. 20')
40'
Future 1,600 SF
SRE Building
39.5'
50'
Hudsonia
Tomentosa
Plant
40'
79'
79'
32'
Float Storage
Future Tiedowns
Snow Storage
Rare Species
Colony
Exist. AWOS 500'
Critical Area
Taxiway A
Legend
Future SRE Building
Future Pavement
Future Hangar
Future Tiedown
Rare Plant Colony
Hudsonia Tomentosa Plant
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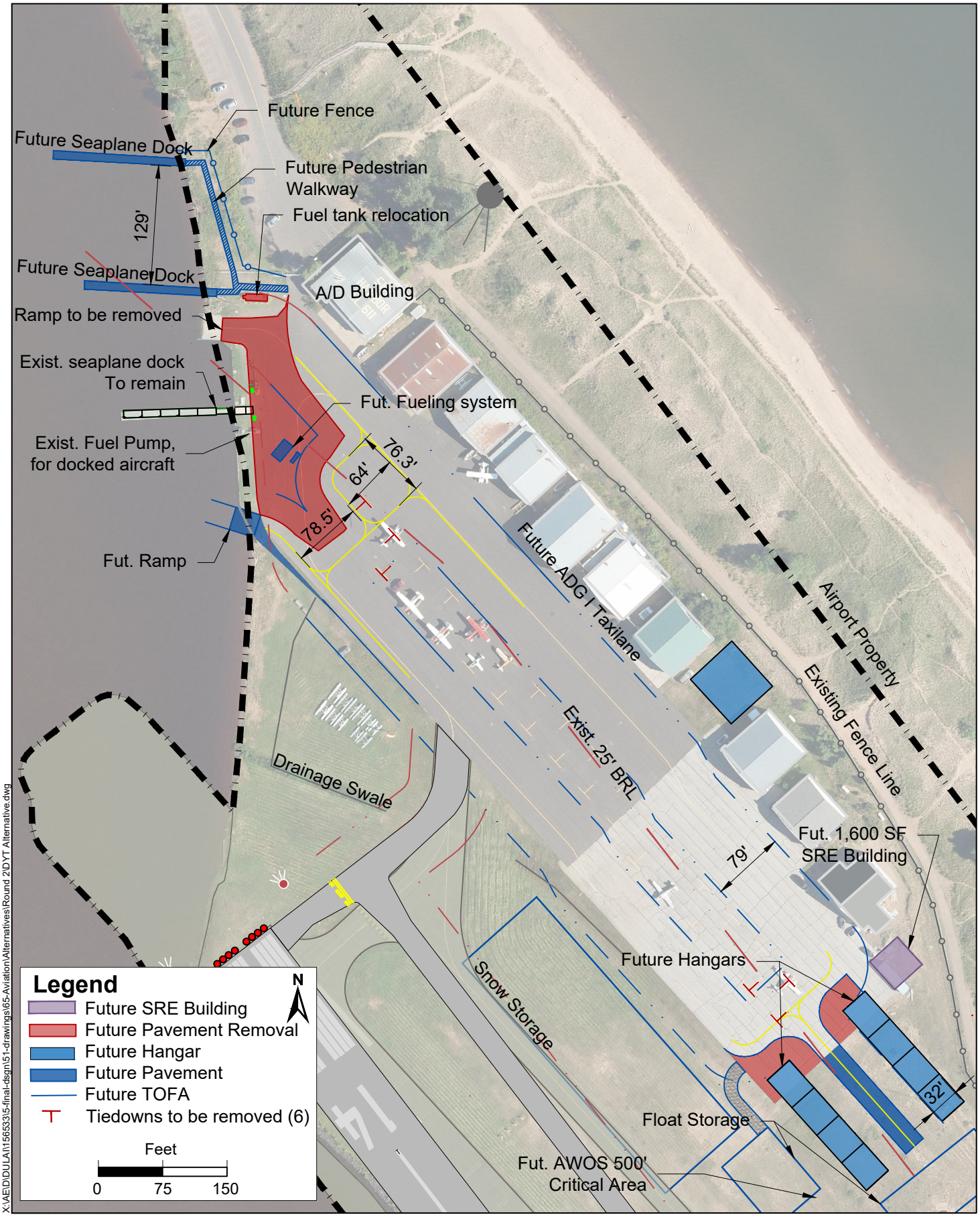
X:\AE\D\DULAI\156333\5-final-dsgn\51-drawings\65-Aviation\Alternatives\Round 2\DYT_Figure 5-6 ALT 2C - Apron Extension.dwg


Future Fence
Future Seaplane Dock
Future Pedestrian Walkway
Fuel tank relocation
129'
Future Seaplane Dock
A/D Building
Ramp to be removed
Exist. seaplane dock To remain
Fut. Fueling system
Exist. Fuel Pump, for docked aircraft
76.3'
64'
78.5'
Fut. Ramp
Future ADG I Taxilane
Airport Property
Existing Fence Line
Exist. 25' BRL
Drainage Swale
79'
Fut. 1,600 SF SRE Building
Future Hangars
Snow Storage
32'
Float Storage
Fut. AWOS 500' Critical Area
Legend
Future SRE Building
Future Pavement Removal
Future Hangar
Future Pavement
Future TOFA
Tiedowns to be removed (6)
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Feet
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150
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6 Environmental Overview

The National Environmental Policy Act of 1969 (NEPA) requires that environmental impacts of proposed airport development be considered throughout the planning period. Three categories of environmental actions relevant to airport development are outlined in 40 Code of Federal Regulations (CFR) Parts 1500 – 1508. Every project proposed for an airport is categorized into one of these three actions:

- Categorical Exclusions (CatEx) – Projects categorically excluded are those actions that have been found under normal circumstances to have no potential for significant environmental impact.
- Actions Normally Requiring an Environmental Assessment (EA) – Projects normally requiring an EA are actions that have been found by experience to sometimes have significant environmental impacts.
- Actions Normally Requiring an Environmental Impact Statement (EIS) – The purpose of an EA is to determine whether or not a project will have significant impacts. Based on the results reported in an EA, the FAA then prepares either a finding of no significant impact (FONSI) or an EIS. An EIS further investigates a project's potential environmental impacts.

The major product of the Master Plan process is the ALP, which shows an airport's existing and planned development. Federal Aviation Regulations require that an airport operator undertake an environmental analysis for the planned development for FAA review and approval if it plans to apply for federal grants to fund development depicted on the ALP. Due to the limited shelf-life of environmental studies, a formal EA or Categorical Exclusion documentation is typically developed at such time to ensure the environmental work is current within the timeframe during which the actual project would be undertaken.

Of the projects identified in **Chapter 5** that would trigger a federal action, the majority can be reviewed through a CatEx document.

A detailed environmental inventory is included in **Section 1.17**. The following areas of possible environmental impact must be addressed in detail in the planning and design phase for the improvements recommended in **Chapter 5**.

6.1 Environmental Impact Overview

6.1.1 Air Quality

The Clean Air Act (CAA) established National Ambient Air Quality Standards (NAAQS) for six pollutants, termed "criteria pollutants" and requires each State to adopt a plan to achieve the NAAQS for each pollutant within specific timeframes. These air quality plans are known as State Implementation Plans (SIP). The State of Minnesota has developed a SIP, which contains the rules and programs the State will use to help ensure air quality continues to meet the NAAQS.

The potentially significant impact of future recommended development on the attainment and maintenance of air quality standards must be disclosed. Conformity with the SIP must also be demonstrated. The information on the EPA Greenbook website (https://www.epa.gov/green-bookhttp://www.epa.gov/air/oaqps/greenbk/index.html) indicates that there are no non-attainment areas in the City of Duluth and surrounding areas. However, the City of Duluth, including the

Airport, is a Maintenance Area for carbon monoxide (CO). The proposed projects are not expected to have significant impacts to CO levels.

6.1.2 Coastal Resources

Federal agencies are required to consult with the USFWS before committing funds for projects or actions within the CBRS. The Airport is approximately nine (9) miles outside of the nearest CBRS, which is located along Lake Superior.

The CZMA applies to states having an approved Coastal Zone Management (CZM) plan. The CZM plan is implemented by a designated state or local agency and proposed federal actions within the CZM boundary must work to achieve consistency with the applicable CZM plan. The CZM plan typically compliments and implements relevant and applicable federal, state, and local regulations, policies and management plans to achieve the goals and intent of the CZMA. In Minnesota, the CZM is implemented through Minnesota's Lake Superior Coastal Program (MLSCP), a federal-state partnership dedicated to comprehensive planning and management within the designated Coastal Boundary of Lake Superior. MLSCP is administered by the MNDNR and encourages greater cooperation, simplifies governmental processes, and provides tools for implementing existing policies, authorities, and programs within the Coastal Boundary. The Airport is located entirely within the Coastal Boundary with the City of Duluth as the local unit of government.

The airport falls within a coastal zone, however no projects identified in the CIP are likely to require a mandatory review under MN Rules 4410.4300 and 4410.4400. The environmental review process, once the scope of the project is identified, will identify the impacts to costal resources.

6.1.3 Section 4(f)

Section 4(f) legislation was established under the Department of Transportation (DOT) Act of 1966 (now codified at 49 USC 303, 23 USC 138) and protects publicly owned land in public parks, recreation areas, or wildlife and waterfowl refuges of national, state, or local significance or lands from a historic site of national, state, or local significance. There are Section 4(f) resources near the project area, including the Minnesota Point Pine Forest Scientific and Natural Area (SNA) and the Park Point Nature Trail. There are no 4(f) resources within the project area.

Hangar development in Lot 8 and the construction of the SRE Building will be located adjacent to the Park Point Nature Trail, impacts to Section 4(f) resources are not anticipated for projects identified in this report.

6.1.4 Farmlands

Federal conversion of farmland to non-agricultural uses is regulated by the Farmland Protection Policy Act (FPPA) through the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NCRS). Farmland is defined by the underlying soil type (not the use of the land) and is classified by the USDA as "prime farmland", "prime farmland if drained", or "farmland of statewide importance." Preservation of prime farmland is a priority for the USDA, and the sponsors of projects funded with federal support are required to assess the effects of the projects on prime farmland.

While Farmland of Statewide Important exist across the bay in Superior, Wisconsin, no soils within the Airport boundary or adjacent to the Airport are designated prime or unique farmlands and will not have an impact on planned project as identified in this Master Plan.

6.1.5 Floodplains

FEMA FIRM panel #270421 0040 D, effective November 3rd, 1992, identified the airport as being located in Zone C (area of minimal flood hazard).

The adjacent areas of Lake Superior and Superior Bay are identified as Zone A1 on the FIRM. This means the area is subject to the 100-year flood event as determined by detailed methods. The map indicates the methodology indicates a base flood elevation (BFE) of 605 feet. The FIRM indicates that flood insurance is not available for new construction or substantially improved structures on and after November 16, 1990 in designated coastal barriers for the entire area of Minnesota Point south of 42nd Street South.

The City of Duluth Natural Resources Overlay Zone District Map indicates that the narrow strip of land immediately adjacent to the Airport runway on the bay side is designated as City General Floodplain zone. Further out in Superior Bay is considered a Floodway of Lake Superior. Neither the Airport nor the area immediately adjacent to it is located in the floodway.

6.1.6 Fish and Wildlife Resources

The Fish and Wildlife Coordination Act requires that agencies consult with the State wildlife agencies and the Department of the Interior (FWS) concerning the conservation of wildlife resources. The Fish and Wildlife Conservation Act also encourages conservation of non-game fish and wildlife and their habitats.

The Airport is located within the Northern Superior Uplands (NSU) Section, and more specifically the North Shore Highlands Subsection as defined by the MNDNR Ecological Classification System (ECS) *Field guide to the Native Plant Communities of Minnesota: the Laurentian Mixed Forest Province* (MNDNR 2003). Vegetative cover immediately surrounding the Airport facilities is maintained by mowing to keep grasses and shrubs low to the ground as to not create any potential vegetative obstructions for aircraft utilization of the runway, taxiway, or other ground surfaces.

6.1.7 Rare, Threatened and Endangered Species

An “Endangered Species” is defined as any member of the animal or plant kingdom determined to be in danger of extinction throughout all or a significant portion of its range. A “Threatened Species” is defined as any member of the plant or animal kingdom likely to become endangered in the foreseeable future.

The Airport is within the distributional range of the federally-listed Northern long-eared bat (*Myotis septentrionalis* - Threatened). The Northern long-eared bat spends summer months in wooded areas, habitat that is present nearby the Airport. The Northern long-eared bat hibernates in caves and mines. The Fish and Wildlife Service is proposing an up-status to the Northern long-eared bat from a threatened species to an endangered species. This decision is likely to be finalized in 2022. No projects will impact this species.

A review of the MNDNR NHIS database identified fourteen state-listed species that have been reported within one mile of the Airport. These species, and their state-status, were lake sturgeon

(*Acipenser fulvescens* – special concern), beach grass (*Ammophila breviligulata* ssp. *breviligulata* – threatened), discoid beggarticks (*Bidens discoidea* – special concern), rusty-patch bumble bee (*Bombus affinis* – watchlist), pale moonwort (*Botrychium pallidum* – special concern), St. Lawrence grapefern (*Botrychium rugulosum* – special concern), lease moonwort (*Botrychium simplex* – special concern), piping plover (*Charadrius melodus* – endangered), hairy-necked tiger beetle (*Cicindela hirticollis rhodensis* – endangered), lake hub (*Couesius plumbes* – special concern), slender hair grass (*Deschampsia flexuosa* – threatened), beach heather (*Hudsonia tomentosa* –threatened), sand-loving laccaria (*Laccaria trullisata* – special concern), tricolored bat (*Perimyotis subflavus* – special concern), and common tern (*Sterna hirundo* – threatened). Several field surveys for state listed plants within and near the project area have been conducted, most recently in 2022. Due to the lack of developable areas due to Federal Aviation Airport safety surfaces that surround all runways, taxiways, taxilanes and Navigational Aid equipment, there is limited locations on airport property where development outlined in this master plan can occur. The proposed location of several projects will result in a taking of the state-threatened American beach grass, A takings permit will likely be required, which may consist of a fee payment, salvage/replanting of plants, or other activity to be defined during the permitting process. The projects that are likely to require the takings permit are listed below:

- SRE Building
- Taxilane Development
- T and Ranch Hangar Development

The piping plover and red knot are unlikely to occur or nest within Airport property due to the ongoing operations at the Airport.

6.1.8 Hazardous Materials, Pollution Prevention and Solid Waste

Airport improvements, which consist of development such as runways, taxiways, and terminal buildings, do not normally have a direct significant effect on solid waste collection or disposal. The future recommended development does not include uses that will significantly increase the solid waste generated at the site.

It is likely that a renovated or reconstructed terminal building may attract additional customers to the airport, especially if the proposed retail area is constructed. The airport should continue to monitor the waste generated from the retail area and encourage recycling when possible. Construction waste should be recycled and reused on site when possible.

6.1.9 Historical, Archeological, Architectural and Cultural Resources

The National Historic Preservation Act (NHPA) of 1966, as amended, establishes the Advisory Council on Historic Preservation (ACHP) and the National Register of Historic Places (NRHP). Section 106 of the NHPA requires consideration of the effects of undertaking on properties that are eligible for inclusion in the NRHP. Compliance with Section 106 requires consultation with the State Historic Preservation Officer (SHPO) if there is a potential adverse effect to historic properties on or eligible for listing on the National Register of Historic Places.

The Archeological and Historic Preservation act of 1974 provides for the preservation of historic American sites, buildings, objects, and antiquities of national significance by providing for the survey, recovery, and preservation of historical and archeological data which might otherwise be destroyed or irreparably lost due to a development project.

A Phase I archeological survey within and around the Airport was conducted by Duluth Archaeology in 2009. The survey identified six possible cabin locations. No indication of Native American sites or burials were observed. No projects are anticipated to impact any cultural resources; however, monitoring of future ground disturbing activities was recommended for unrecorded archaeological sites or burials. The terminal building was constructed in 1979 and is less than 50-years old.

6.1.10 Noise

None of the future recommended development at the airport will alter the current noise levels at the airport.

6.1.11 Water Quality

The Federal Water Pollution Control Act, as amended (commonly referred to as the Clean Water Act), provides the authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, location with regard to an aquifer or sensitive ecological area such as a wetlands area, and regulate other issues concerning water quality. Additionally, a National Pollutant Discharge Elimination System (NPDES) permit under Section 402 of the Clean Water Act is required for point-source discharges into waters of the U.S. and for construction activities to protection from construction related erosion and sedimentation. A 404 permit is required to place dredged or fill material in waters of the U.S. including jurisdictional wetlands.

Typically, pollutants carried in airport runoff include spilled fuel and oil, deposits from rubber tires, and accidentally discharged chemicals, i.e., agricultural spray operations, aircraft de-icing, and washing agents. For most airport improvements, design, control during construction, and other mitigation measures can avoid significant impacts to water quality.

For aerial spray wash and deicing facilities at airports, water quality standards require the collection and treatment of materials to prevent distribution into storm water runoff.

A Storm Water Pollution Prevention Plan (SWPPP) is required to identify the Airport operations having the potential to affect storm water and the appropriate Best Management Practices (BMPs) to eliminate or minimize surface water contamination. Erosion and sedimentation control and management of runoff during construction is typically designed during specific improvement projects and reviewed and approved during the NPDES permitting process.

A SWPPP will be required for airport construction projects listed on the CIP and may be required for the construction of additional hangar space and the apron redesign. These impacts and required permits will be evaluated and documented in the NEPA review process.

6.1.12 Water Resources

The Airport is located near Lake Superior, Superior Bay (16-1P), and the St. Louis River, all of which are listed as Public Waters by the MNDNR Public Waters Inventory. The Minnesota DNR describes docks as narrow structures used for getting to deeper water. The DNR For certain docks, a general permit may be used. The addition of the two docks as identified in the master plan will likely require a General Permit from from the State of Minnesota’s Department of Natural Resource (DNR) since they are likely to exceed a width of eight (8) feet. The relocation of the seaplane ramp will also require a permit as the width will exceed eight feet.

Wetland impacts are not anticipated for any of the projects listed in the CIP projects.

7 Financial and Implementation Plan

There are many projects planned for the Sky Harbor Regional Airport (DYT) in the upcoming years, as discussed throughout this Master Plan. Understanding the costs of these projects and the potential funding partners (FAA, MnDOT, Hangar Loan Program, etc.) is essential to determine the feasibility of the plan. This chapter will discuss the various sources of potential funding, provide a brief description of the planned projects, and summarize the Capital Improvement Plan (CIP) for all the planned development.

7.1 Funding Sources

In Minnesota, airport development projects are usually funded by several sources, including the FAA Airport Improvement Program (AIP), Minnesota Airport Construction Grant Program, Airport Maintenance and Operations Program, Hangar Loan Revolving Account Program, local (Airport and/or City) funding, and private investment.

7.1.1 FAA Airport Improvement Program (AIP)

The FAA AIP was created by the Airport and Airways Act of 1982 to assist in the development of a nationwide system of public-use airports. AIP replaced the previous programs, including the Airport Development Aid Program (ADAP) and the earlier Federal Aid to Airports Program (FAAP). AIP provides an increased level of funding, higher federal participation rate, and greater project eligibility. Amendments to the program since 1982 have consistently increased funding levels, participation rate, and eligibility.

The AIP has limits on eligibility. Generally, grant eligible items include airfield and aeronautical related facilities, such as: runways, taxiways, aprons, lighting, and visual aids, as well as land acquisition, planning, and environmental tasks needed to accomplish the Airport improvement projects. Most revenue producing items like hangars, fuel farms, and FBO facilities are not eligible for AIP funds. Additionally, equipment eligibility is limited to safety equipment like Aircraft Rescue and Firefighting (ARFF) trucks and snow removal equipment (SRE). Mowers, earth moving equipment, and airport operations vehicles are not eligible for funding. The FAA utilizes a priority system to rank development items. Generally, the smaller the Airport and the farther the item is from the runway, the lower priority it receives (e.g. runways have priority over taxiways, which have greater priority than aprons, which have priority over roads, etc.). However, development or equipment required by rule or law has a high priority.

Currently, federal participation in the AIP is 90% of the eligible cost of airport projects, leaving the Airport sponsor responsible for the other 10%. In Minnesota, MnDOT Aeronautics has typically provided a grant for 50% of the sponsors share on AIP grants. All funding from both State and Federal agencies must be for planning, design, construction, or pavement maintenance projects, and cannot be used to supplement the operating expenses of the airport.

There are two types of AIP funds that an airport will receive: entitlement and discretionary.

7.1.1.1 Entitlement Funds

All NPIAS[27] General Aviation airports receive an entitlement of $150,000 per year. General aviation airports are defined as airports that do not offer commercial airline service, are open to the public, have at least 10 based aircraft, and are located 20 miles outside of the nearest NPIAS airport. If an airport desires to receive discretionary funds (**Section 7.1.1.2**) for a development item, the airport's CIP should include at least two years of entitlement funds dedicated to the project. An airport can use entitlement funds on any eligible item; however, excessive use of entitlements on low priority work can have a negative effect on the FAA's discretionary funding plans for that airport. Currently, as of November 2022, DYT's existing FAA Entitlement balance is $360,990.

7.1.1.2 Discretionary Funds

Approximately half of the AIP appropriations each year can be dispersed by the FAA at their discretion, rather than the fixed entitlement grants. The FAA has many priority programs they fund each year; examples are runway safety areas, runway surface treatments, and projects which improve overall system capacity (e.g. new runways at hub airports). Airports, such as DYT, compete best for discretionary funding for safety, security, and pavement preservation projects.

7.1.2 FAA Bipartisan Infrastructure Law (BIL) Airport Improvement Grants (AIG)

The Infrastructure Investment and Jobs Act, popularly known as the Bipartisan Infrastructure Law (BIL), was signed into law on November 15, 2021, providing nearly $1.2 trillion of investment into the Nation's infrastructure needs. The goal of BIL is to modernize infrastructure, increase equity in transportation, help fight climate change, strengthen the supply chain, and create jobs.

Over a five-year period (2022-2026), BIL will provide a total of $25 billion to the FAA for the Nation's air transportation system to address the physical condition of the FAA's air traffic control facilities and improve safety and efficiency at our nation's airports. The $25 billion of aviation funding includes $15 billion for Airport Infrastructure Grants (AIG), $5 billion for the Airport Terminal Program (ATP), and $5 billion for FAA Air Traffic Facilities (ATF).[28]

7.1.2.1 Airport Infrastructure Grants (AIG) Funding

AIG funding totals includes allocations of up to $500 million annually for Non-Primary Airports and $2.39 billion annually for Primary Airports. Allocations for Nonprimary Airports are based on the airport's role in the NPIAS with a fixed amount for each role (e.g., National, Regional, etc.). Unclassified NPIAS airports do not receive an AIG allocation. Allocations for Nonprimary Airports, such as DYT, is a consistent amount of $159,000 per year. For Federal Fiscal years 2024-2026 DYT will receive this amount annually for use on airport project. AIG has the same standard federal match as AIP projects for each airport, which is currently 90% for DYT (see **Section 7.1.1**). ***As a Nonprimary Airport, DYT is anticipated to received $159,000 annually, from 2022 through 2026.***

[27] National Plan of Integrated Airport Systems. See **Section 1.4.1**Error! Reference source not found.**.**
[28] https://www.faa.gov/bil

7.1.2.2 Airport Terminal Program (ATP) Funding

ATP funding totals $5 billion in competitive discretionary grants, with $1 billion per year to eligible projects. ATP eligible projects include airport terminals and associated roadways, multimodal terminal projects, on airport rail access projects, and airport-owned Air Traffic Control Towers (ATCTs). Allocation for BIL ATP funding is not more than 55% to Large Hub airports, not more than 15% to Medium Hub airports, not more than 20% to Small Hub airports, and not more than 10% to Non-Hub and Non-Primary airports. The Federal share for ATP projects is 80% for Large and Medium Hubs, and 95% for Small, Non-Hub, and Non-Primary airports. Airport sponsors must apply for ATP funding each year, and compete with airports across the country for the funding. This program has been identified as a funding opportunity to address the needed infrastructure improvements of the existing Terminal Building at Sky Harbor.

7.1.3 Minnesota State Airport Funding

In order for an airport to be eligible for Minnesota State funding, it must be included in the State Aviation System, established in a Commissioner's Order by the Commissioner of Transportation and approved by the Governor of Minnesota, subject to determination of relative priority of any proposed project in the MnDOT's State System CIP. DYT is listed in the Minnesota's Aviation System as an Intermediate Airport. The construction and maintenance of an airport can be funded through the State by three primary methods: Airport Construction Grant Program, Airport Maintenance and Operation Program, and Hangar Loan Revolving Account Program. These programs are described below.

Per Minnesota Statutes, MnDOT participation rates for funding airports and navigation are set annually by the Commissioner of Transportation by June 1st[29]. If the Commissioner does not establish local contribution rates by June 1, the previous year's rates apply. **Table 7-1** shows the funding rates for DYT[30] for State Fiscal Year (FY) 2022 per the rate letter dated May 27, 2021.

[29] Minnesota Statute 360.305 Subdivision 4.
[30] NPIAS Airport, with Sponsor Population Under 5,000.

Table 7-1 – Fiscal Year 2021 State Airport Fund Grant Rates

Project Type	State Share for NPAIS Airports (e.g. DYT)	
	Federal Projects	State Projects
Construction, Planning, Zoning, Environmental, Land, Navigation Systems, AWOS	5%	75%
Air Service Marketing	5%	70%
Maintenance and Operations (M&O)	5%	75%
M&O Utilities in Use by Non-Federal Navigation Aids	5%	75%
Fuel Systems	5%	70%
Equipment	5%	75%

Source: MnDOT Aeronautics. Effective July 1, 2021 to June 30, 2022.

7.1.3.2 Airport Construction Grant Program

The State Construction Grant Program funds most capital improvements at state system airports. Funding for this program is based on a determination that the Airport improvement is a justifiable benefit to the air-traveling public. For these projects, the State has historically provided funding at an 80%/20% basis for State/Local projects. However, projects that have revenue-generating potential are funded at 50%/50%. Grants are issued for planning, land acquisition, construction and rehabilitation of runways, taxiways, aprons, hangar areas, vehicle parking areas, entrance roads, arrival/departure buildings, maintenance buildings, utilities, drainage facilities, aviation fuel facilities, and airfield lighting systems. This program also funds airport maintenance equipment at a 2/3 State and 1/3 local participation rate.

7.1.3.3 Airport Maintenance and Operations Program

The State Airport Maintenance and Operation Grant program has historically provided 2/3 reimbursement to the state system airports for their documented, routine maintenance. The day-to-day labor, material, equipment, and utility expenses of maintaining airport pavements, airport grounds, lighting systems, buildings, and maintenance equipment are eligible costs for this program. There is a maximum amount of reimbursement available from MnDOT, with that dollar value being based on the size of the airport and total area of pavement. The total fundable amount is also based on the size of the airport and total area of pavement.

7.1.3.4 Hangar Loan Revolving Account Program

The State of Minnesota may finance up to 80% of the cost of hangar construction under the State Hangar Loan Revolving Account Program. The sponsor is required to fund the initial 20% of the total costs, with the remaining 80% issued as a no-interest loan with a pay-back period of twenty years.

7.2 Capital Improvement Plan

A Capital Improvement Program (CIP) is developed for each airport in the State of Minnesota that qualifies for state and/or federal funding. Airports typically develop a CIP to show their development plans and the anticipated funding sources. The CIP is updated every year to help state officials plan for upcoming construction projects at airports. A quality CIP must be realistic

and reflect the maximum practical amount of funds available from the FAA AIP, MnDOT Aeronautics grants, Hangar Loan program, local funding, etc. The CIP should also reflect eligibility and priorities of the federal and state programs. The result is a CIP with a higher probability for accomplishment. Past participation rates and eligibility rules are the best available guide to develop a CIP for DYT.

Future development at DYT, as included in this Master Plan study, covers a 20-year period (2021-2041). Estimated development costs based on the Airport Layout Plan are included in the CIP. Projects are based on the recommended facility requirements as discussed in **Chapter 4** and the selected alternatives in **Chapter 5**. Demand for certain facilities, especially in the later time frame, and the economic feasibility of their development are the prime factors influencing the implementation of a project's timeframe. Estimated costs are expressed in 2022 dollars with no adjustments for inflation and include design, construction, and construction administration. All projects programmed beyond 2022 will need to account for escalation for the year they are accomplished.

DYT receives $150,000 annually in FAA Entitlement funds to pay for the FAA portion of federally eligible projects. The CIP for DYT is shown in **Table 7-2** and discussed in the sections that follow, use DYT's beginning entitlement balance of $360,990 (November 2022). As discussed in **Section 7.1.2**, the CIP also assumes MnDOT provides funding for 50% of the Sponsor's share of federally eligible projects through 2025. When reorganizing and prioritizing projects in DYT's CIP, the available FAA Entitlement funds, as well as the local participation required for each project were kept in mind. It is important that the CIP be as realistic as possible for the first five years of the CIP.

DYT

Table 7-2

Updated 24-Jul-23

Duluth Sky Harbor Airport (DYT)
CIP 2022-2042

Annual Entitlements through 2020: $ - $ -
Annual Entitlements 2021 $ 210,990.00 $ -

FEDERAL OR STATE FISCAL YEAR (FFY/SFY)	Future Development	Project Type	Cost	Funding Rates			AIP Funding (Entitlement and Discretionary)	AIG Funding - Annual Allotment	AIG Funding - Terminal Grant	State Funding	DAA Reserves	Other Funding	Other Funding Source	Local Funding Source	AIP Entitlement Balance Tracking	AIG Allotment Balance tracking
				FAA	MnDOT	Local										
CALENDAR YEAR 2022														Annual Entitlement	$ 150,000.00	$ 159,000.00
														Total Entitlement Available	$ 360,990.00	$ 159,000.00
PLANNING AND ENVIRONMENTAL																
															$ 360,990.00	$ 159,000.00
AIRSIDE ENGINEERING AND CONSTRUCTION																
FFY2022	Southeast Apron Rehabilitation (multi-year grant)	Construction	$ 460,533.00	PR	PR	PR	$ 368,345.25	$ -		$ 56,345.63	$ 35,841.63				$ (7,355.25)	$ 159,000.00
SFY 2023	Seaplane Ramp Repair	Construction	$ 80,000.00	0%	70%	30%	$ -	$ -		$ 56,000.00	$ 24,000.00				$ (7,355.25)	$ 159,000.00
LANDSIDE ENGINEERING AND CONSTRUCTION																
															$ (7,355.25)	$ 159,000.00
ARCHITECTURE AND BUILDINGS																
FFY 2022	SRE Building - Design	Construction/Engineering	$ 73,700.00	90%	0%	10%	$ -	$ 66,330.00	$ -	$ -	$ 7,370.00	$ -	-	-	$ (7,355.25)	$ 92,670.00
EQUIPMENT																
															$ (7,355.25)	$ 92,670.00
	CALENDAR YEAR TOTALS		**$ 614,233.00**				**$ 368,345.25**	**$ 66,330.00**		**$ 112,345.63**	**$ 67,211.63**	**$ -**			**$ -**	**$ 92,670.00**
CALENDAR YEAR 2023														Annual Entitlement	$ 150,000.00	$ 159,000.00
														Total Entitlement Available	$ 150,000.00	$ 251,670.00
PLANNING AND ENVIRONMENTAL																
FFY 2023	Runway Relocation - Phase 5 Mitigation Monitoring (if needed)	Environmental	$ 50,000.00	90%	5%	5%	$ 45,000.00	$ -	$ -	$ 2,500.00	$ 2,500.00	$ -			$ 105,000.00	$ 251,670.00
FFY 2023	BIL Money Transfer from DLH (SRE Building)	Planning	$ (600,000.00)	100%	0%	0%	$ -	$ (600,000.00)	$ -	$ -	$ -	$ -			$ 105,000.00	$ 851,670.00
FFY 2023	Entitlement Repayment OUT - AUM	Planning	$ 100,000.00	100%	0%	0%	$ 100,000.00	$ -	$ -	$ -	$ -	$ -			$ 5,000.00	$ 851,670.00
AIRSIDE ENGINEERING AND CONSTRUCTION																
FFY 2023	Taxilane and Hangar Design	Engineering	$ 75,000.00	90%	0%	10%	$ -	$ 67,500.00	$ -	$ -	$ 7,500.00	$ -			$ 5,000.00	$ 784,170.00
SFY 2024	Seaplane Base Improvements Phase 1 - Dock Replacement and Safety Upgrades	Construction	$ 300,000.00	0%	70%	30%	$ -	$ -	$ -	$ 210,000.00	$ 90,000.00	$ -			$ 5,000.00	$ 784,170.00
LANDSIDE ENGINEERING AND CONSTRUCTION																
															$ 5,000.00	$ 784,170.00
ARCHITECTURE AND BUILDINGS																
FFY 2023	GA Terminal Building - Design and Construction	Construction/Engineering	$ 1,400,000.00	95%	0%	5%	$ -	$ -	$ 1,330,000.00	$ -	$ 70,000.00	$ -	AIG Terminal Grant Program		$ 5,000.00	$ 784,170.00
FFY 2023	SRE Building - Construction & CA	Construction/Engineering	$ 800,000.00	90%	0%	10%	$ -	$ 720,000.00		$ -	$ 80,000.00	$ -			$ 5,000.00	$ 64,170.00
EQUIPMENT																
															$ 5,000.00	$ 64,170.00
	CALENDAR YEAR TOTALS		**$ 2,125,000.00**				**$ 145,000.00**	**$ 187,500.00**		**$ 212,500.00**	**$ 250,000.00**	**$ -**			**$ 5,000.00**	**$ 64,170.00**
CALENDAR YEAR 2024														Annual Entitlement	$ 150,000.00	$ 159,000.00
														Total Entitlement Available	$ 155,000.00	$ 223,170.00
PLANNING AND ENVIRONMENTAL																
FFY 2024	Entitlement Transfer OUT - Repayment to AUM	Planning	$ 170,000.00	100%	0%	0%	$ 170,000.00	$ -	$ -	$ -	$ -	$ -			$ (15,000.00)	$ 223,170.00
FFY 2024	Entitlement Transfer IN	Planning	$ (300,000.00)	100%	0%	0%	$ (300,000.00)	$ -	$ -	$ -	$ -	$ -			$ 285,000.00	$ 223,170.00
AIRSIDE ENGINEERING AND CONSTRUCTION																
FFY 2024	Taxilane Construction & CA	Construction	$ 225,000.00	90%	5%	5%	$ 202,500.00	$ -	$ -	$ 11,250.00	$ 11,250.00	$ -			$ 82,500.00	$ 223,170.00
LANDSIDE ENGINEERING AND CONSTRUCTION																
															$ 82,500.00	$ 223,170.00
ARCHITECTURE AND BUILDINGS																
															$ 82,500.00	$ 223,170.00
EQUIPMENT																
															$ 82,500.00	$ 223,170.00
	CALENDAR YEAR TOTALS		**$ 95,000.00**				**$ 72,500.00**			**$ 11,250.00**	**$ 11,250.00**	**$ -**			**$ 82,500.00**	**$ 223,170.00**
CALENDAR YEAR 2025														Annual Entitlement	$ 150,000.00	$ 159,000.00
														Total Entitlement Available	$ 232,500.00	$ 382,170.00
PLANNING AND ENVIRONMENTAL																
FFY 2025	Entitlement Repayment	Transfer	$ 150,000.00	100%	0%	0%	$ 150,000.00	$ -	$ -	$ -	$ -	$ -			$ 82,500.00	$ 382,170.00
AIRSIDE ENGINEERING AND CONSTRUCTION																
FFY 2025	Runway / Taxiway Rehabilitation - Crack Seal	Construction	$ 150,000.00	0%	70%	30%	$ -	$ -	$ -	$ 105,000.00	$ 45,000.00	$ -			$ 82,500.00	$ 382,170.00
LANDSIDE ENGINEERING AND CONSTRUCTION																
															$ 82,500.00	$ 382,170.00
ARCHITECTURE AND BUILDINGS																
															$ 82,500.00	$ 382,170.00
EQUIPMENT																
SFY 2026	Mower/Float Tractor	Mower/Tractor	$ 200,000.00	0%	70%	30%	$ -			$ 140,000.00	$ 60,000.00				$ 82,500.00	$ 382,170.00
	CALENDAR YEAR TOTALS		**$ 500,000.00**				**$ 150,000.00**			**$ 245,000.00**	**$ 105,000.00**	**$ -**			**$ 82,500.00**	**$ 382,170.00**
CALENDAR YEAR 2026														Annual Entitlement	$ 150,000.00	$ 159,000.00
														Total Entitlement Available	$ 232,500.00	$ 541,170.00
PLANNING AND ENVIRONMENTAL																
FFY 2026	AIG Transfer from DLH	Planning	$ (134,000.00)	100%	0%	0%	$ -	$ (134,000.00)	$ -	$ -	$ -	$ -			$ 232,500.00	$ 675,170.00
AIRSIDE ENGINEERING AND CONSTRUCTION																
FFY 2026	Apron Improvements & Safety Enhancements Phase 1 - Pavement Removal	Engineering/Construction	$ 160,000.00	90%	5%	5%	$ 144,000.00	$ -	$ -	$ 8,000.00	$ 8,000.00	$ -			$ 88,500.00	$ 675,170.00
LANDSIDE ENGINEERING AND CONSTRUCTION																
FFY 2026	Single Ranch Hangar Construction (32'x160')	Construction	$ 750,000.00	90%	0%	10%	$ -	$ 675,000.00	$ -	$ -	$ 75,000.00	$ -			$ 88,500.00	$ 170.00
ARCHITECTURE AND BUILDINGS																

																$ 88,500.00	$ 170.00
EQUIPMENT																	
																$ 88,500.00	$ 170.00
	CALENDAR YEAR TOTALS		**$ 776,000.00**				**$ 144,000.00**	**$ 541,000.00**	**$ -**	**$ 8,000.00**	**$ 83,000.00**	**$ -**			**$ 88,500.00**	**$ 170.00**

CALENDAR YEAR 2027														**Annual Entitlement**	**$ 150,000.00**	**$ 159,000.00**
														Total Entitlement Available	**$ 238,500.00**	**$ 159,170.00**
PLANNING AND ENVIRONMENTAL																
FFY 2027	Entitlement Repayment	Transfer	$ 150,000.00	100%	0%	0%	$ 150,000.00	$ -	$ -	$ -	$ -	$ -			$ 88,500.00	$ 159,170.00
AIRSIDE ENGINEERING AND CONSTRUCTION																
FFY 2027	Seaplane Base Improvements - Phase 1 - Seaplane Ramp Relocation	Construction	$ 110,000.00	90%	0%	10%	$ -	$ 99,000.00	$ -	$ -	$ 11,000.00	$ -			$ 88,500.00	$ 60,170.00
FFY 2026	Installation of Segmented Circle – Design and Construction	Engineering/Construction	$ 50,000.00	90%	0%	10%	$ -	$ 45,000.00	$ -	$ -	$ 5,000.00	$ -			$ 88,500.00	$ 15,170.00
LANDISDE ENGINEERING AND CONSTRUCTION																
SFY 2027	Apron Improvements & Safety Enhancements Phase 2 - Fueling System (Pump & Cabinet System) Relocation	Construction	$ 200,000.00	0%	70%	30%	$ -	$ -	$ -	$ 140,000.00	$ 60,000.00	$ -			$ 88,500.00	$ 15,170.00
SFY 2027	Apron Improvements & Safety Enhancements - Phase 2: Fuel Tank Replacement	Engineering/Construction	$ 610,000.00	0%	70%	30%	$ -	$ -	$ -	$ 427,000.00	$ 183,000.00	$ -			$ 88,500.00	$ 15,170.00
ARCHITECTURE AND BUILDINGS																
															$ 88,500.00	$ 15,170.00
EQUIPMENT																
															$ 88,500.00	$ 15,170.00
	CALENDAR YEAR TOTALS		**$ 1,120,000.00**				**$ 150,000.00**	**$ 144,000.00**		**$ 567,000.00**	**$ 259,000.00**	**$ -**			**$ 88,500.00**	**$ 15,170.00**

CALENDAR YEAR 2028														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 238,500.00**
PLANNING AND ENVIRONMENTAL															
														$ 238,500.00	
AIRSIDE ENGINEERING AND CONSTRUCTION															
FFY 2027	Seaplane Base Improvements - Phase 2 - Dock #2, Pedestrian Walkway, & Fence	Construction	$ 680,000.00	0%	70%	30%	$ -			$ 204,000.00	$ 204,000.00			$ 238,500.00	
LANDSIDE ENGINEERING AND CONSTRUCTION															
														$ 238,500.00	
ARCHITECTURE AND BUILDINGS															
														$ 238,500.00	
EQUIPMENT															
														$ 238,500.00	
	CALENDAR YEAR TOTALS		**$ 680,000.00**				**$ -**			**$ 204,000.00**	**$ 204,000.00**	**$ -**		**$ 238,500.00**	

CALENDAR YEAR 2029														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 388,500.00**
PLANNING AND ENVIRONMENTAL															
														$ 388,500.00	
AIRSIDE ENGINEERING AND CONSTRUCTION															
														$ 388,500.00	
LANDSIDE ENGINEERING AND CONSTRUCTION															
FFY 2029	Apron Rehabilitation - Crack Repair & Slurry Seal	Construction	$ 200,000.00	90%	5%	5%	$ 180,000.00			$ 10,000.00	$ 10,000.00			$ 208,500.00	
ARCHITECTURE AND BUILDINGS															
														$ 208,500.00	
EQUIPMENT															
														$ 208,500.00	
	CALENDAR YEAR TOTALS		**$ 200,000.00**				**$ 180,000.00**	**$ -**		**$ 10,000.00**	**$ 10,000.00**	**$ -**		**$ 208,500.00**	

CALENDAR YEAR 2030														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 358,500.00**
PLANNING AND ENVIRONMENTAL															
														$ 358,500.00	
AIRSIDE ENGINEERING AND CONSTRUCTION															
														$ 358,500.00	
LANDSIDE ENGINEERING AND CONSTRUCTION															
														$ 358,500.00	
ARCHITECTURE AND BUILDINGS															
														$ 358,500.00	
EQUIPMENT															
FFY 2030	Replace Tractor #26 with attachments	Equipment	$ 400,000.00	0%	70%	30%	$ -	$ -		$ 280,000.00	$ 120,000.00			$ 358,500.00	
	CALENDAR YEAR TOTALS		**$ 400,000.00**				**$ -**	**$ -**		**$ 280,000.00**	**$ 120,000.00**	**$ -**		**$ 358,500.00**	

CALENDAR YEAR 2031														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 508,500.00**
PLANNING AND ENVIRONMENTAL															
										$ -	$ -			$ 508,500.00	
AIRSIDE ENGINEERING AND CONSTRUCTION															
FFY 2031	Seaplane Dock #3 Construction	Construction	$ 380,000.00	90%	5%	5%	$ 342,000.00			$ 19,000.00	$ 19,000.00			$ 166,500.00	
LANDSIDE ENGINEERING AND CONSTRUCTION															
														$ 166,500.00	
ARCHITECTURE AND BUILDINGS															
														$ 166,500.00	
EQUIPMENT															
														$ 166,500.00	
	CALENDAR YEAR TOTALS		**$ 380,000.00**				**$ 342,000.00**	**$ -**		**$ 19,000.00**	**$ 19,000.00**	**$ -**		**$ 166,500.00**	

CALENDAR YEAR 2032														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 316,500.00**
PLANNING AND ENVIRONMENTAL															
														$ 316,500.00	
AIRSIDE ENGINEERING AND CONSTRUCTION															
FFY 2032	Runway Rehabilitation - Crack Repair & Slurry Seal	Maintenance	$ 200,000.00	90%	5%	5%	$ 180,000.00			$ 10,000.00	$ 10,000.00			$ 136,500.00	

FFY 2032	Taxiway Rehabilitation - Crack Seal & Slurry Seal	Maintenance	$ 350,000.00	90%	5%	5%	$ 315,000.00			$ 17,500.00	$ 17,500.00				$ -
LANDSIDE ENGINEERING AND CONSTRUCTION															
FFY 2032	General Aviation Apron Reconstruction	Construction	$ 800,000.00	90%	5%	5%	$ 720,000.00			$ 40,000.00	$ 40,000.00				$ -
ARCHITECTURE AND BUILDINGS															
															$ -
EQUIPMENT															
															$ -
	CALENDAR YEAR TOTALS		**$ 1,350,000.00**				**$ 1,215,000.00**			**$ 67,500.00**	**$ 67,500.00**	**$ -**			**$ -**

CALENDAR YEAR 2033														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 150,000.00**
PLANNING AND ENVIRONMENTAL															
															$ 150,000.00
AIRSIDE ENGINEERING AND CONSTRUCTION															
															$ 150,000.00
LANDSIDE ENGINEERING AND CONSTRUCTION															
															$ 150,000.00
ARCHITECTURE AND BUILDINGS															
FFY 2033	Lot 8 Hangar Construction (60'x60' w/ fire suppression)	Construction	$ 600,000.00	0%	70%	30%	$ -			$ 180,000.00	$ 180,000.00				$ 150,000.00
EQUIPMENT															
															$ 150,000.00
	CALENDAR YEAR TOTALS		**$ 600,000.00**				**$ -**			**$ 180,000.00**	**$ 180,000.00**	**$ -**			**$ 150,000.00**

CALENDAR YEAR 2034														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 300,000.00**
PLANNING AND ENVIRONMENTAL															
FFY 2034	Master Plan & ALP Update	Planning	$ 300,000.00	90%	5%	5%	$ 270,000.00	-		$ 15,000.00	$ 15,000.00				$ 30,000.00
AIRSIDE ENGINEERING AND CONSTRUCTION															
															$ 30,000.00
LANDSIDE ENGINEERING AND CONSTRUCTION															
															$ 30,000.00
ARCHITECTURE AND BUILDINGS															
															$ 30,000.00
EQUIPMENT															
															$ 30,000.00
	CALENDAR YEAR TOTALS		**$ 300,000.00**				**$ 270,000.00**			**$ 15,000.00**	**$ 15,000.00**	**$ -**			**$ 30,000.00**

CALENDAR YEAR 2035														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 180,000.00**
PLANNING AND ENVIRONMENTAL															
															$ 180,000.00
AIRSIDE ENGINEERING AND CONSTRUCTION															
															$ 180,000.00
LANDSIDE ENGINEERING AND CONSTRUCTION															
FFY 2035	Rotating Beacon Relocation & Replacement	Construction	$ 110,000.00	90%	5%	5%	$ 99,000.00			$ 5,500.00	$ 5,500.00				$ 81,000.00
ARCHITECTURE AND BUILDINGS															
															$ 81,000.00
EQUIPMENT															
															$ 81,000.00
	CALENDAR YEAR TOTALS		**$ 110,000.00**				**$ 99,000.00**			**$ 5,500.00**	**$ 5,500.00**	**$ -**			**$ 81,000.00**

CALENDAR YEAR 2036														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 231,000.00**
PLANNING AND ENVIRONMENTAL															
															$ 231,000.00
AIRSIDE ENGINEERING AND CONSTRUCTION															
															$ 231,000.00
LANDSIDE ENGINEERING AND CONSTRUCTION															
															$ 231,000.00
ARCHITECTURE AND BUILDINGS															
															$ 231,000.00
EQUIPMENT															
															$ 231,000.00
	CALENDAR YEAR TOTALS		**$ -**				**$ -**			**$ -**	**$ -**	**$ -**			**$ 231,000.00**

CALENDAR YEAR 2037														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 381,000.00**
PLANNING AND ENVIRONMENTAL															
															$ 381,000.00
AIRSIDE ENGINEERING AND CONSTRUCTION															
															$ 381,000.00
LANDSIDE ENGINEERING AND CONSTRUCTION															
															$ 381,000.00
ARCHITECTURE AND BUILDINGS															
															$ 381,000.00
EQUIPMENT															
															$ 381,000.00
	CALENDAR YEAR TOTALS		**$ -**				**$ -**			**$ -**	**$ -**	**$ -**			**$ 381,000.00**

CALENDAR YEAR 2038														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 531,000.00**
PLANNING AND ENVIRONMENTAL															
															$ 531,000.00
AIRSIDE ENGINEERING AND CONSTRUCTION															
															$ 531,000.00

LANDSIDE ENGINEERING AND CONSTRUCTION															
															$ 531,000.00
ARCHITECTURE AND BUILDINGS															
															$ 531,000.00
EQUIPMENT															
															$ 531,000.00
	CALENDAR YEAR TOTALS		**$ -**				**$ -**			**$ -**	**$ -**	**$0**			**$ 531,000.00**

CALENDAR YEAR 2039														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 681,000.00**
PLANNING AND ENVIRONMENTAL															
															$ 681,000.00
AIRSIDE ENGINEERING AND CONSTRUCTION															
															$ 681,000.00
LANDSIDE ENGINEERING AND CONSTRUCTION															
															$ 681,000.00
ARCHITECTURE AND BUILDINGS															
															$ 681,000.00
EQUIPMENT															
FFY 2039	Replace #42 Loader	SRE	$ 400,000.00	90%	5%	5%	$ 360,000.00			$ 20,000.00	$ 20,000.00				$ 321,000.00
	CALENDAR YEAR TOTALS		**$ 400,000.00**				**$ 360,000.00**			**$ 20,000.00**	**$ 20,000.00**	**$ -**			**$ 321,000.00**

CALENDAR YEAR 2040														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 471,000.00**
PLANNING AND ENVIRONMENTAL															
															$ 471,000.00
AIRSIDE ENGINEERING AND CONSTRUCTION															
															$ 471,000.00
LANDSIDE ENGINEERING AND CONSTRUCTION															
															$ 471,000.00
ARCHITECTURE AND BUILDINGS															
															$ 471,000.00
EQUIPMENT															
															$ 471,000.00
	CALENDAR YEAR TOTALS		**$ -**				**$ -**			**$ -**	**$ -**	**$ -**			**$ 471,000.00**

CALENDAR YEAR 2041														**Annual Entitlement**	**$ 150,000.00**
														Total Entitlement Available	**$ 621,000.00**
PLANNING AND ENVIRONMENTAL															
															$ 621,000.00
AIRSIDE ENGINEERING AND CONSTRUCTION															
															$ 621,000.00
LANDSIDE ENGINEERING AND CONSTRUCTION															
															$ 621,000.00
ARCHITECTURE AND BUILDINGS															
															$ 621,000.00
EQUIPMENT															
															$ 621,000.00
	CALENDAR YEAR TOTALS		**$ -**				**$ -**			**$ -**	**$ -**	**$ -**			**$ 621,000.00**

7.2.2 5 Year CIP (2021 – 2026)

The 5 Year CIP is the short-term plan discussing the capital improvements planned at DYT for the next five years (2022 to 2026). The following plans are shown on **Figure 7-1**.

7.2.2.1 Federal Fiscal Year 2022

- **Southeast Apron Rehabilitation** - The pavement on the southeastern portion of the apron is in poor condition and is in need of rehabilitation. This project consists of the rehabilitation of this portion of the apron. The project was bid in 2022 at a total cost of $460,532.50. AIP eligible portions of the project will be funded at 90% FAA, 5% Airport and 5% MnDOT. The AIP ineligible portions of the project will be funded at 70% MnDOT and 30% Airport.
- **Seaplane Ramp Repair** - The existing ramp has cracked concrete and the existing plastic strips that protect aircraft floats from the concrete ramp should be replaced as they each reach the end of their useful life. The strips exposed to UV rays, those that are not continuously submerged, have cracked and should be replaced. This project was bid in 2022 and will cost $19,132.90. This project is not projected to be eligible for FAA AIP funds, with the project funding ratio of MnDOT 70% and Airport 30%.
- **SRE Building – Design** - DYT's existing equipment is currently housed in the DAA's hangar attached to the A/D Building. Federally funded equipment should be stored in an SRE building to protect and preserve the equipment. This project is expected to include the design of the building. This project is estimated to cost $73,700. The building is eligible FAA BIL funds, with the project funding ratio of FAA 90%, and Airport 10%.

7.2.2.2 Federal Fiscal Year 2023

- **Runway Relocation – Phase 5 Mitigation Monitoring** - Since the relocation and construction of Runway 14/32, monitoring of the environmental mitigation may be required beyond 2023. Depending on the success rate of the initial mitigation and DNR feedback, this project may not be needed. This project is estimated to cost $50,000 at a funding ratio of FAA 90%, MnDOT 5%, and Airport 5%.
- **BIL Funds Transfer – IN –** This project identifies the transfer of $600,000 in BIL funds from Duluth International Airport (DLH) to Sky Harbor (DYT) to fund the construction of the Snow Removal and Equipment Building. It is not anticipated that these funds will be transferred back to DLH.
- **Entitlement Transfer OUT** - The Duluth Airport Authority will repay approximately $100,000 of their 2023 FAA entitlement dollars to Austin Municipal Airport. Austin had previously loaned entitlement dollars to DYT in 2016 to fund the design of the runway relocation.
- **Taxilane & Hangar Design –** Additional hangar space is needed, and this project includes the design of a hangar and the accommodating taxilane needed for access off the west end of the existing apron. This project is estimated to cost $75,000 at a funding ratio of 90% FAA and 10% Airport.
- **Seaplane Base Improvements Phase 1 – Dock Replacement & Safety Upgrades** - The seaplane dock at DYT is not a sufficient size and the construction can damage aircraft. This project consists of the replacement of that dock. The project was initially bid in 2022 but the bid prices exceeded available funding. This project is estimated to cost $300,000 and is anticipated to have funding ratio of MnDOT 70% and Airport 30%.

- **GA Terminal Building – Design & Construction** - The existing A/D Building is in poor condition and needs rehabilitation. This project consists of upgrading the building to ADA compliance, adding public space, and rehabilitate the concrete cracking underneath the doors. This project is expected to include the design and construction. The estimated cost is $1,400,000. This project is projected to be eligible for FAA AIP funds. The Airport intends to apply for Airport Terminals Program (ATP) funding which is a competitive grant program. This program has a funding rate of 95% FAA and 5% Airport. It is expected that some spaces will be ineligible for FAA funding. These spaces could be funded with MnDOT funding at a funding rate of 70% MnDOT and 30% Airport.
- **SRE Building – Construction and CA** – There is no SRE Building at DYT to store the existing snow removal equipment. This project includes the construction and construction administration of the SRE building on the northwest corner of the existing apron. This project is estimated to cost $800,000 with a funding ratio of 90% FAA and 10% Airport.

7.2.2.3 Federal Fiscal Year 2024

- **Entitlement Transfer OUT** - The Duluth Airport Authority will repay approximately $170,000 of their 2024 FAA entitlement dollars to the Austin Municipal Airport. This transfer will complete the full repayment.
- **Entitlement Transfer IN –** This project identifies the transfer of money into DYT at an amount of $300,000.
- **Taxilane Construction and CA –** This project includes the construction and administration of the taxilane off the west end of the apron that was planned in federal fiscal year 2023. This project is estimated to cost $225,000 with a funding ratio of 90% FAA, 5% MnDOT, and 5% Airport.

7.2.2.4 Federal Fiscal Year 2025

- **Entitlement Transfer OUT** - The Duluth Airport Authority will repay approximately $150,000 of their FAA entitlement dollars.
- **Runway & Taxiway Rehabilitation – Crack Seal** - Joint and crack sealing is recommended approximately every five years, or as needed based on the pavement condition. Runway 14/32 and Taxiway A was reconstructed in 2020. The pavement maintenance will include repairing and resealing previously sealed joints and prepping and sealing new cracks in the pavement. This project is anticipated to cost a total of $150,000 and has an anticipated funding ratio of MnDOT 70%, and Airport 30%.
- **Acquire Mower or Float Tractor** - The Airport is in need of a new mower and the existing float tractor needs to be replaced. The replacement equipment is estimated to cost $200,000 and is anticipated to be funded at a ratio of MnDOT 70% and Airport 30%.

7.2.2.5 Federal Fiscal Year 2026

- **AIG Transfer from DLH –** This project identifies the transfer of funds from the Duluth International Airport (DLH) to Sky Harbor (DYT) at a sum of $134,000. It is not anticipated these funds will be transferred back to DLH.
- **Apron Improvements & Safety Enhancements Phase 1 – Pavement Removal –** The existing apron experiences flooding often, impacting the seaplane ramp and fueling activity. This project includes removing pavement spanning from the existing fuel tank down past the fueling system. This project is estimated to cost $160,000 at a funding ratio of 90% FAA, 5% MnDOT, and 5% Airport.

- **Single Ranch Hangar Construction (32'x160')** – This project includes the construction of a ranch hangar following the design and the construction of the taxilane. This project is estimated to cost $750,000 with a funding ratio of 90% FAA and 10% Airport.

7.2.3 10 Year CIP (2027 – 2031)

The 10 Year CIP is the mid-term plan discussing the capital improvements planned at DYT for the next ten years (2027 to 2031). The 10 Year CIP projects are shown on **Figure 7-2**.

7.2.3.1 Federal Fiscal Year 2027

- **Entitlement Transfer OUT** - The Duluth Airport Authority will repay approximately $150,000 of their FAA entitlement dollars.
- **Seaplane Base Improvements Phase 1 - Reconstruct Seaplane Ramp** - The seaplane ramp relocation is part of the mitigation to the apron flooding and congestion, and this project includes the construction of a new seaplane ramp in a new location. This project is expected to include design and construction. This project is estimated to cost $110,000 and is projected to be eligible for FAA AIG funds, with the project funding ratio of FAA 90% and Airport 10%.
- **Instillation of Segmented Circle – Design and Construction –** Following feedback from the tenants and the Airport, it was recommended that the airport consider changing Runway 32 to right traffic due to the proximity of Superior Airport (SUW) to the south of DYT. While there are no immediate safety concerns, this project should be planned for within the next 5 years The Project is estimated to cost $500,000 and will utilize the nearly all the remaining BIL funds. This project will be funded at 90% BIL and 10% local
- **Apron Improvements & Safety Enhancements Phase 2 - Fueling System (Pump & Cabinet System) Relocation** - The fueling system at DYT is in poor condition and needs to be replaced. This project consists of replacing the fuel pump and cabinet. This project is estimated to cost $200,000 with an anticipated funding ratio 70% State and 30% Airport. If it is determined that the fuel pump replacement project can be delayed, it could be completed at a later time concurrent with apron pavement removal (to be completed as part of the 2032 apron reconstruction project).
- **Apron Improvements & Safety Enhancements Phase 2** – **Fuel Tank Replacement –** Following the removal of impervious pavement, this project includes the replacement of the existing fuel tank and place it within the area where pavement was removed. This project is estimated to cost $610,000 at a funding ratio of 70% MnDOT and 30% Airport.

7.2.3.2 Federal Fiscal Year 2028

- **Seaplane Base Improvements Phase 2 – Dock #2, Pedestrian Walkway, & Fence** - A second seaplane dock is needed to meet capacity needs for seaplane parking. This project consists of constructing a second dock with the construction of a pedestrian walkway and a fence, with an estimated total cost of $680,000. This project has anticipated funding ratio of MnDOT 70%, and Airport 30%.

7.2.3.3 Federal Fiscal Year 2029

- **Apron Rehabilitation – Crack Repair & Slurry Seal** - Joint and crack sealing is recommended approximately every five years, or as needed based on the pavement condition. It is anticipated that in 2029 the apron at the Airport will require joint and crack sealing and repair as part of this project. The pavement maintenance will include

repairing and resealing the previously sealed joints and prepping and sealing new cracks in the pavement. This project is estimated to cost $200,000. This project is projected to be eligible for FAA AIP funds, with a funding ratio of FAA 90%, MnDOT 5%, and Airport 5

7.2.3.4 Federal Fiscal Year 2030

- **Replace Tractor & Attachments** - The Airport's existing tractor is anticipated to be replaced in 2030. This project is estimated to cost $400,000, with the project funding ratio of FAA 90%, MnDOT 5%, and Airport 5%.

7.2.3.5 Federal Fiscal Year 2031

- **Seaplane Dock #3 Construction** – A third seaplane dock will be needed to accommodate traffic. This project includes the construction of an additional seaplane dock and is estimated to cost $380,000 at a funding ratio of 90% FAA, 5% MnDOT, and 5% Airport.

7.2.4 20 Year CIP (2032 – 2041)

The 20 Year CIP is the long-term plan discussing the capital improvements planned at DYT for the next twenty years (2031 to 2040). The 20 Year CIP projects are shown on **Figure 7-3**.

7.2.4.1 Federal Fiscal Year 2032

- **Runway Rehabilitation – Crack Repair & Slurry Seal** - Joint and crack sealing is recommended approximately every five years, or as needed based on the pavement condition. It is anticipated that in 2032 Runway 14/32 at the Airport will require joint and crack sealing and repair as part of this project. The pavement maintenance will include repairing and resealing the previously sealed joints and prepping and sealing new cracks in the pavement. This project is estimated to cost $200,000. This project is projected to be eligible for FAA AIP funds, with a funding ratio of FAA 90%, MnDOT 5%, and Airport 5%.
- **Taxiway Rehabilitation – Crack Repair & Slurry Seal** - Joint and crack sealing is recommended approximately every five years, or as needed based on the pavement condition. It is anticipated that in 2032 all taxiway pavements at the Airport will require joint and crack sealing and repair as part of this project. The pavement maintenance will include repairing and resealing the previously sealed joints and prepping and sealing new cracks in the pavement. This project is estimated to cost $350,000. This project is projected to be eligible for FAA AIP funds, with a funding ratio of FAA 90%, MnDOT 5%, and Airport 5%.
- **General Aviation Apron Reconstruction** - Pavement rehabilitation or reconstruction is recommended approximately every 20 years, and the apron was last reconstructed in 2015. This project consists of the rehabilitation of the apron and includes design and construction. This project includes the removal of impervious areas as depicted in the selected apron alternative. The fuel pump system relocation should be completed prior to or concurrent to this project. This project is estimated to cost $800,000 (2022 dollars). This project is projected to be eligible for FAA AIP funds, with the funding ratio of FAA 90%, MnDOT 5%, and Airport 5%.

7.2.4.2 Federal Fiscal Year 2033

- **Lot 8 Hangar Construction** – This project includes the construction of a 60'x60' hangar with fire suppression with an estimated cost of $500,000. This project is anticipated to have a funding ratio of 70% MnDOT and 30% Airport.

7.2.4.3 Federal Fiscal Year 2034

- **2034 Master Plan & ALP Update** - The Minnesota State System Plan (SASP) recommends that Intermediate Airports, such as DYT, update their Master Plan approximately every 15 years. The last Master Plan (this Master Plan) is anticipated to have been completed in 2022. The Master Plan is estimated to cost $300,000, and is projected to be eligible for FAA AIP funds, with the project funding ratio of FAA 90%, MnDOT 5%, and Airport 5%.

7.2.4.4 Federal Fiscal Year 2035

- **Rotating Beacon Replacement** - The existing rotating beacon is expected to be replaced in 2035. This project will also include the replacement of the beacon in its existing location. This project is estimated to cost $100,000 with a funding ratio of FAA 90%, MnDOT 5%, and Airport 5%.

7.2.4.5 Federal Fiscal Year 2036

- **No Projects Planned** - The Duluth Airport Authority will not pursue federal funding for an airport project to save this year's entitlement allocation ($150,000) for future projects.

7.2.4.6 Federal Fiscal Year 2037

- **No Projects Planned** - No projects are planned this year. The year's entitlement ($150,000) will be saved for future projects.

7.2.4.7 Federal Fiscal Year 2038

- **No Projects Planned** - The Duluth Airport Authority will not pursue federal funding for an airport project to save this year's entitlement allocation ($150,000) for future projects.

7.2.4.8 Federal Fiscal Year 2039

- **Replace #42 Loader** - The existing loader is anticipated (acquired in 2007) to be replaced at the end of its useful life in 2039.This project is estimated to cost $400,000. This project is projected to be eligible for FAA AIP funds, with the project funding ratio of FAA 90%, MnDOT 5%, and Airport 5%.

7.2.4.9 Federal Fiscal Year 2040

- **No Projects Planned** - No projects are planned this year. The year's entitlement ($150,000) will be saved for future projects.

7.2.4.10 Federal Fiscal Year 2041

- **No Projects Planned** - No projects are planned this year. The year's entitlement ($150,000) will be saved for future projects.

7.3 Recommended Projects Not Included in the 20-Year CIP

There are several recommended projects and airport improvements in **Chapter 4**, *Facility Recommendations* and **Chapter 5**, *Alternatives Analysis* that are not shown in the 20-Year CIP. This is due to either the project being the responsibility of the Airport Sponsor, or the project is estimated to occur beyond the 20-year period. These recommended projects are described in detail in the sections that follow.

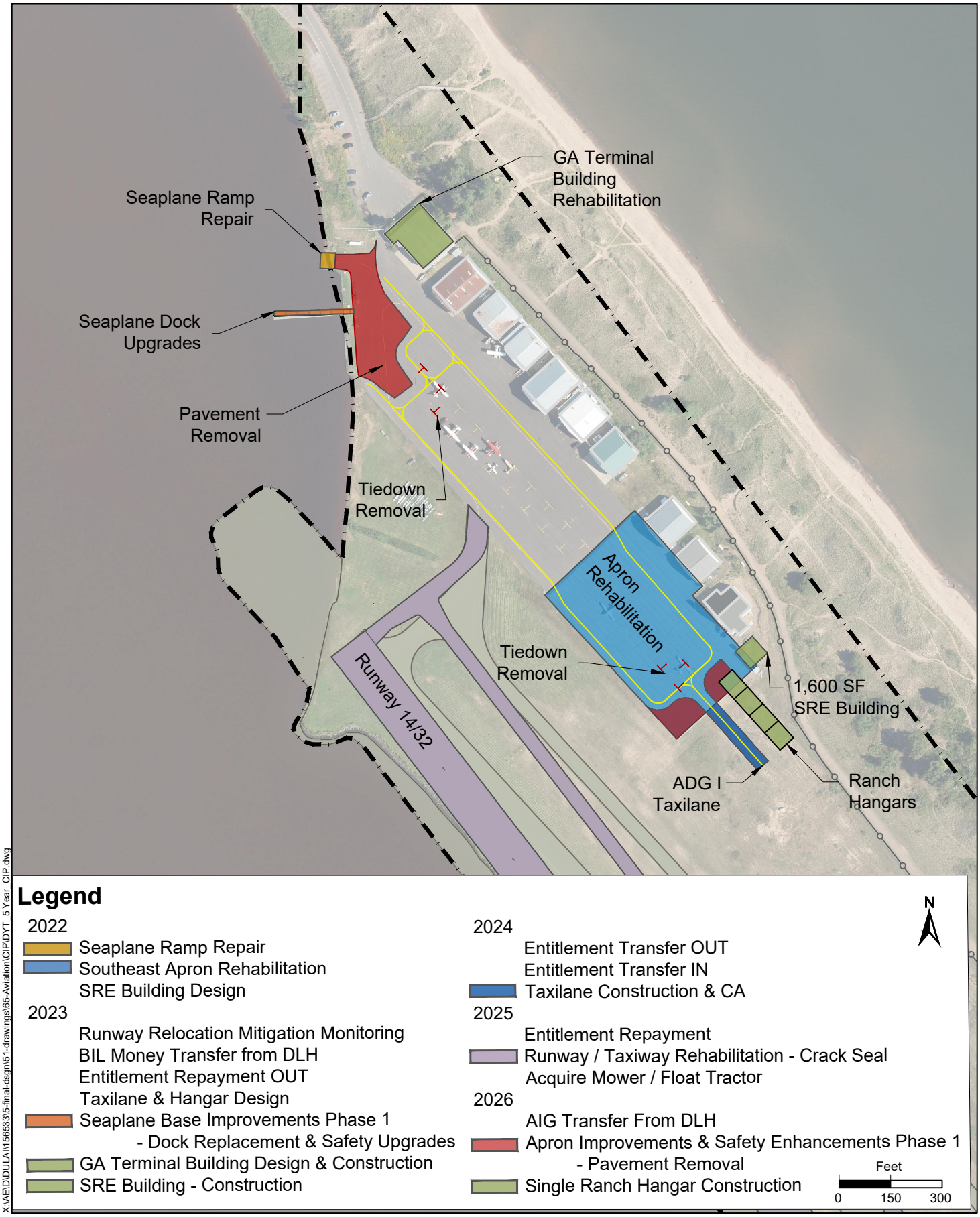
7.3.1 Airport Sponsor Projects

There are recommended projects within this Master Plan that are the responsibility of the Airport Sponsor. As a result, the projects listed below are not included in the 20-Year Capital Improvement Plan, since no Federal or State funding will be used for these projects.

- **Spill Prevention, Control, and Countermeasure (SPCC) Plan (Section 4.7.4).**
  - The Airport is required to have a Spill Prevention, Control, and Countermeasure (SPCC) Plan but no plan has been developed; ***the absence of an SPCC Plan is considered noncompliant with 40 CFR Parts 110 and 112***. It is recommended the Sponsor develop an SPCC Plan *as soon as possible*.
- **Monitor the FAA's and EPA's progress for updated regulations and replacements for AvGas (Section)**
  - AvGas is the only transportation fuel that still contains lead. Lead is a toxic substance that can be inhaled or absorbed in the blood stream. The FAA, Environmental Protection Agency (EPA), and the aviation industry are working to remove lead from aviation fuels. It is recommended that the Sponsor monitor the FAA's and EPA's progress for updated regulations and replacements for AvGas (**Section 4.3.5.3**).

7.3.2 Projects Beyond 20-Years

There are projects recommended in this Master Plan that are not anticipated to be completed within the 20-year planning period (2022-2041). This is either due to not enough demand forecasted in the 20-year planning period to justify the recommended improvement (but recommended to be shown on Airport Layout Plan (ALP) as ultimate condition), or due to project priority and cost. These projects are anticipated to occur after 2041.



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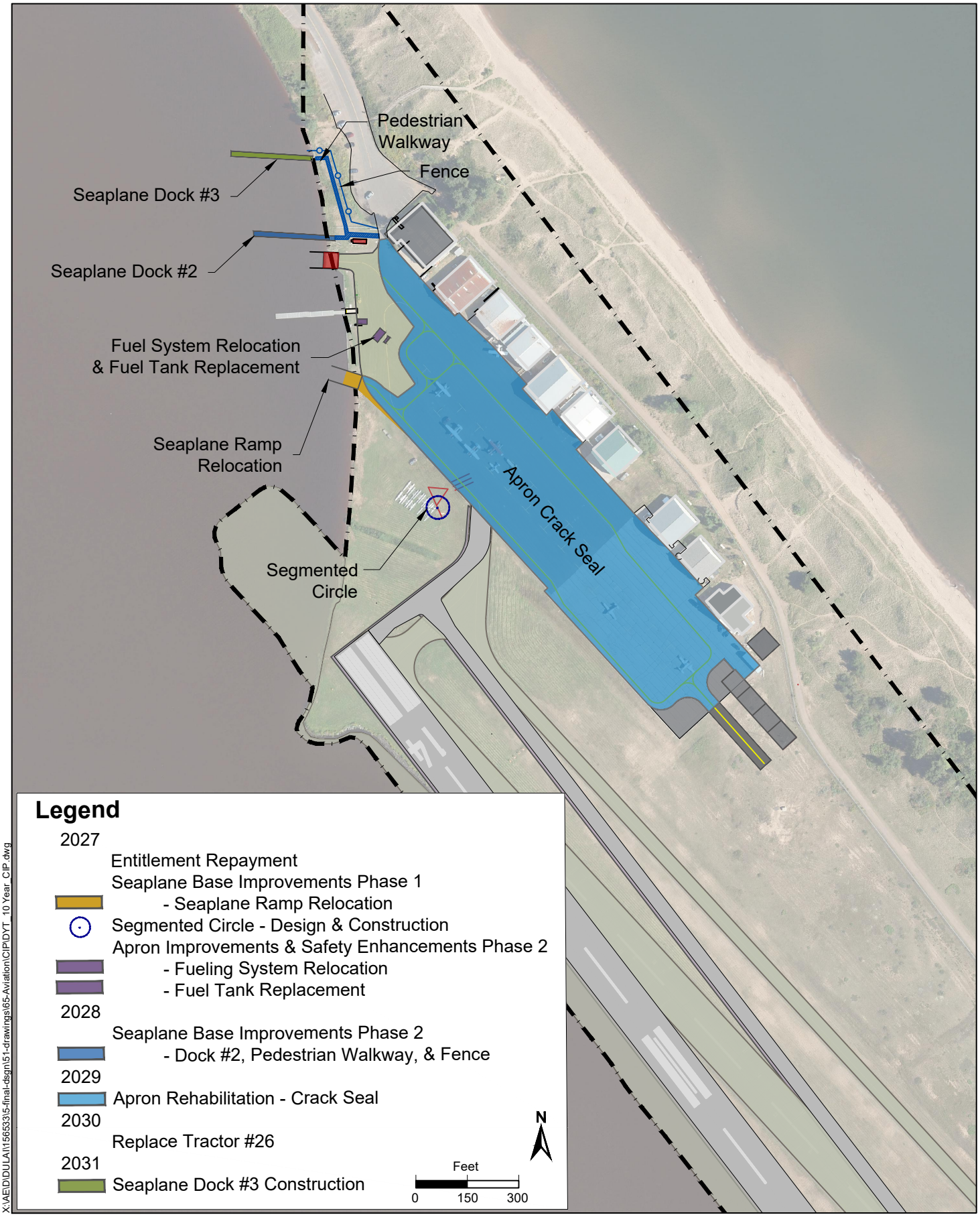
Pedestrian Walkway
Fence
Seaplane Dock #3
Seaplane Dock #2
Fuel System Relocation & Fuel Tank Replacement
Seaplane Ramp Relocation
Segmented Circle
Apron Crack Seal
Legend
2027
Entitlement Repayment
Seaplane Base Improvements Phase 1
- Seaplane Ramp Relocation
Segmented Circle - Design & Construction
Apron Improvements & Safety Enhancements Phase 2
- Fueling System Relocation
- Fuel Tank Replacement
2028
Seaplane Base Improvements Phase 2
- Dock #2, Pedestrian Walkway, & Fence
2029
Apron Rehabilitation - Crack Seal
2030
Replace Tractor #26
2031
Seaplane Dock #3 Construction
N
Feet
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150
300
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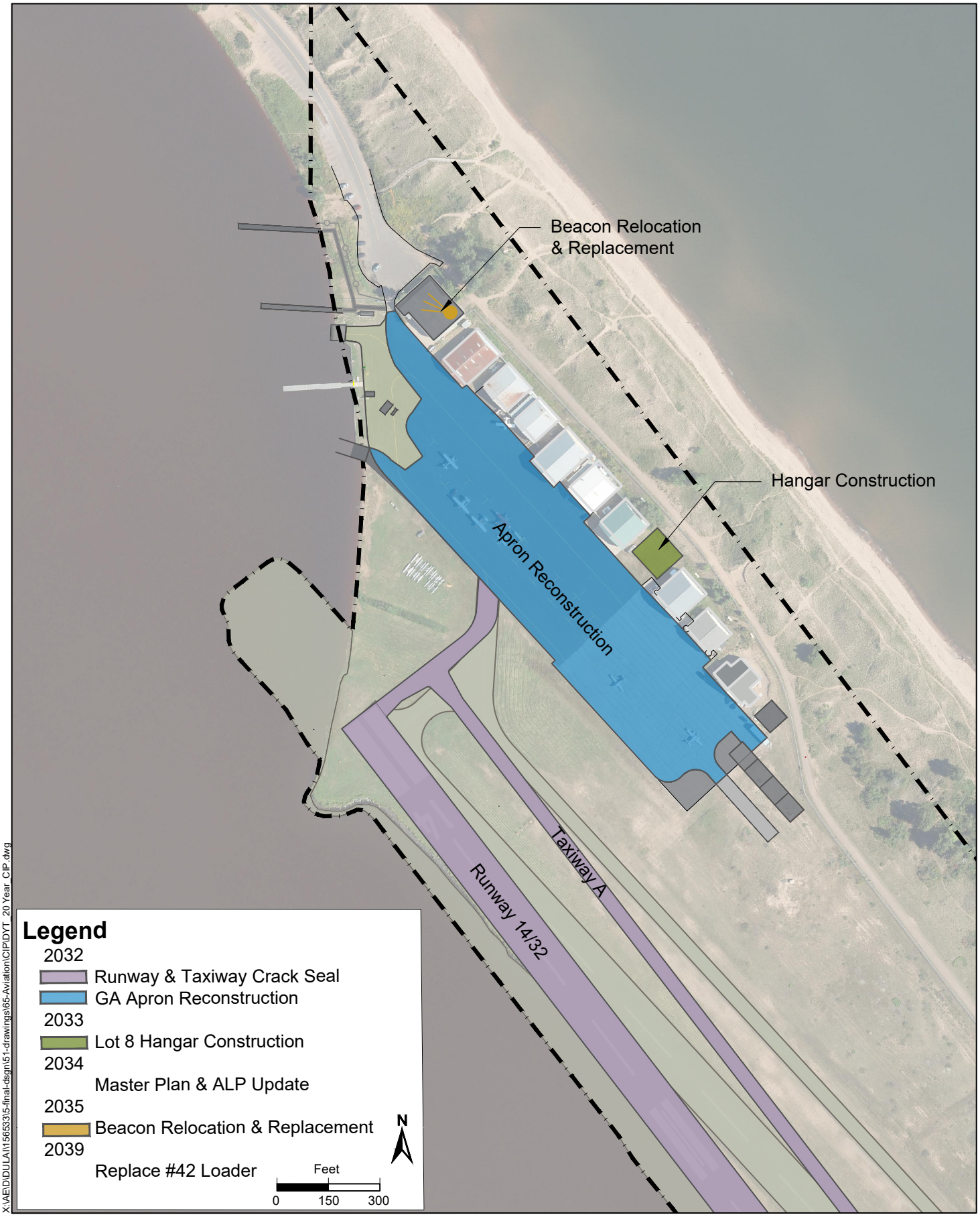
Beacon Relocation
& Replacement
Hangar Construction
Apron Reconstruction
Taxiway A
Runway 14/32
Legend
2032
Runway & Taxiway Crack Seal
GA Apron Reconstruction
2033
Lot 8 Hangar Construction
2034
Master Plan & ALP Update
2035
Beacon Relocation & Replacement
2039
Replace #42 Loader
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X:\AE\D\DULAI\156533\5-final-dsgn\51-drawings\65-Aviation\CIP\DYT_20 Year_CIP.dwg

Appendix A

User Survey Overview

Building a Better World for All of Us®

MEMORANDUM

TO: Kevin Lyons, Sky Harbor Airport Manager

FROM: Kaci Nowicki, Sr. Airport Planner

DATE: November 19, 2020

RE: DYT User Survey Results

As part of the Sky Harbor Airport (DYT) planning study, a user survey was sent to over 800 registered regional pilots and based aircraft owners. Using the FAA pilot database, licensed pilots within a 25 nautical mile range of DYT in Minnesota and Wisconsin were mailed a postcard with the survey link. Additionally, survey postcards were sent to owners of based aircraft at similar-sized airports in Northern Minnesota that typically see seaplane activity. DAA Staff also used social media to share the survey link to followers. The Minnesota Seaplane Pilots Association (MSPA) was contacted to share the survey link with their members; however, no response was received from the MSPA and it does not appear the MPSA shared the link with their members.

Current and potential users were asked about their current use of DYT, future needs of the airport and if their aircraft was based at DYT. Over 100 people accessed or began the survey, and 63 people completed the survey. This memo summarizes the responses.

BASED AIRCRAFT INTEREST

Nine respondents currently have their aircraft(s) based at DYT. These nine pilots have had their aircraft(s) based at DYT for an average of just over eleven years. The remaining 53 responses are considered transient pilots. On average, each transient user reports using DYT 16 times per year. Of these 53 transient pilots, 21 indicated they would be interested in basing their aircraft(s) at DYT if adequate facilities existed.

The majority of pilots who do not base their aircraft at DYT base their aircraft at Lake Elmo (21D), Duluth (DLH), Crystal (MIC), Superior (SUW), Anoka-Blaine (ANE) and Two Harbors (TWM). These pilots were asked what facilities would be needed to base their aircraft at DYT. Several pilots indicated that due to the distance from their home to Duluth that they would not base their aircraft at DYT. Pilots who are interested in basing their aircraft at DYT provided comments on facility improvements that would be needed to consider moving their aircraft, those comments are listed below.

- *Hangar for floatplane*
- *Tie downs, chocks, more hangars.*
- *Fuel 100LL*
- *I haven't used Sky Harbor yet because I recently moved to Duluth and couldn't get a hangar there. The new runway length is a concern for winter operations (ice/snow contamination).*
- *Self-service fuel. Clean and modern lobby to act as a meeting place for passengers. Training room for CFI, and youth eagles' program. Celebrate Sky Harbor's history and potential*
- *Maintenance, crosswind year-round runway(s), 24-hr fuel*

- *Reasonable tax rates*
- *There is a need for hangar spaces at all airports in the Duluth area. If I could find hangar protection for an airplane, I would own one.*
- *Maintenance*
- *Water & sewer*
- *An instrument approach, like an RNAV. I don't own an aircraft, but I do conduct flight training and always enjoy landing at Sky Harbor.*
- *Hangar space, I am in the market for an aircraft (floatplane).*
- *Hangar space.*

Pilots who indicated they were interested in basing their aircraft at DYT were also asked if they would prefer to own or lease a hangar and what type of hangar they would need. **Table 1** shows the preference of hangar type and ownership of the 21 respondents who indicated they may be interested in relocating their aircraft to DYT if adequate facilities existed.

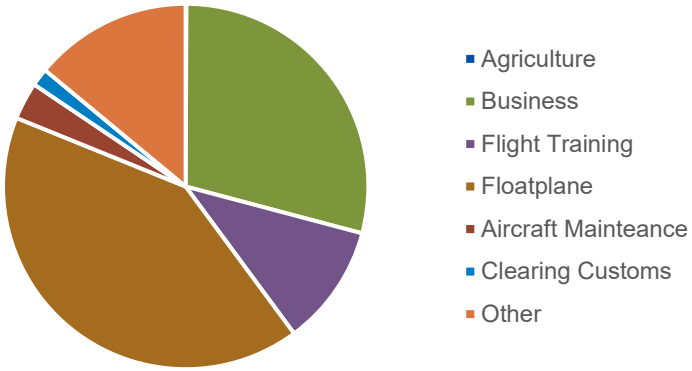
Table 1 – Hangar Lease and Ownership Preference
(Aircraft owners interested in moving to DYT)

Lease Hangar	**9**
Box Hangar	3
T-Hangar	6
Own Hangar	**12**
Box Hangar	10
T-Hangar	2

AIRPORT USE AND ACTIVITY

Identifying the current uses of Sky Harbor and activity will help inform the airport activity forecast. **Chart 1** depicts the response from users on operations per year grouped by the purpose of flight.

Chart 1- Operations Per Year by Use

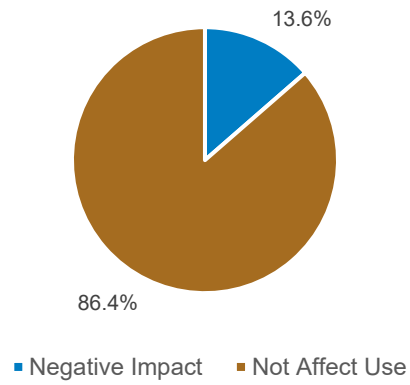


Sky Harbor Airport offers a traditional asphalt and two water landing strips located in Superior Bay. Of the respondents who listed their aircraft type, 96.1% own single-engine aircraft and 3.9% own a multi-engine aircraft. Respondents were also asked to indicate the gear type of their aircraft, 79.9% are on wheels, 16.3% are on floats and 3.8% are amphibious type aircraft.

Customs and Border Protection Services

Sky Harbor Airport offers US Customs services. Pilots were asked how often they utilize Customs services at DYT and how it would affect their use of the airport if US Customs were not available at DYT. 3% of pilots who responded utilize these services, averaging about five times per year. Respondents were asked how their DYT use would be affected if US Customs were not available. 13.6% reported it would have a negative impact, while 86.4% reported it would not affect their use of the airport.

Chart 2 - DYT Use Impacts if Customs was not avaliable



EXCITING FACILITY AND EQUIPMENT RATING

Table 2 below shows the average and mode (most frequent) rating for existing airport facilities and equipment:

Table 2 – Existing Airport Facilities and Equipment Ratings

	Tiedown Availability	Based Aircraft Hangar Availability	Transient Aircraft Hangar Availability	GA Terminal Building	Pilot Services	Fuel Services	Ground Transportation	Automobile Parking	Airport Ground Access	Reliability/ Availability of Float Cart	Dock Access/Size	Seaplane Ramp
Avg.	7.9	3.8	2.9	6.8	6.7	8.3	6.5	7.1	7.5	7.6	7.2	8.8
Mode	10	1	1	10	5	10	8	8	10	9	10	10

IMPRVOEMENTS TO FACILITES

Respondents were asked to describe (via open ended responses) improvements they thought were needed to the buildings, apron, seaplane base ramp and dock, services, and transportation. Responses to this question are included below and are grouped by similar improvement needs. For the purposes of this memo to DAA staff, exact responses are given. Responses will be further summarized, rather than verbatim, in the Master Plan report.

- **Buildings and Apron**
  - *Modernize the pilot lounge*
  - *Buildings are inadequate*
  - *The ramp is often underwater*
  - *Larger parking ramp, more hangars/availability, tie downs/chocks available*
  - *Inactive aircraft and floats should be moved further away from the central active ramp area. The place feels like it's a private airport not a public airport. There are a lot of tourists milling just*

outside and a lost opportunity on the inside. Should be a place for the public to better view the airport activity

- *The FBO lobby should be remodeled.*
- *Most of all, I am looking for a place to hangar an airplane (C-172 size). It seems there are long waiting listings at every airport in the Duluth area.*
- *Fix water on the apron/flooding issue. Expand the camping area.*
- *Terminal & pilot lounge is very dated and uncomfortable*
- *Get the Duluth Fire Department to drop requiring sprinklers for any new hangars. This is a very uncommon requirement, and it makes the cost to build a new hangar prohibitive. Plus, water is not very effective in dealing with a gasoline fire.*
- *The building needs a solid facelift both inside & out, bathrooms are an embarrassment for transient guests.*
- *Apron needs to be cared for, more tie downs need to be placed, and the area needs to be cared for.*
- *Newer Terminal building and available ground transportation.*
- *The ramp needs improvement, as well as FBO facilities.*
- *Need better transient parking and availability of transient hangaring.*
- *FBO building needs updating. The building itself needs some repair and improvements to general appearance. bathrooms need a remodel. The ramp is adequate. Some effort annually to clear weeds and clean out tiedowns would help. Tiedowns on the south ramp have huge holes in them and it is possible to get stuck in them taxiing.*
- *The terminal building is not the friendly and accommodating place it once was, but that may be mostly because of the Covid-19 restrictions.*
- *I would like to see more options or hangars available for purchase. I moved back to the Northland 5 years ago and wanted to get back into flying and own an aircraft. I wanted to have my own hangar before purchasing the plane. I work at the end of Rices point so wanted Sky harbor versus other airports in the area as proximity to work. I investigated available hangars when I moved up here and there were none. My name was put on a list as someone might be selling soon. About a year later I was contacted as someone was selling a hangar and if I was still interested. I was still interested and was able and had money to purchase but never heard back. I haven't investigated much since then and spent my time and money on other things. I would be interested if options were available to own hangars or build my own. I would like to own a hangar before purchasing an aircraft so I know I have a good year round storage option. My preference would be at Sky Harbor.*
- *FBO is outdated, but it has what you need. The bathrooms are always clean and it is a beautiful location.*
- *The runway improvements and airport facilities are now pretty good. Just need hangar space so I can purchase an airplane.*
- *A little more room and seating in the facility would be nice. Transient tie downs a little uncertain.*

○ **Seaplane base ramp and dock**

- *The dock could use a T at the end.*
- *A 90-degree extension off of the dock would increase its usefulness when the Beaver is working*
- *Seaplane ramp submerged portion has washed out between the concrete cross sections causing huge bumps. Worried about small front amphibious wheels being damaged.*
- *More docks. Logistics through canal park in the summer is an issue. Takes time*
- *Easier fuel on the dock*

- *We need an actual seaplane dock, a T dock would be an idea. Whenever there are more than 3 airplanes at the dock, it's impossible to get in for fuel. The current dock destroys floats as well. Float cart has needed service all summer, no attention is given to it*
- *Another dock would be immensely helpful. The Beaver takes up so much space on the existing dock that it leaves little room for any other seaplanes to get in or out safely. The Beaver operators are very accommodating in terms of moving or making room when they can, but this summer it was difficult to get into and out of the dock.*
- *The seaplane dock needs a T at the end. A Back-Up float cart More T Hangars*

○ **Services**
- *Fuel services are poor*
- *In dire need of a new fuel pump and hose installation. the one that is there is a piece of junk.*
- *The fuel location is awkward. Maybe pave around it so more than one plane can approach at the same time.*

○ **Transportation**
- *Courtesy car would be nice. I have utilized uber and Lyft with good success.*
- *There isn't much to do about ground access to the airport: Park Point is a busy, slow road, and the Airport Authority can't do much about that!*

ADDITIONAL COMMENTS

Respondents were asked to provide additional suggestions or improvements to the airport and/seaplane base that could better suit user needs. Most responses were echoed from the previous questions; however, there are additional comments provided by users.

○ *The fuel pump has always been difficult to use (has many times forced me to purchase fuel elsewhere), ramp, dock, pilot lounge/building.*
○ *Works well.*
○ *See prior comments, you all have an opportunity to make something Duluth can be proud of,*
○ *If DYT had great avionics or repair services, I would consider taking my plane there instead of Park Rapids, St. Cloud, Fargo, etc.*
○ *It is adequate for what I do.*
○ *Please lengthen the runway, widen the taxiway and enlarge the taxiway turns. Pretty please.*
○ *Please add hangar space.*
○ *Expanded camping area*
○ *Terminal/lounge updates and a new commercial desk for tours/visitors would improve appeal.*
○ *I think if we collectively freshen the place up, so that it's a place that people's concerns are heard, and invite many fellow pilots in for special events, we could really make DYT the destination of the North Shore*
○ *I suggest the airport actively host/promote aviation-oriented events to attract "out of area" pilots.*
○ *The place is unique in the country and deserves to be treated as the jewel that it is. The recent changes to operations are welcome, but in my view the airport will always be a recreational asset and I do not think the airport management is at all in tune with recreational flying or the needs of the people who do it. Also, the airport is always being thought of as a revenue generator as opposed to being part of the City's infrastructure. It would be nice if it supported itself but that is like asking a road to support itself. The primary purpose of the airport is to bring people and commerce to the City. As such, if it can break even it should be considered a success. People come here because it looks interesting on the map. They should be welcome when they arrive.*
○ *Longer, or second, seaplane ramp.*
○ *Keep Seaplane ramp clear of debris. Drainage of high water after storms/rain events on the ramp. Tie more airplanes that are long term customers on south end of ramp to allow for transient aircraft to tie down near fuel and FBO.*

- *Not sure, airport hasworked for me so far. A little more space and seating in the FBO would be good.*
- *Availability of affordable hangar space*
- *Great fuel prices*
- *It also does not have the full approach capability of DLH*
- *Not need, but want, fuel, maintenance facilities, seaplane options for putting floats on and a place to put in the water. Believe most of these exist already.*
- *Not a bad place to land.*
- *Airport is well equipped for our occasional visits.*
- *Don't fly there enough to form an opinion.*
- *None. The new improved facilities are wonderful!*

cc: Tom Werner
Mark Papko
Jana Kayser

KK

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Appendix B

FAA Forecast Approval Letter

U.S. Department
of Transportation
Federal Aviation Administration

Dakota-Minnesota Airports District Office
Bismarck Office
2301 University Drive, Building 23B
Bismarck, ND 58504

Dakota-Minnesota Airports District Office
Minneapolis Office
6020 28th Avenue South, Suite 102
Minneapolis, MN 55450

April 20, 2021

Mr. Mark Papko, Operations Director
Duluth Airport Authority
4701 Grinden Dr.
Duluth, MN 55811

Sky Harbor Airport (DYT) – Duluth, MN
Approval of Master Plan Forecast

Dear Mr. Papko:

This forecast was prepared at the same time as the evolving impacts of the COVID-19 public health emergency. Forecast approval is based on the methodology, data, and conclusions at the time the document was prepared. However, consideration of the impacts of the COVID-19 public health emergency on aviation activity is warranted to acknowledge the reduced confidence in growth projections using currently-available data.

Accordingly, FAA approval of this forecast does not constitute justification for future projects. Justification for future projects will be made based on activity levels at the time the project is requested for development. Documentation of actual activity levels meeting planning activity levels will be necessary to justify AIP funding for eligible projects.

This forecast approval is subject to the caveats identified above being inserted as a disclaimer at the beginning of the forecast document and applicable master plan chapters.

A summary of the Draft Master Plan's forecast information is provided in the table below.

	Base Year (2019)	**20-Year Forecast (2040)**	**Master Plan Source**
Based Aircraft	22	38	Table 2-20
Aircraft Operations	11,740	16,829	Table 2-20
Critical Design Aircraft	A-I Small Cessna 172 (C172)	A-I Small Cessna 172 (C172)	Section 2-10
Source: Draft Master Plan prepared by SEH, Draft received 04-19-2021			

As a reminder, basedaircraft.com should be officially updated as individual changes in based aircraft occur at the airport.

If you have any questions or would like to discuss this information further, please feel welcome to contact me at (612) 253-4641 or gina.mitchell@faa.gov.

Sincerely,

Gina M. Mitchell, AICP, Community Planner
Dakota-Minnesota Airports District Office, Minneapolis Office

cc: Matt Stewart, SEH (email)
Kaci Nowicki, SEH (email)
Jake Martin, FAA (email)
Kevin Carlson, MnDOT Aeronautics (email)
Matt Lebens, MnDOT Aeronautics (email)
Don Berre, MnDOT Aeronautics (email)

Table 2-20 – Summarizing and Documenting Airport Planning Forecasts

Airport Name:	Duluth Sky Harbor Airport		Specify base year:		2019				
	2019	2020	2025	2030	2040	2020	2025	2030	2040
Operations									
Itinerant									
Commuter/air taxi	704	715	843	899	1,010	N/A	N/A	N/A	N/A
General aviation	2,026	2,055	2,424	2,585	2,904	1.4%	3.7%	2.5%	2.4%
Military						0.0%	0.0%	0.0%	0.0%
Local									
General aviation	9,010	9,141	10,781	11,496	12,915	1.5%	3.7%	2.5%	2.4%
Military						0.0%	0.0%	0.0%	0.0%
TOTAL OPERATIONS	**11,740**	**11,911**	**14,048**	**14,980**	**16,829**	**1.5%**	**3.7%**	**2.5%**	**2.4%**
Instrument Operations	1,074	1,090	1,285	1,370	1,540	1.5%	3.7%	2.5%	2.4%
Peak Hour Operations	30	30	36	38	42	0.0%	0.0%	0.0%	0.0%
Based Aircraft									
Single Engine (Nonjet)	20	20	27	31	35	0.0%	6.2%	4.5%	3.8%
Multi Engine (Nonjet)	2	2	2	3	3	0.0%	0.0%	4.1%	2.7%
Jet Engine						0.0%	0.0%	0.0%	0.0%
Helicopter						0.0%	0.0%	0.0%	0.0%
Other						0.0%	0.0%	0.0%	0.0%
TOTAL BASED AIRCRAFT	**22**	**22**	**29**	**34**	**38**	**0.0%**	**5.7%**	**4.4%**	**3.7%**

B. Operational Factors

	2019	2020	2025	2030	2040
GA operations per based aircraft	410	416	348	303	300

Appendix C

Terminal Building Report

EXECUTIVE SUMMARY

INTRODUCTION

The Duluth Airport Authority (DAA) retained Short Elliott Hendrickson Inc. (SEH) to perform an Architectural and Engineering Feasibility Study related to the existing Arrival / Departure Building at the Sky Harbor Airport. The A/D Building and associated property were identified by the Airport Authority for potential renovation and improvements to support ongoing operations, address ongoing deficiencies, and develop new opportunities to generate revenue.

Generally, the study involved the following four major components: (1) Facility Condition Assessment, (2) Space Needs Identification, (3) Conceptual Design Diagrams, and (4) Preliminary Cost Estimating. The four major components of the study are further summarized below and described in detail in the report sections which follow.

SCOPE OF WORK

The scope of work conducted by SEH in support of the study included the following major tasks:

1. **Perform condition assessment of existing facility.** Condition assessment included site visit by architectural, structural, mechanical and electrical disciplines to visually observe condition of existing building and equipment.
2. **Develop space needs identification.** Space needs assessment included meeting with DAA staff to review existing and future space needs.
3. **Develop conceptual building and site design layouts.** Conceptual design included development of multiple concept building and site design layout alternatives.
4. **Develop preliminary cost estimates.** Preliminary estimates of probable cost for concept designs.

FACILITY AND CONDITION ASSESSMENT

The SEH team started by conducting an extensive discovery tour of the existing facility to gain an understanding of the current condition of the A/D Building. During this process, SEH documented the condition of the major building systems and elements such as the building shell, roofing, interior finishes, structural systems, and mechanical and electrical systems. The assessment began with a review of available original building drawings in conjunction with a site visit by architectural, structural, and mechanical/electrical engineers. During the site visit a facility tour was conducted with airport staff to visually observe existing interior and exterior conditions. Detailed notes, dimensions, and photographs were taken to document the current conditions. At the completion of the assessment the collected data was compiled into the following written report.

The assessment and recommendations in this report are based on limited site observations. Field observations were limited to visual observations without testing of materials and without any removal of finishes to verify obstructed construction. Observations were not made in all locations throughout the building for the purpose of this evaluation,

however, an attempt was made to observe representative conditions in each part of the facility.

SPACE NEEDS ANALYSIS

SEH then collected information to evaluate the current and future space needs for the facility. This information was gathered by conducting an interactive meeting with airport staff and stakeholders to discussions current and future anticipated building use, needs, and opportunities.

CONCEPTUAL DESIGN

After compiling initial information from the facility condition assessment and space needs identification conceptual building and site design alternatives were developed. These conceptual design options are being presented to the DAA in the form of building conceptual floor plan diagrams to demonstrate the building and site organizational concepts and space needs program for the facility.

PRELIMINARY COST ESTIMATE

A preliminary estimate of probable cost has been developed for each of the conceptual design to support the DAA in planning and feasibility efforts. The preliminary cost estimate is limited to the known project constraints and includes anticipated costs for building renovation and/or construction, infrastructure improvements, site development, furnishings and equipment and fees, and related soft costs.

SUMMRY OF FINDINGS

After conducting the scope of work related to the study, SEH found the existing Sky Harbor Airport Arrival / Departure building to be in overall fair condition with a sound structure but aged interior and exterior finishes, dated mechanical and electrical systems and an inefficient overall building layout that does not suit the current needs of the users. The building is well suited for a renovation project that could include updates to the interior layout to suit current and future anticipated needs, improve accessibility and provide more efficient mechanical and electrical systems as well as provide a more visually appealing and inviting exterior façade.

Additionally, through the course of airport staff/stakeholder discussion it was noted that there is a desire for more revenue generating and public engagement opportunities to be provided at the A/D Building to take advantage of the higher volume of foot traffic in the summer season. These opportunities would need to work within the seasonal fluctuations of the space, so they do not become financially burdensome in the winter months.

FACILITY AND CONDITION ASSESSMENT

INTRODUCTION

The Sky Harbor Airport Arrival / Departure Building is located at the northern end of the airport property at 5000 Minnesota Avenue in Duluth, MN. The A/D Building is located directly adjacent to the float plane ramp and dock providing access to the Superior Bay. The building is also directly adjacent to the main public parking area for the beach and the Park Point Nature Trail which runs along the northeast edge of the airport property.

The building was originally constructed in 1979 as an aircraft hangar and Arrival / Departure Building according to limited original building plans available. At some point in the building's history a portion of the space was converted into a live-in apartment space and included a bedroom, kitchen, and restroom area. In more recent years the apartment space has been used as general-purpose storage and workspaces for airport staff. A second level mezzanine floor is located directly over the office and apartment space. The mezzanine level is currently used for general storage and mechanical equipment.

BUILDING

The existing Sky Harbor Arrival and Departure building has a footprint of approximately 5,200 square feet and includes a 3,600 SF aircraft hangar, offices, meeting spaces, two single-user restrooms and a storage space that was previously utilized as a live-in apartment. There is a second level above the office, meeting and storage space that provides an addition 1,600 square feet of space that is currently used for general storage, mechanical equipment and an office space that is currently not utilized.

Building Structure

The building's foundations consist of cast-in-place concrete floating slab based on the original construction drawings available. This system includes a monolithic slab which is thickened at bearing walls and columns to provide support for the building's structure. The foundation systems appear to be in good condition showing no significant signs of settlement or deterioration. Concrete floor slabs are also in good condition showing no signs of significant cracking or settlement.

The building's main structural system is a pre-engineered steel building including steel columns and a combination of open-web steel roof trusses at the hangar portion of the building and tapered steel roof beams at the two-story office area. The mezzanine level floor is framed with open-web steel joists, steel decking and a concrete topping. The steel joists are believed to be bearing on a concrete masonry wall that runs around the perimeter of the lower-level office area. The building's structural systems are in good condition and show no signs of differential settlement or being overstressed. Load bearing masonry walls are in good condition where visible and show signs of cracking or deterioration.

The steel framed portion of the building is insulated on the walls and roof with fiberglass batts and a vapor barrier membrane. The insulation measured approximately 5-inches thick at the walls which is significantly less than would be used in modern construction. The vapor barrier system also has several holes and areas of damage. Exterior concrete block walls at the office area are believed to be insulated on the exterior face of the wall with rigid foam and wood furring. Replacement or upgrades to the building's insulation systems is recommended as part of a major building renovation to increase the thermal performance and reduce energy costs.

Exterior Cladding

The current roof system is believed to be original to the 1979 construction and consists of a corrugated metal panel system with gutters and downspouts for drainage. At the time of the site visit for this conditions assessment staff noted that the roof was not actively leaking. In general, the roofing systems are in fair condition and functioning as expected but well beyond there useful lifespan. Replacement of the roof is recommended in the next 5 years.

Exterior walls are clad with a corrugated metal panels which are in fair condition. The metal panel cladding has minor dents and scratches but is performing as expected with no signs of damage or water infiltration.

Exterior windows are operable metal clad wood units with insulated glass. The windows do not appear to be original to the building construction but are beyond their useful lifespan.

Exterior walk-doors consist of steel doors set in steel frames. Exterior doors and frames are aged and should be replaced as part of a major renovation of the building.

The exterior bi-fold hangar door was noted by staff during our site visit to be operational and had recently been serviced. The door appears to be original to the building's construction but has been maintained well. With proper regular maintenance the door should function as intended for several years. It is recommended that the doors exterior cladding be replaced as part of a major building upgrade to match the remainder of the building's cladding.

Interior Finishes

Interior finishes vary throughout the main level office area of the building. Ceilings are acoustical panels suspended in a ceiling grid system. Walls are primarily painted concrete masonry or gypsum board and flooring is vinyl tile or carpeting in the previous apartment space. In the main entry / meeting area of the building the walls are clad with tongue and groove wood boards. Overall, the building's interior finishes are aged, dated, and in poor condition and should be replaced.

At the time of the conditions assessment interior floor and wall finish upgrades were underway for the main office and corridor spaces.

Mezzanine Floor Level

The mezzanine floor level located above the first-floor office areas is currently unoccupied space. This area is used for general storage and houses two mechanical units. It appears at some point in the past a portion of the space was planned for use as an office and meeting room with interior partition walls partially constructed. The building roof structure slopes down across the mezzanine leaving a clear height on the northern end of approximately 5-feet to the bottom of the steel structure.

Use of the mezzanine level as occupiable space is very limited given the low headroom, access to a single egress stair, and lack of accessible access for disabled persons. With modifications to the mezzanine layout and egress stairs could allow this space to be used for a few private offices it is not feasible to place meeting or public use spaces on the mezzanine level. It would be our recommendation to limit the use of the mezzanine to general purpose storage and mechanical equipment.

Access to the mezzanine level is via a wood framed stair accessed from the hangar portion of the building. This stair serves as the only means of access and egress from the mezzanine level and is in poor condition. The stair is not complaint with building codes for egress, does not have proper hand and guardrails and is structurally in unsound condition. It is recommended that replacement of the wood stair be a high priority if access to the mezzanine is to be maintained.

General Accessibility

One of the major challenges to address in a building that is 40 years old is providing accessible access and elements for building occupants. The State of Minnesota Building code requires four main accessible elements be included in a building renovation, accessible access to the building, accessible routes within the building to main use areas, and an accessible restroom and drinking fountain.

Should the building be renovated, we would recommend reviewing the handicapped parking stall location, signage and striping in the parking lot and verifying the main sidewalk entry approach to the building is compliant with the maximum slope to provide an accessible access to the building. It is also recommended that the existing restrooms be renovated to provide at least one accessible facility along with access to a drinking fountain.

BUILDING SYSTEMS

Plumbing Systems

The existing plumbing systems including the fixtures are old and past their useful operating lives. It is recommended that plumbing systems and fixtures be completely replaced as part of any major building renovation project.

The water and waste piping is original to the building's construction and in poor condition. There is a fuel oil fired water heater that is over 20 years old, and it is also in poor condition.

The existing main building water supply is a city service original to the building. It is in fair condition and should be serviceable for some time.

The sanitary system discharges to an onsite sewage treatment system with a mound. This system is working but approaching the end of its useful operating life.

Heating, Ventilation, and Air Conditioning Systems (HVAC)

The hangar portion of the building has older infrared radiant heating at the ceiling and a newer high efficiency gas furnace blowing heat into the room. These systems are working but are aged, inefficient and should be replaced with newer units.

The office area is served by two old fuel oil fired furnaces with no air conditioning. These units are original to the building and beyond their useful operating lives and in poor condition and should be replaced with modern, efficient heating units. There are exhaust venting systems in the restrooms that is also believed to be original to the building and should be replaced as part of any restroom improvements. There does not appear to be fresh air ventilation into any portion of the building. It is recommended that any new systems that are provided incorporate fresh air intakes to

improve indoor air quality. There are also a couple of areas with old electric baseboard that should be removed.

Lighting Systems
The hangar area has newer LED lighting installed and it is in good condition. The office area primarily has old fluorescent lighting which is inefficient and beyond their useful operating lifespan.

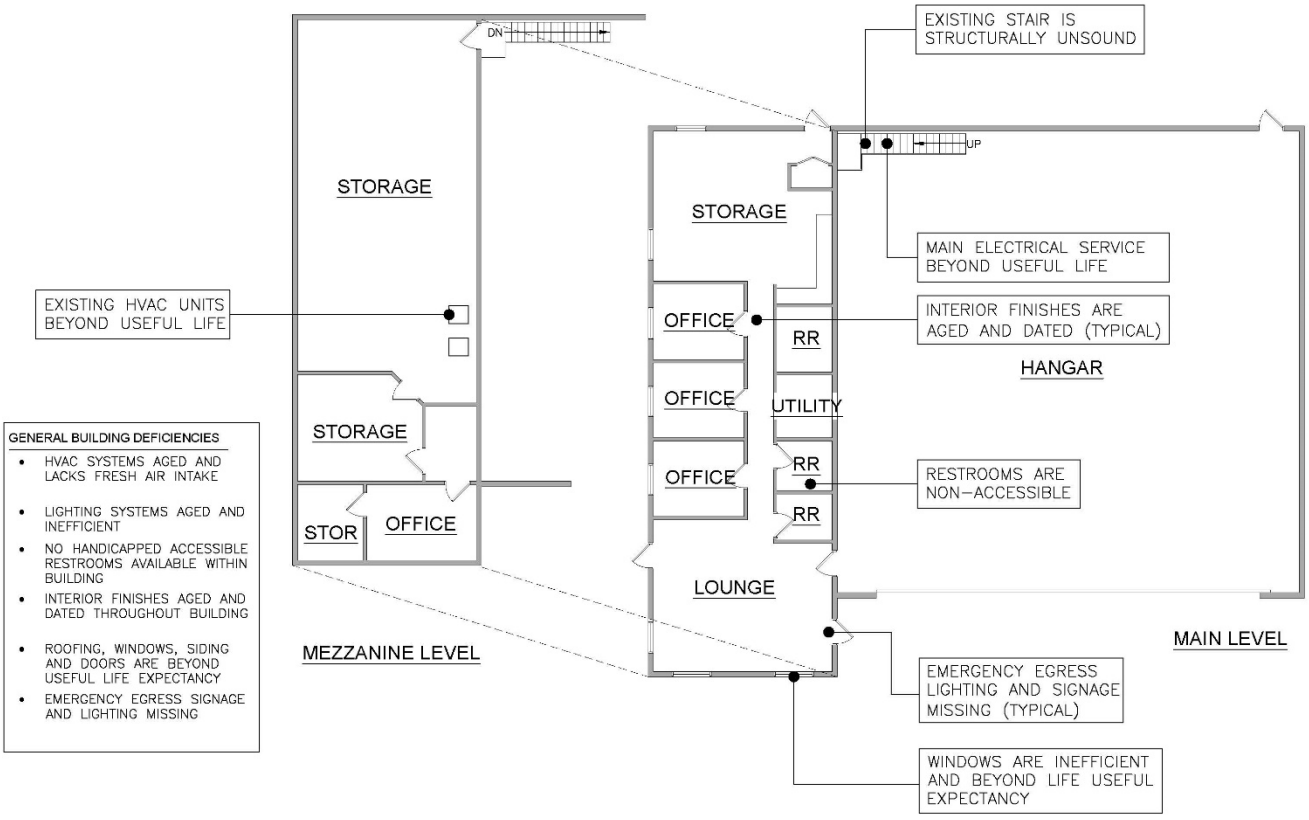
Electrical Power Systems
The power system is mostly original and is a small 120/240V single phase service with old distribution panels, branch circuits and devices. This system should be replaced entirely.

Life Safety Systems
There was only one exit sign within the building that was noted at the time of the site visit and no emergency battery lighting. Emergency egress signage and lighting systems are inadequate, and it is our recommendation to make the replacement and addition of proper egress lighting a priority for building occupant safety.

Low Voltage Systems
The low voltage consists of the telephone system which is older and approaching the end of its useful operating life. It is recommended that building data and wi-fi systems be reviewed and fully integrated into the building as part of a renovation project.

There is also a limited camera system that appears to be functional, but it is older. Future security needs should be determined by the owner.

A summary of existing building conditions is also included in the building layout diagram below.



SPACE NEEDS ANALYSIS

A critical component of determining a building project's feasibility is better understanding existing and anticipated space needs. SEH gathered this information by way of meeting with DAA staff to discuss current and anticipated future needs and brainstorm ideas for further enhancement of the airport and A/D building.

SPACE NEEDS ANALYSIS

Using the data gathered through staff and stakeholder meetings, the needs were categorized into types of space and assigned a square foot allocation which has identified a total building program of approximate 2,000 square feet. This analysis is summarized in the space needs matrix below.

Sky Harbor A/D Building Space Needs

			Programmed 20-Year Projection			
Staff/Component Description	Space Code	Unit NSF	Staff	Units	Subtotal NSF	Comments
Pilots Lounge	OA	400	-	1	400	Small kitchenette, tables and chairs
Flight Planning Room	ER	100	-	1	100	
Staff Office	PO	120	1	1	120	Could go to mezzanine level
Meeting Room	ER	225	-	1	225	Table and chairs for `10 people
Mechanical Room	ER	100	-	1	100	Furnace, electrical panels - could be on mezzanine level
General Storage	ER	100	-	1	100	
Janitorial Closet	ER	70	-	1	70	
Restroom	ER	70	-	2	140	
Exterior Amenity Support	ER	150	-	1	150	Vending, storage for exterior food cart, etc.
				Subtotal	**1,405**	
TOTAL STAFF			1			
Subtotal - Net Square Feet					**1,405**	
Partition & Circulation Factor			30%		602	
TOTAL GROSS SQUARE FEET					**2,007**	

CONCEPTUAL DESIGN AND PRELIMINARY COST ESTIMATE

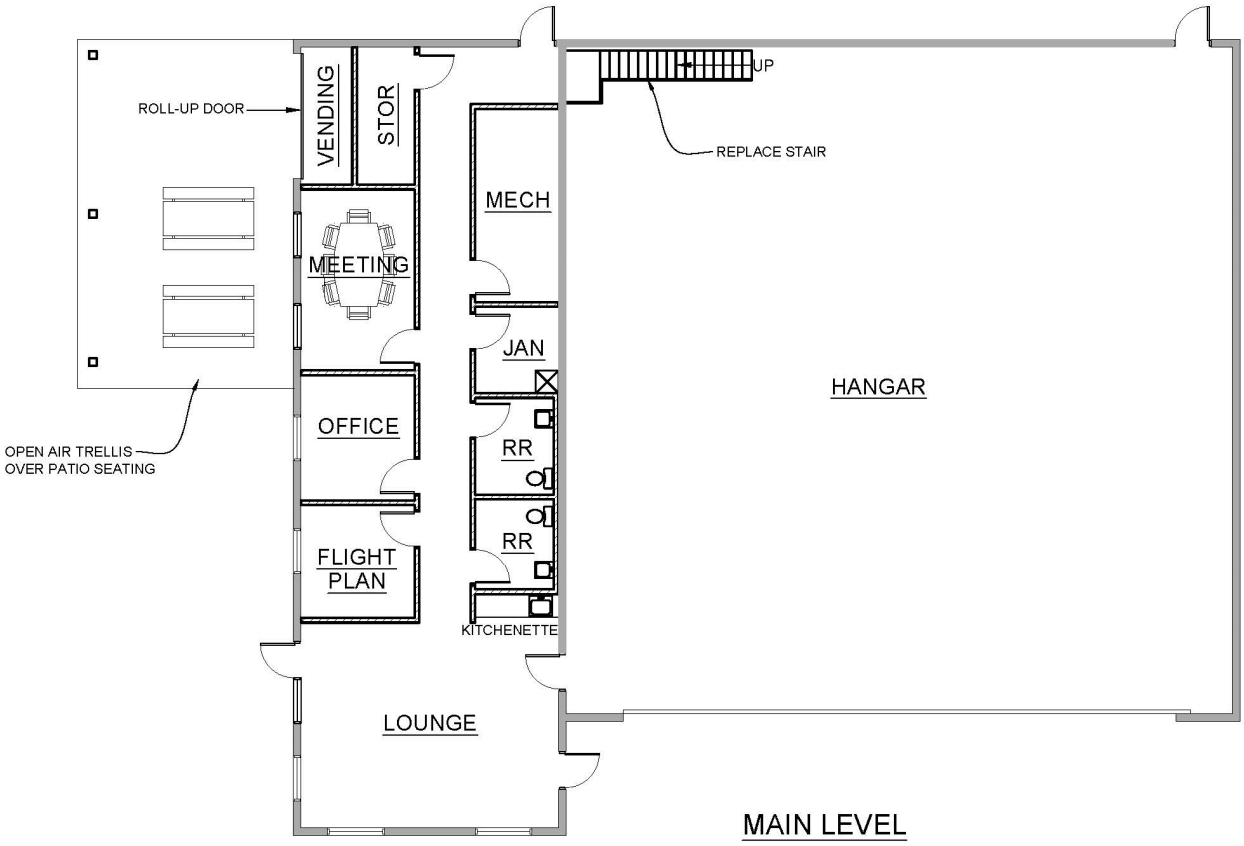
SEH prepared two initial conceptual design options based on information gathered during the facility assessment and space needs analysis portions of the study. These initial concepts ranged from renovations to the existing building to demolition of the existing two-story office and construction of a completely new addition to the aircraft hangar.

CONCEPTUAL DESIGN OPTION-1 (Renovate Existing Structure)

This conceptual design option depicted by the floor plan diagram and 3D rendering below is focused on maximizing the usability and accessibility of the existing building, providing improvements to the exterior façade, and incorporating a public access seating and vending area. The concept includes an interior layout that utilizes the existing space in a more efficient manner while adding features such as a meeting room, accessible restrooms and dedicated mechanical and storage spaces. This concept would also include new interior floor, wall, and ceiling finishes, updated mechanical and electrical systems and new exterior cladding materials on the administration portion of the building.

The existing aircraft hangar area would receive a new mechanical HVAC system and the overall electrical service and panels would be replaced.

MAIN LEVEL CONCEPT FLOOR PLAN



CONCEPT DESIGN RENDERING

OPTION-1 PRELIMINARY COST ESTIMATE

A preliminary estimate of probable costs was prepared for interior and exterior renovations to the existing building and the addition of outdoor seating areas. The project cost estimate is summarized in the table below.

ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Existing Building Renovation	1,647	SF	$300	$494,000
Exterior Patio / Trellis Addition	580	SF	$75	$44,000
Replace Roofing / Siding	1	LS	$150,000	$150,000
Building and Site Subtotal:				**$688,000**
Fixtures, Furnishings, and Equipment				$20,000
Construction Contingency (15%)				$105,000
Soft Costs - Architecture, Engineering, Permitting, etc. (30%)				$210,000
TOTAL PROJECT ESTIMATE:				**$1,023,000**

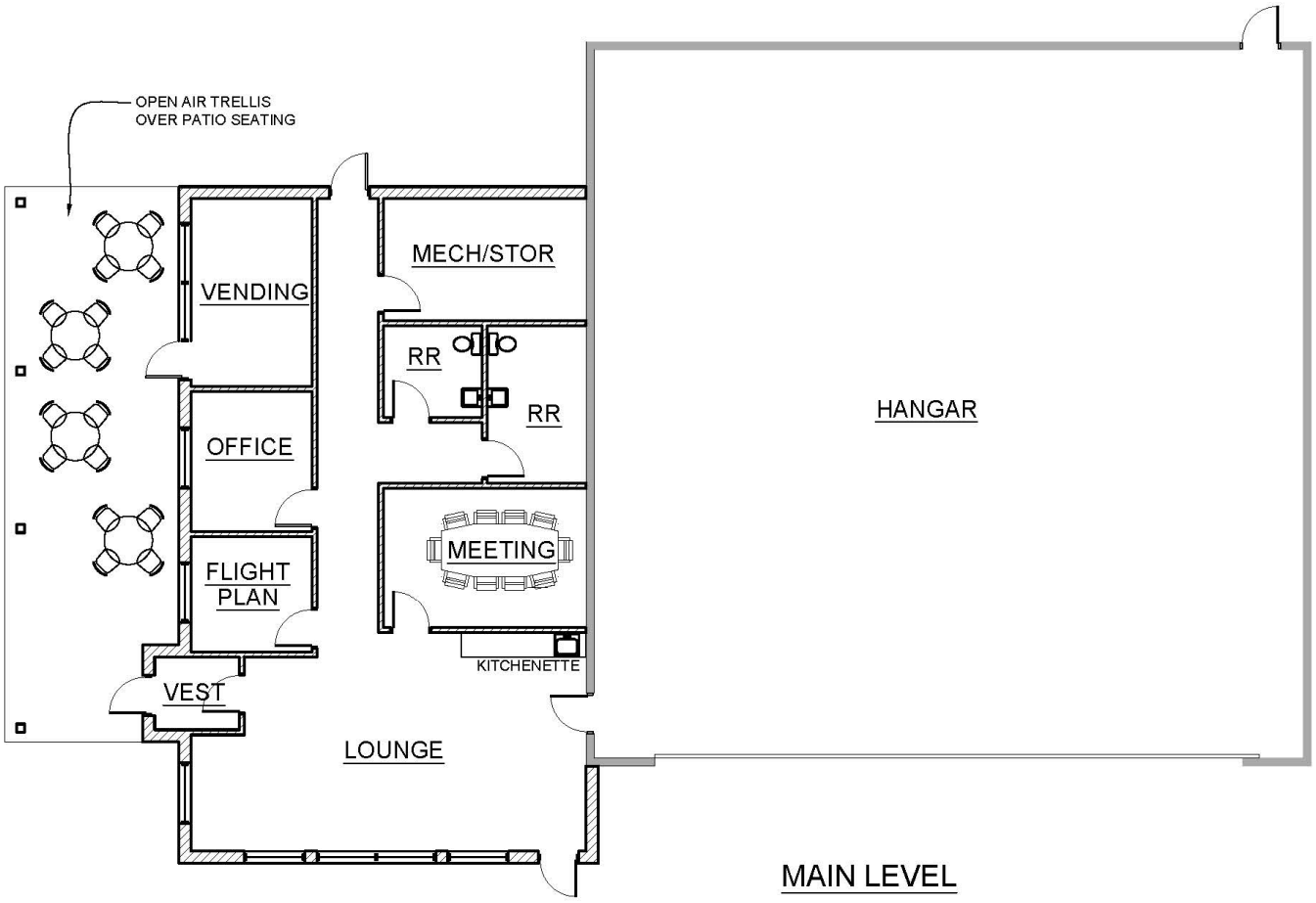
- The following are not included in this estimate:
  - Inflation costs
  - Testing and removal of hazardous materials
- The preliminary Estimate of Probable Cost prepared by the Architect represent the Architect's judgement as a design professional. It is recognized that neither the Architect nor the Owner has control over the cost of labor, materials or equipment; the Contractor's methods of determining bid process, or competitive bidding market conditions. Accordingly, the Architect cannot and does not warrant or represent that bid process will not vary from the Owner's budget for the Cost of the Work or from any Estimates of Probable Cost prepared or agreed to by the Architect.

CONCEPTUAL DESIGN OPTION-2 (New Terminal Structure)

Option-2 considers removal of the existing two-story portion of the building while salvaging the aircraft hangar. The proposed addition includes lounge, office, flight planning and meeting spaces along with mechanical, storage and accessible restroom support spaces. An outdoor seating area along with an interior retail or vending area are also included to support seasonal revenue opportunities. This option, while more costly than Option-1, provides a more efficient layout because it is not constrained by the existing exterior building shell.

The existing aircraft hangar area would receive a new mechanical HVAC system and the overall electrical service and panels would be replaced.

CONCEPT FLOOR PLAN



OPTION-2 PRELIMINARY COST ESTIMATE

A preliminary estimate of probable costs was prepared for demolition of the existing two-story portion of the building and construction of a new single-story addition to the existing hangar building. The project cost estimate is summarized in the table below.

ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Existing Building Demolition	1	LS	$50,000	$50,000
Building Addition	1,917	SF	$400	$767,000
Replace Roofing / Siding	1	LS	$120,000	$120,000
Building and Site Subtotal:				**$937,000**
Fixtures, Furnishings, and Equipment				$20,000
Construction Contingency (15%)				$140,000
Soft Costs - Architecture, Engineering, Permitting, etc. (30%)				$280,000
TOTAL PROJECT ESTIMATE:				**$1,377,000**

- The following are not included in this estimate:
  - Inflation costs
  - Testing and removal of hazardous materials
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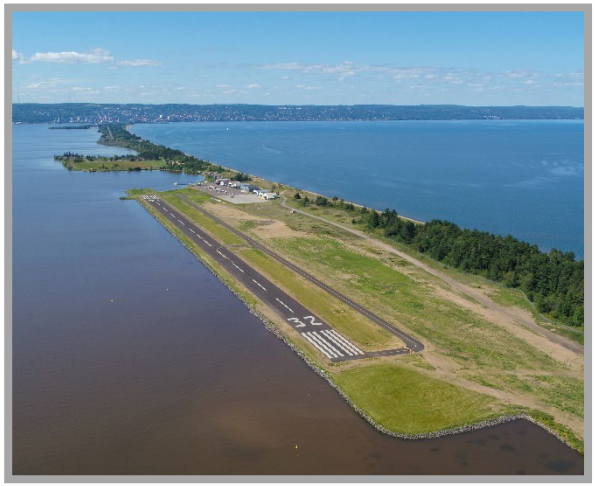
Appendix D

Sky Harbor Viewing Area Boards

Welcome to the AIRCRAFT VIEWING AREA



Duluth Sky Harbor Airport

- 1931: First landing and takeoff performed. A sand runway was constructed to incorporate land-based operations and later was stabilized with clay and seeded grass.
- 1946: City leases the airport land to private owners, Sportsmen Airways Inc.
- 1948: City leases the airport land to private owners, Sportsmen Airways Inc.
- 1963: The City of Duluth takes over ownership and constructed a paved runway in the place of the sod runway.
- 1969: The city chartered the Duluth Airport Authority and the DAA took over responsibility of the airports in Duluth.
- 1985: The city chartered the Duluth Airport Authority and the DAA took over responsibility of the airports in Duluth.

Founded in 1931, Sky Harbor has added capabilities while still maintaining harmony with its natural surroundings. Located on the end of the world's longest freshwater sand spit, Sky Harbor is seamlessly integrated into an environment of beaches, trails, and old-growth pine forests. Unlike many other airports, our amphibious air base is fully funded through user fees, without any taxpayer support. Sky Harbor is more than just an airport; it's a community hub providing a base for business, education, and tourism travel as well as exploration for all.

Welcome to the
AIRCRAFT VIEWING AREA


Cessna U206G Stationair


Cessna 150L


Cessna 172


Cessna 185 Skywagon


Piper J3C-65 Cub


Hatz Bantam


Vans RV-9A


Stinson 108-3


Aeronca 7AC Champ


Piper PA-30


Piper PA-28


Champion 7GCB


Republic RC-3 Seabee


DE Havilland Beaver

Welcome to the
AIRCRAFT VIEWING AREA

Building a Better World for All of Us®

Sustainable buildings, sound infrastructure, safe transportation systems, clean water, renewable energy and a balanced environment. Building a Better World for All of Us communicates a company-wide commitment to act in the best interests of our clients and the world around us.

We're confident in our ability to balance these requirements.

Join Our Social Communities