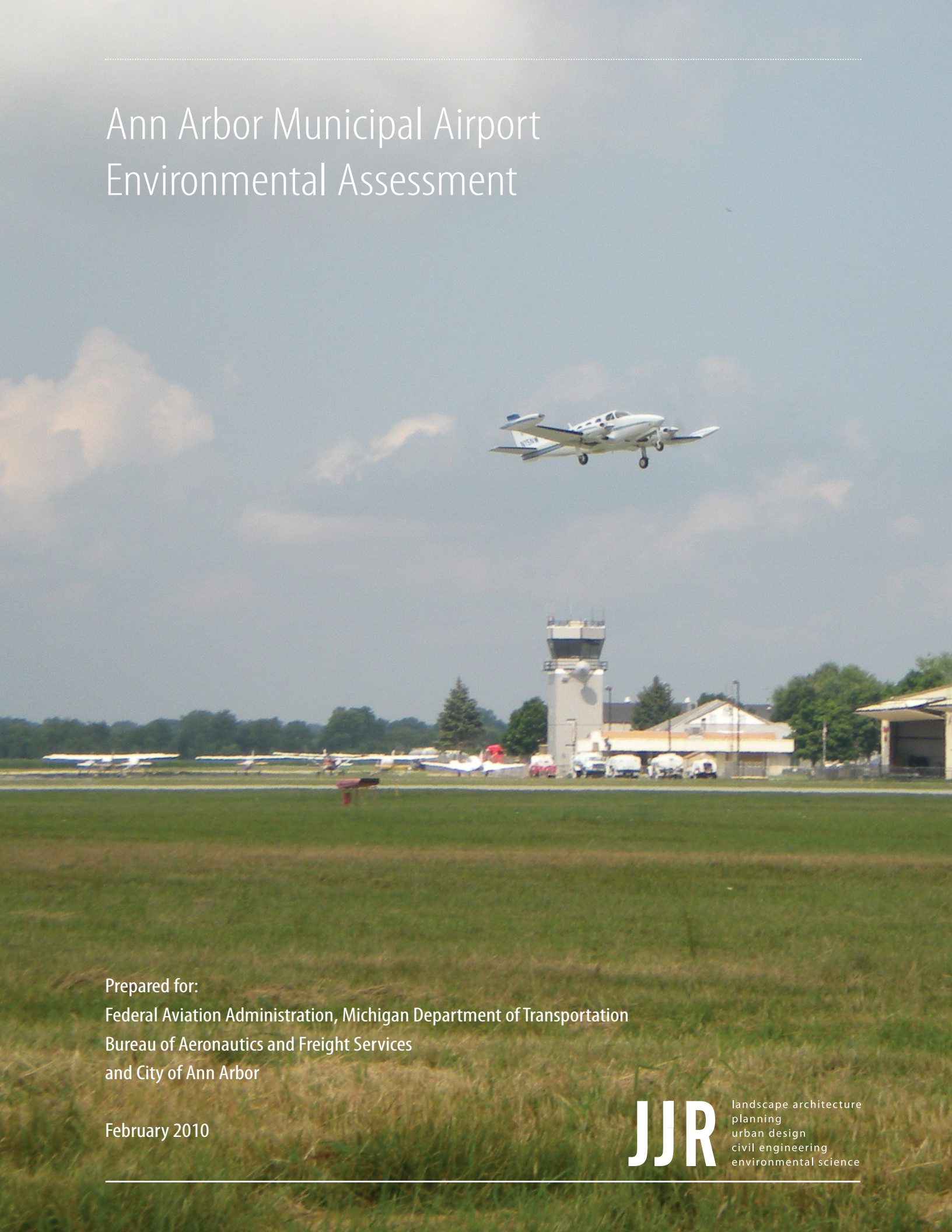
Ann Arbor Municipal Airport Environmental Assessment



Prepared for:
Federal Aviation Administration, Michigan Department of Transportation
Bureau of Aeronautics and Freight Services
and City of Ann Arbor

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environmental science

Environmental Assessment
for
Ann Arbor Municipal Airport
Ann Arbor, Michigan

Prepared for:

Michigan Department of Transportation
Bureau of Aeronautics and Freight Services
and
City of Ann Arbor

Prepared by:

JJR, LLC

This environmental assessment becomes a State of Michigan document when evaluated and signed by the responsible state official.

Responsible State Official	Date of Approval
Responsible Federal Official	Date of Approval

This Environmental Assessment describes the social, economic, and environmental impacts associated with the Preferred Alternative for implementing proposed improvements at the Ann Arbor Municipal Airport. The alternatives considered were: (1) No Build, (2) Use other airports, (3) Construct new airport, (4) Develop alternative modes of transportation, and (5) Runway 6/24 alternatives.

Comments on this Environmental Assessment should be received within 30 days of the date of publication and should be sent to Ms. Molly Lamrouex, Airports Division, MDOT Bureau of Aeronautics and Freight Services, 2700 Port Lansing Road, Lansing, Michigan 48906-2160.

ANN ARBOR MUNICIPAL AIRPORT
ENVIRONMENTAL ASSESSMENT

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Section 1.
Executive Summary

The Ann Arbor Municipal Airport (ARB), owned and operated by the City of Ann Arbor, is located in Pittsfield Township, Washtenaw County, Michigan. ARB initiated preparation of an Environmental Assessment (EA) in 2009 to evaluate the potential impacts of implementing portions of proposed developments shown on the Federal Aviation Administration (FAA) approved Airport Layout Plan (ALP).

The proposed developments focus on extending and improving Runway 6/24, the primary runway, to address the needs of the existing critical aircraft that use the airport. Alternatives were developed to provide options for extending the existing 3,505-foot runway to 4,300-feet, while extending the existing parallel taxiway to the same length. Alternatives considered in this study included no build, use other airports, construct new airport, develop alternative modes of transportation, and Runway 6/24 alternatives.

The alternatives were evaluated based on their ability to meet the purpose and need of the project, the impact the alternative would have on the community and environment, and other limiting factors, such as cost. Based on this evaluation, a build alternative that involves shifting and extending the existing runway was selected as the Preferred Alternative.

Implementation of the Preferred Alternative would not require the acquisition of land, and no homes or businesses would be displaced. The Preferred Alternative would not impact wetlands, county drains, or floodplains. The proposed project would have a positive impact on interstate commerce to the immediate Ann Arbor area, as well as enhance the safety of airport operations.

Section 2.
Purpose and Need

2.1 PROJECT LOCATION AND DESCRIPTION

Note: The following information contains a large number of aviation-related acronyms. A glossary with definitions is included in Section 10 of this document.

Ann Arbor Municipal Airport (ARB) is a public-use, general aviation airport located in Washtenaw County, Michigan. The airport is located in Pittsfield Township and consists of approximately 837 acres. ARB is generally bound by Ellsworth Road to the north, State Road to the east, and Lohr Road to the west (Figure 2-1).

ARB is in close proximity to state highways including US-23, M-14, US-12, and I-94. Direct access to the airport is from Ellsworth and State Roads. The closest public-use airport is Willow Run Airport in Ypsilanti, which is approximately 12 miles to the east (approximately a 20 minute drive by automobile). The southeastern region of Michigan has a high level of commerce, and high levels of commercial, corporate, and general aviation air traffic.

The City of Ann Arbor owns and operates ARB. The city is responsible for contracting with the Fixed Base Operators (FBO), which are Solo Aviation, Ann Arbor Aviation Center, and Bijan Air. ARB's operating budget is an enterprise fund comprised solely of revenue generated by airport operations.

The primary runway, Runway 6/24, is 3,505-feet long by 75-feet wide and is oriented in a northeast/southwest direction. ARB has 22 permanent aviation service buildings, including the administration building, the FBOs, maintenance facilities, conventional box hangars, a privately owned hangar, and the FAA Air Traffic Control Tower (ATCT). The airport also provides 150 T-hangar spaces in an additional 13 T-hangar structures.

The current FAA-approved Airport Layout Plan (ALP) was updated in 2008 (Figure 2-2), and it incorporates the future development proposed in the Airport Capital Improvement Plan for ARB.

The proposed improvements from the ALP that are documented in this EA include:

- Shift and extend existing Runway 6/24, resulting in a runway that would be 4,300-feet long by 75-feet wide.
- Shift and extend the parallel taxiway to coincide with the revised Runway 6/24.
- Provide a new taxiway connector to the extended Runway 6 end.
- Provide a new taxiway connector and holding bay to the shifted Runway 24 end.

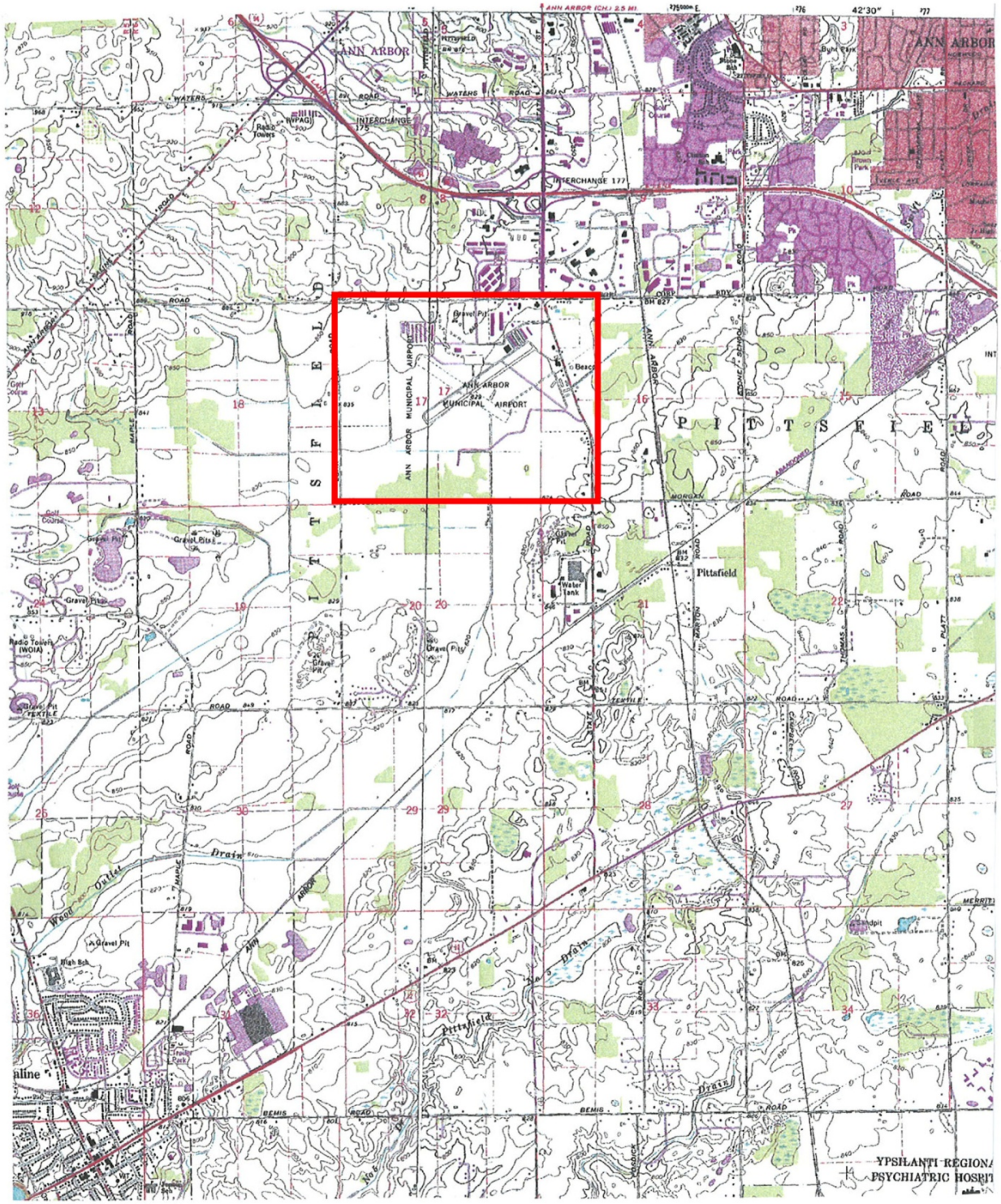

Figure 2.1: Location Map
Ann Arbor Municipal Airport Environmental Assessment

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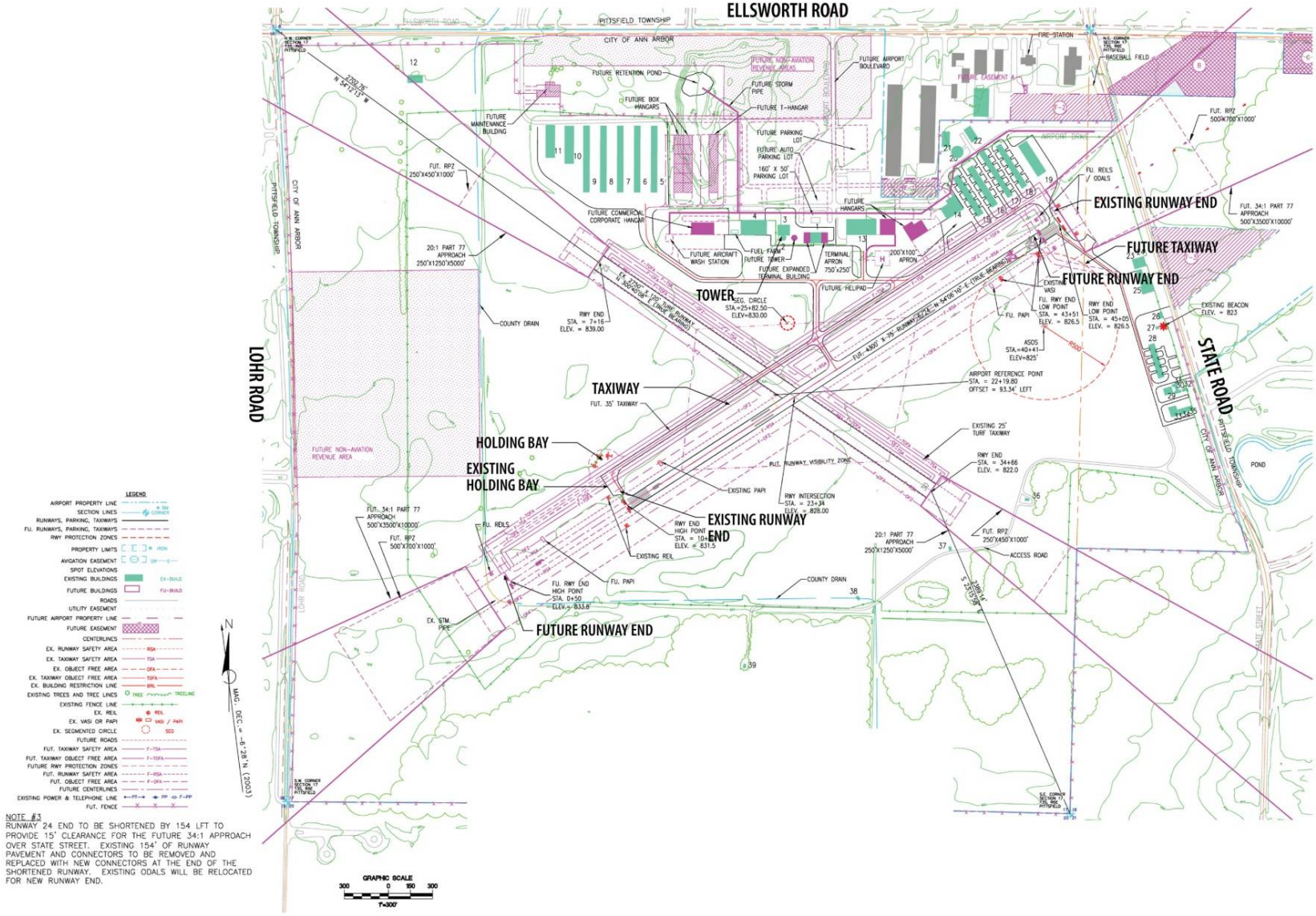

Figure 2.2: Airport Layout Plan
Ann Arbor Municipal Airport Environmental Assessment

2.2 PURPOSE AND NEED

The purpose of the proposed improvements at ARB is to provide facilities that more effectively and efficiently accommodate the *critical aircraft* that presently use the airport, as well as to enhance the operational safety of the airport.

The critical aircraft is defined by the FAA as the most demanding aircraft-type that performs a minimum of 500 annual operations at a particular airport. In cases where the critical aircraft weigh less than 60,000 lbs, a classification of aircraft is used rather than a specific individual aircraft model.

A recent Airport User Survey has confirmed that the critical aircraft classification for ARB is "B-II Small Aircraft" (MDOT, 2009). Aircrafts in this category have runway approach speeds between 91 and 120 knots, wingspans between 49- and 79-feet, and maximum certificated takeoff weights of 12,500 lbs or less. A representative aircraft of this classification is the Beechcraft King Air 200, a twin-engine turboprop aircraft that typically seats 10-12 people, including the flight crew.

As stated in FAA Advisory Circular 150/5325-4B, "*The design objective for the main primary runway is to provide a runway length for all airplanes that will regularly use it without causing operational weight restrictions.*" Airplanes that are classified within an airport's critical aircraft classification are considered by the FAA to be the regular use aircrafts of the primary runway.

Development of the primary runway at ARB to the recommended length of 4,300-feet would allow the majority of B-II Small classification aircraft to operate at their optimum capabilities (without weight restrictions). Interstate commerce into and out of a community can be negatively impacted if business aircraft are forced to operate with load restrictions (i.e. reductions in passengers, cargo, and fuel associated with aircraft range) due to lack of suitable runway length.

An origin-destination analysis was conducted on Instrument Flight Rules (IFR) flight plan records associated with ARB as part of the user survey process. Although the data analyzed did not include records of all operations conducted at ARB, it did confirm that there are a significant number of operations between ARB and distant locations throughout the country.

Flight operations were verified between ARB and at least 31 other states (approximately 63 percent of the continental US). Also, approximately 67 percent of the IFR flight plan records examined were between ARB and out-of-state locations. These factors are strong indicators of corporate flight activity associated with interstate commerce, as opposed to local pleasure flying by general aviation pilots. The large number of states that were linked to ARB is also a strong indicator of use of the airport by many corporations, as opposed to a single or few corporate users. Some of the larger corporations that were confirmed by the user survey as being users of ARB are Synergy International, Wells Fargo, Polaris Industries, Bombardier Aerospace, Avis Industrial Corporation, Thumb

Energy, NetJets, and AvFuel. NetJets provides on-demand air charter service and corporate aircraft fractional ownership opportunities to a large number of businesses located throughout the country. AvFuel Corporation, a nationwide supplier of aviation fuels and aviation support services, is headquartered in Ann Arbor and bases their Cessna 560 Excel Jet at ARB.

The City of Ann Arbor proposes to extend the existing 3,505-foot primary runway to 4,300-feet in total length in order to more effectively accommodate the critical aircraft that currently use the airport. The runway extension would enhance interstate commerce associated with business aviation, and the other proposed modifications would enhance the operational safety of ARB.

The objectives of the proposed project are to:

- Enhance interstate commerce by providing sufficient runway length to allow the majority of critical aircraft to operate without weight restrictions.
- Enhance operational safety by improving the FAA ATCT line-of-sight issues.
- Enhance operational safety in low-visibility conditions by providing a clear 34:1 approach surface to Runway 24, over State Road.
- Reduce the occurrence of runway overrun incidents by small category A-I aircraft (local objective).
- Relocate and potentially upgrade the Runway 24 Approach Light System.

2.2.1 Safety Enhancement

The proposed 150-foot shift of the Runway 24 threshold to the west would enhance the safety of ground operations by taxiing aircraft. Currently, a hangar structure blocks the line-of-sight from the FAA ATCT to a portion of the parallel taxiway at the east end of the runway, including most of the taxiway hold area for departing aircrafts. While this situation is not considered hazardous, the proposed shift would enhance operational safety, and possibly prevent a runway incursion, by expanding the view of the hold area and parallel taxiway to ATCT personnel.

The proposed shift of the Runway 24 threshold would also allow for a clear 34:1 approach surface to the east end of the runway (the current approach surface is the steeper 20:1). By keeping obstructions below the flatter 34:1 approach surface, an additional margin of safety is provided between approaching aircraft and any ground-based obstacles. This is particularly beneficial when aircraft are operating in low-visibility conditions. Provision of a clear 34:1 approach surface would also potentially allow visibility minimums to the Instrument Approach Procedure to Runway 24 to be lowered to 3/4 of a mile, as opposed to the current 1-mile visibility minimum. This would enhance the all-weather capability of the airport (and also interstate commerce) by allowing aircraft to continue to access the airport when weather conditions resulted in visibility dropping below the current 1-mile minimum.

Due to the proposed relocation of the Runway 24 threshold, it is also proposed that the existing runway approach light system be relocated accordingly. The airport currently uses an Omni-Directional Approach Lighting System (ODALS) to identify the approach end of Runway 24. The sequentially-flashing strobe lights assist pilots in identifying the runway threshold location and runway centerline alignment in low-visibility conditions. Since the FAA no longer installs ODALS, the current approach light system would potentially be upgraded and replaced with the newer Medium Intensity Approach Lighting System with Sequenced Flashers (MALSF) as part of the relocation. The MALSF would serve the same function as the ODALS, and is structurally very similar.

2.2.2 Role of the Airport

ARB is a public-use facility that serves the local community by supporting economic development and public services. The following businesses and organizations are located at and operate from the airport and employ staff that supports the operations of the airport:

- Two fixed-wing FBOs;
- A helicopter FBO;
- Three national rental car agencies;
- Two flying clubs;
- Four flight schools and pilot training centers;
- FAA ATCT; and,
- Air taxi, aircraft sales, aviation insurance and aviation fueling businesses.

ARB serves the Ann Arbor medical and biomedical industries with professional air ambulance services, transporting patients, human organs, radio isotopes, and other biomedical products and services.

Community pilots and aircraft owners are members of nonprofit organizations providing "no charge" charitable gifts of flight time to citizens in need. Some of these organizations include Wings of Mercy, Angel Flight, and Dreams and Wings. Wings of Mercy has documented 292 fights into or out of ARB since 1992 including 51 flights in 2009.

ARB is included in the FAA's National Plan of Integrated Airport Systems (NPIAS) as a general aviation airport. Not all public-use airports are included in this nationwide airport system plan. Inclusion in the NPIAS signifies that the FAA considers this airport an important part of the nation's air transportation system, and it makes ARB eligible to receive federal grants as part of the FAA's Airport Improvement Program.

ARB is also included in MDOT's Michigan Airport System Plan (MASP) (MDOT, 2008). The MASP presents the results of an airport system planning process that has been aligned with the goals and objectives of MDOT's State Long Range Plan. The MASP supports programming decisions and is useful in evaluating programming actions related to airport system and airport facility deficiencies.

As part of the MASP development, each of Michigan's public-use airports were assigned to one of three tiers based on their contribution to the state system goals. Tier 1 airports respond to essential/critical airport system goals. These airports should be developed to their full and appropriate level. Tier 2 airports complement the essential/critical airport system and/or respond to local community needs. Focus at these airports should be on maintaining infrastructure with a lesser emphasis on facility expansion. Tier 3 airports duplicate services provided by other airports and/or respond to specific needs of individuals and small business.

The MASP identifies ARB as a Tier 1 airport, with a current MASP classification of B-II. Basic standard developmental items for B-II category airports, as outlined in Table 40 of the MASP, are a paved primary runway of 4,300-feet in length by 75-feet wide, a paved parallel taxiway, appropriate runway lighting and visual aids, a runway approach protection plan, basic pilot and aircraft services, all-weather access, year-round access, and landside access. Although it is not a requirement, MDOT encourages all of Michigan's Tier 1 airport sponsors to consider development of their airports to comply with the basic development standards outlined in the MASP.

ARB currently meets all MASP basic development standards for category B-II airports, with the exception of runway length. The current primary runway is only 3,505-feet in length by 75-feet wide. An extension of the primary runway to 4,300-feet in length would result in the airport meeting all state-recommended standards for B-II category airports.

2.2.3 Aircraft Operations and Runway Length Recommendations

The Airport Reference Code (ARC) is a coding system developed by the FAA to correlate airport design criteria with the operational and physical characteristics of the airplane types that regularly use a particular airport. The critical aircraft, or grouping of aircraft, are generally the largest, most demanding types that conduct at least 500 operations per year at the airport. The ARC for each particular airport is determined based on two characteristics of the critical aircraft: the approach speed to the runway and the wingspan of the aircraft.

The first component, designated by letter A through E, is the critical aircraft's Approach Category. This is determined by the approach speed to the runway:

- Category A: Approach speed less than 91 knots.
- Category B: Approach speed 91 knots or more, but less than 121 knots.
- Category C: Approach speed 121 knots or more, but less than 141 knots.
- Category D: Approach speed 141 knots or more, but less than 166 knots.
- Category E: Approach speed 166 knots or more.

The second component, designated by Roman numeral I through VI, is the critical aircraft's Design Group. This is determined by the wingspan of the aircraft:

- Group I: Wingspan less than 49-feet.
- Group II: Wingspan 49-feet or more, but less than 79-feet.
- Group III: Wingspan 79-feet or more, but less than 118-feet.
- Group IV: Wingspan 118-feet or more, but less than 171-feet.
- Group V: Wingspan 171-feet or more, but less than 214-feet.
- Group VI: Wingspan 214-feet or more, but less than 261-feet.

The FAA has also established categories for aircraft based on their certificated Maximum Takeoff Weights (MTOW), which are determined by each specific aircraft's manufacturer. *Small Aircraft* are those with MTOWs of 12,500 lbs. or less. *Large Aircraft* are those with MTOWs greater than 12,500 lbs.

As previously mentioned, the airport user survey confirmed that the current critical aircraft category (and ARC) for ARB is "**B-II Small Aircraft**". Based on the findings of the user survey analysis, the primary runway length recommendations by MDOT and FAA are as follows:

MDOT – *Source: Michigan Airport System Plan (MASP 2008) Table 40* (*statewide standard for all ARC B-II airports*) **4,300-feet**

FAA – *Source: FAA Advisory Circular 150/5325-4B, "Runway Length Requirements for Airport Design" Figure 2-2* (*airport-specific standard for ARB*) **4,200-feet***

** Note: The FAA runway length recommendation was obtained from Figure 2-2 in Advisory Circular 150/5325-4B. The following specifics for ARB were used in the determination:*
Airport Elevation: 839-feet above mean sea level
Temperature: 83 degrees F mean daily maximum temp, hottest month of year (July)

The FAA recommended runway length of 4,200-feet at ARB was obtained by calculation from FAA Advisory Circular 150/5325-4B, *"Runway Length Requirements for Airport Design"*, a publication that is used nationally by the agency. The resulting recommended runway lengths are airport-specific, and can vary by hundreds of-feet from site to site, depending on the specific airport elevations and mean daily maximum temperatures used in the calculations.

The MDOT recommendation of 4,300-feet is a statewide standard for all airports in the state with category B-II critical aircraft classifications. Since airport elevations and mean maximum temperatures do not vary significantly from airport to airport in Michigan, as opposed to many other states, MDOT uses a single runway length recommendation for all airports of the same critical aircraft classification.

The existing ARC shown on the current ALP for the airport is category B-II. This classification has been confirmed correct by the recent airport user survey. Even if the

proposed extension to 4,300-feet is constructed, the ALP shows that the future ARC for the airport will remain category B-II.

2.2.4 Airport Operational Forecasts

Year 2007 was the onset year of planning activities associated with the potential extension of Runway 6/24, and the year in which the airport manager and FBOs were requested to collect based and itinerant aircraft operational data for the purpose of determining project justification. In order to maintain consistency, FlightAware operational records from target year 2007 were also examined during the user survey analytical process.

Actual total operations for year 2009 were recently published (January 2010) by the FAA for airports with ATCT. From the user survey operational data year 2007 through the most recent operational data year 2009, total annual operations at ARB have decreased approximately 21.8% (from 72,853 actual in 2007 to 57,004 actual in 2009). Since the operational totals were obtained from actual ATCT records, rather than estimates, they are considered very accurate.

By applying the 21.8% decrease in total annual operations at ARB from 2007 to 2009 to the user survey results, a very accurate estimate can be obtained for the current level of operations by B-II category critical aircraft. The user survey report documents a total of 750 actual annual operations by B-II category critical aircraft from survey data year 2007. A 21.8% decrease in this number is 586 - still well above the FAA's substantial use threshold of 500. Therefore, even with the current decrease in annual operations due to the economic recession, there is still justification at the present time for the runway extension.

The FAA's Terminal Area Forecast (TAF) shows year 2009 to be a low-point in total annual operations at ARB. The TAF projects total annual operations to continually increase every single year, from year 2010 through year 2030. Since the estimated 586 annual operations by B-II category aircraft in year 2009 confirm present justification for the runway extension, the continual increase in operations that are forecasted by the TAF confirm that justification for the runway extension is substantiated through year 2030.

The following actual and forecasted Total Operations at ARB, from year 2000 through year 2030, are from the FAA data sources listed below. The Estimated Category B-II Operations for each year have been calculated based on the percentage of actual B-II operations to actual total operations in survey data year 2007.

Table 2-1
Actual and Forecasted Total Operations at ARB

Year	Total Operations	Estimated Category B-II Operations
2000	104,342 *	1,074
2001	102,321 *	1,053
2002	91,414 *	941
2003	77,051 *	793
2004	65,516 *	674
2005	67,940 *	699
2006	71,785 *	739
2007	72,853 *	750***
2008	64,910 *	668
2009	57,004 *	586
2010	56,986 **	586
2011	57,514 **	592
2012	58,073 **	598
2013	58,639 **	604
2014	59,212 **	610
2015	59,791 **	616
2016	60,376 **	622
2017	60,968 **	628
2018	61,567 **	634
2019	62,173 **	640
2020	62,786 **	646
2021	63,405 **	653
2022	64,032 **	659
2023	64,666 **	666
2024	65,307 **	672
2025	65,956 **	679
2026	66,613 **	686
2027	67,277 **	693
2028	67,948 **	700
2029	68,627 **	706
2030	69,314 **	714

* = Actual Total Operations from FAA ATCT records
** = Forecasted Total Operations from FAA TAF
*** = Actual (from User Survey)

Forecasts from the MDOT MASP also project increasing total operations at ARB from years 2010 through 2030. The MDOT forecasts, which are independent of the FAA forecasts, further substantiate the mid-term and long-term FAA projections of a rebound in activity at ARB to near survey year 2007 operational levels.

AvFuel Corporation, which bases a B-II Large category Citation 560 Excel jet at ARB, has confirmed in writing that their operations at ARB increased from 211 actual operations in 2007 to 223 actual operations in 2008. Their Chief Pilot has also submitted written documentation that forecasts their future operational levels potentially increasing to 350 to 450 operations per year at ARB.

The FAA TAF forecast, MDOT MASP forecast, and AvFuel's operational forecast all provide support to the fact that survey year 2007 operational data that was analyzed in the user survey process is a very pertinent representation of estimated future operational levels at ARB.

2.2.5 Surrounding Land Uses

ARB is bordered by Ellsworth Road to the north, Lohr Road to the west, and State Road to the east. The primary runway is situated in a northeast/southwest direction. Residential, business, industrial, recreational, agricultural, and forested areas are located adjacent to the airport, and efforts were made during the analysis of alternatives to minimize impacts to these resources. Residential properties are located along Lohr Road and business properties are located along State and Ellsworth Roads. A perennial stream crosses through the airport property and flows to the south connecting to a county drain (Wood Outlet). A portion of the stream near the southwest end of the runway is enclosed in a concrete culvert.

2.2.6 Other Considerations

Aircraft performance information and runway length requirements for each airplane are contained in the individual airplane flight operating manual. As quoted from FAA Advisory Circular 150/5325-4B, Paragraph 206, "*This information is provided to assist the airplane operator in determining the runway length necessary to operate safely. Performance information from those manuals was selectively grouped and used to develop the runway length curves in Figures 2-1 and 2-2. The major parameters utilized for the development of these curves were the takeoff and landing distances for Figure 2-1 and the takeoff, landing, and accelerate-stop distances for Figure 2-2*." As stated earlier in this section, Figure 2-2 of the Advisory Circular was used to determine the FAA-recommended runway length for ARB.

The *accelerate-stop distance* concept referred to above is an important operating consideration. In this concept, the pilot not only considers the amount of runway needed for takeoff, but also the amount of runway needed to abort the takeoff while on the takeoff roll and bring the aircraft to a stop. In situations where pilots detect a problem with the aircraft while on the takeoff roll, they are forced to continue the takeoff and contend with the problem in the air if there is not enough runway remaining to bring the aircraft to a stop. By having enough remaining runway to safely abort a takeoff and stop the aircraft while still on the ground, a pilot would be able to avoid a potentially hazardous situation of taking to the air with a mechanically-deficient aircraft.

A local objective is to reduce the occurrence of runway overrun incidents. While overrun incidents are not officially recognized by the FAA or MDOT as justification for extending runways, there is merit to this local objective. The 11 overrun incident reports that were analyzed showed that most runway overruns at ARB involved small single-engine category A-I aircraft. These types of incidents often involve student pilots or low-time, relatively inexperienced pilots. There is no evidence in the incident reports that any of the aircraft which overran the end of the existing 3,505-foot runway exceeded the limits of the 300-foot long turf Runway Safety Area. Therefore, in each of these cases, the proposed 4,300-foot long runway would have provided sufficient length for the small category A-I aircraft to safely come to a stop while still on the runway pavement, without running off the runway end.

The considerations mentioned above do not imply that the existing 3,505-foot runway is unsafe in any regard. Accelerate-stop distance requirements can be accommodated on the existing runway if pilots of critical category aircraft operate at reduced load capacities. In the cases of the previous runway overrun incidents, the turf Runway Safety Areas to the existing runway performed as designed and provided a clear area for the overrunning aircraft to come to a stop. There were no reports of personal injuries, although there were reports of aircraft damage in several of the incidents.

2.2.7 Summary

The proposed shift and extension of primary Runway 6/24 at ARB would provide a runway configuration that more effectively accommodates the critical aircraft that presently use the facility. The proposed project would satisfy the FAA design objective of providing sufficient runway length to allow airplanes that regularly use it to operate without weight restrictions. The proposed project would also result in ARB achieving full compliance with all MDOT basic developmental standards outlined in the MASP 2008 for category B-II airports.

In particular, the proposed project would provide the following benefits:

- Enhance business aviation and interstate commerce by providing sufficient runway length to allow the majority of category B-II Small critical aircraft that currently use ARB to operate without load restrictions (i.e. reduction in passengers, cargo, and fuel associated with aircraft range).
- Enhance the safety of ground operations, and lessen the chances of a runway incursion, by expanding the view of the parallel taxiway and aircraft hold area to ATCT personnel.
- Improve the all-weather capability of ARB and enhance operational safety in low-visibility conditions by providing a clear 34:1 approach surface to Runway 24.
- Address the local objective of decreasing the number of runway overruns by small category A-I aircraft by providing approximately 800-feet of additional runway pavement.

Section 3.
Description of Alternatives

Alternatives have been developed to meet the goals of ARB, improve safety and efficiency, and serve current users. The existing airport facilities include the primary runway, Runway 6/24, which is 3,505-feet long and 75-feet wide, a taxiway system, FAA ATCT, and the terminal and hangar buildings. The terminal and hangar buildings are located north of the runway. The taxiway is a full parallel taxiway and there is a turf crosswind runway. See Figure 3-1 for an illustration of existing airport conditions.

The alternatives considered include: No Build (e.g., No Action), use other airports, construct new airport, and four build alternatives for Runway 6/24. The impacts of each alternative were considered along with the ability to meet the purpose and need. An analysis and illustrations of the alternatives follow, along with a summary of their associated impacts.

3.1 ALTERNATIVES CONSIDERED AND DISMISSED

During the evaluation of ARB and its future needs, several alternatives were evaluated. The following alternatives were not considered feasible and were dismissed from further study.

3.1.1 Use Other Airports

The closest public-use airport to ARB is Willow Run Airport, approximately 12 miles east, near the City of Ypsilanti. Runway lengths at Willow Run range from 5,995-feet to 7,526-feet. Surface travel time to this airport is approximately 20 minutes. Willow Run Airport is one of the largest cargo airports in the country, transferring approximately 400 million pounds of freight through the airport annually.

Other airports within 25 miles of ARB include New Hudson-Oakland Southwest Airport (approximately 21 miles north, 3,128-foot runway), Canton-Plymouth-Mettetal Airport (approximately 22 miles northeast, 2,303-foot runway), and Tecumseh-Myers-Divers Airport (approximately 23 miles southwest, 2,660-foot runway). All three of these airports have primary runways that are shorter than the existing 3,505-foot runway at ARB.

From an operational standpoint, Willow Run Airport is capable of accommodating any of the aircraft that currently fly into ARB. Although Willow Run offers longer runway lengths, and a precision Instrument Landing System (ILS) approach procedure, many corporate users still elect to fly into ARB instead of Willow Run. This demonstrates that a large number of operators of business aircraft value the close proximity of ARB to their corporate offices and business contacts over the larger facility at Willow Run. Use of ARB over Willow Run also provides increased economic benefits to the Ann Arbor-based FBOs, as well as nearby hotels, restaurants, and other businesses.

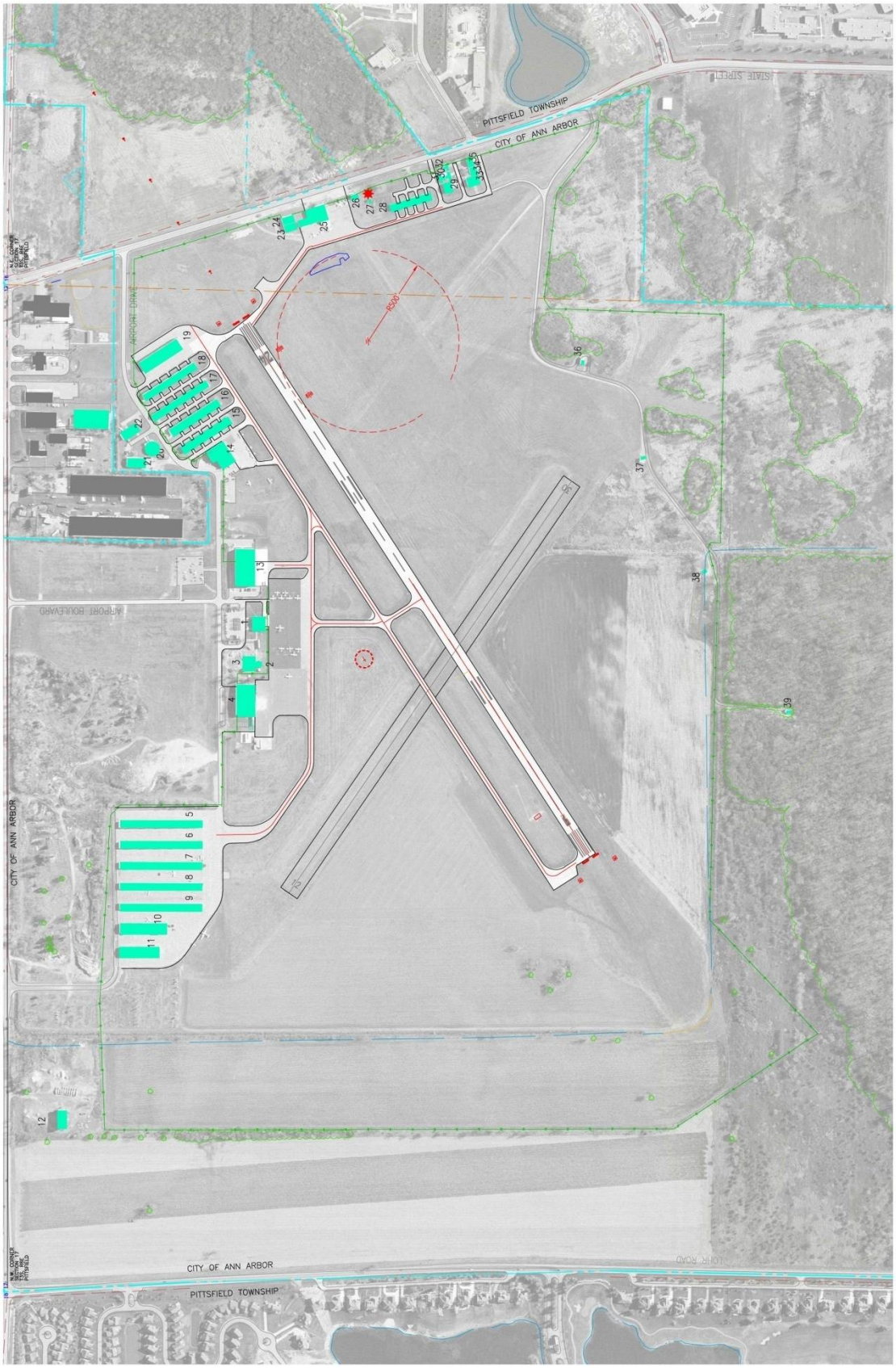

Figure 3.1: Existing Conditions
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Neither MDOT, nor the FAA, dictate to pilots which airports they can and cannot use. The decision on whether or not to use a particular airport is entirely up to the discretion of the pilot. Even with the availability of Willow Run, the recent airport user survey confirmed substantial use of ARB by B-II category aircrafts that are operated by many of the corporations listed in Section 2.2 of this document. The FAA design standards that are used nationally, as well as the MDOT basic development standards outlined in the MASP, are based on accommodating the existing critical aircraft that operate at each particular airport.

3.1.2 Construct New Airport

The existing airport is located in proximity to I-94, US-23, and M-14. ARB has been located at its current location since the 1920s. Many businesses have chosen their location to be in close proximity to ARB.

Relocating the operations of ARB to a new site would initially require acquisition of property comparable to, or larger than, the existing facility. While there may be sites that would physically accommodate the needs of a new airport, the costs associated with the relocation and the environmental consequences of a new airport would be greater than those expected with the expansion of ARB in its current location. It is anticipated that any site for relocation of the airport may require road closures, loss of farmlands, habitat disruption and displacement, residential relocations, and significant infrastructure improvements to provide a facility comparable to the existing airport.

It was determined that constructing a new airport would be a disruption to local businesses, considerably more expensive, and more environmentally damaging than the proposed project at the existing site. Consequently, this alternative was removed from further consideration.

3.1.3 Extend Runway to the East

This build alternative would involve extending Runway 6/24 to the east, holding the west end in its current location. The new runway would be 4,300-feet long and 75-feet wide. The parallel taxiway would also be extended to the east.

Extension of the runway pavement to the east would require the relocation of a considerable portion of State Road. Due to the FAA requirement of providing a clear Runway Safety Area, Object Free Area, and Runway Protection Zone in the approach area to the extended runway, there would also be a need to relocate a portion of Ellsworth Road, as well as the entire intersection of State Road and Ellsworth Road.

State Road and Ellsworth Road are highly traveled corridors. Any relocation would result in an impact to vehicular circulation, businesses, and residents in the area. A considerable amount of right-of-way would also have to be acquired in order to accommodate the relocated roadways, which would result in high costs and further impacts to the nearby businesses. In addition to these impacts, the relocation of State

Road would also severely impact the large wetland complex that is located on its east side.

3.2 ALTERNATIVES CARRIED FORWARD

The following alternatives were considered feasible and were carried forward for further evaluation.

3.2.1 No Build Alternative

The No Build Alternative assumes that no development would occur at ARB other than to maintain the existing facilities. The runway and taxiway would not be altered and no improvements to hangars or hangar access would occur beyond regularly scheduled maintenance.

3.2.2 Build Alternatives

When it was determined that extension of the primary runway was justified based on a determination of the airport's critical aircraft, several build alternatives were developed.

Build Alternative 1 – Extend and Realign the Existing Runway
The existing runway, Runway 6/24, would be realigned and extended to the southwest, holding the east end in its current location (Figure 3-2). The west end would be rotated five degrees counterclockwise. This alignment would maintain wind coverage needs, while moving the west approach away from some residential areas. The runway would be extended 800-feet to the southwest, resulting in a primary runway length of 4,300-feet with a width of 75-feet. The taxiway to the north would be extended to 4,300-feet, creating a full parallel taxiway. The taxiway and runway would have a 240-foot separation.

Build Alternative 2 – Extend the Existing Runway to the West
The existing runway, Runway 6/24, would be extended 800-feet to the west (Figure 3-3), holding the east end in its current location. The primary runway would be lengthened to 4,300-feet, maintaining the existing 75-foot width. As with Build Alternative 1, the existing taxiway would be extended, creating a full parallel taxiway. The taxiway and runway would have a 240-foot separation.

Build Alternative 3 – Shift and Extend the Existing Runway to the West
The east end of the runway would be shortened 150-feet to the west and the west end extended 950-feet to the west. The new runway would be extended a total of 800-feet, resulting in an overall runway length of 4,300-feet long and 75-feet wide (Figure 3-4). The parallel taxiway would be the same length as the runway, with a 240-foot separation.

Changes to the alignment of the primary runway are limited due to the layout of existing surface features and also by wind coverage. Desired wind coverage by FAA is 95 percent. Currently, Runways 6/24 and 13/31 provide 96.9 percent coverage with a maximum 10.5 knot cross wind component. Any change in runway alignment would need to be analyzed to determine the wind coverage.

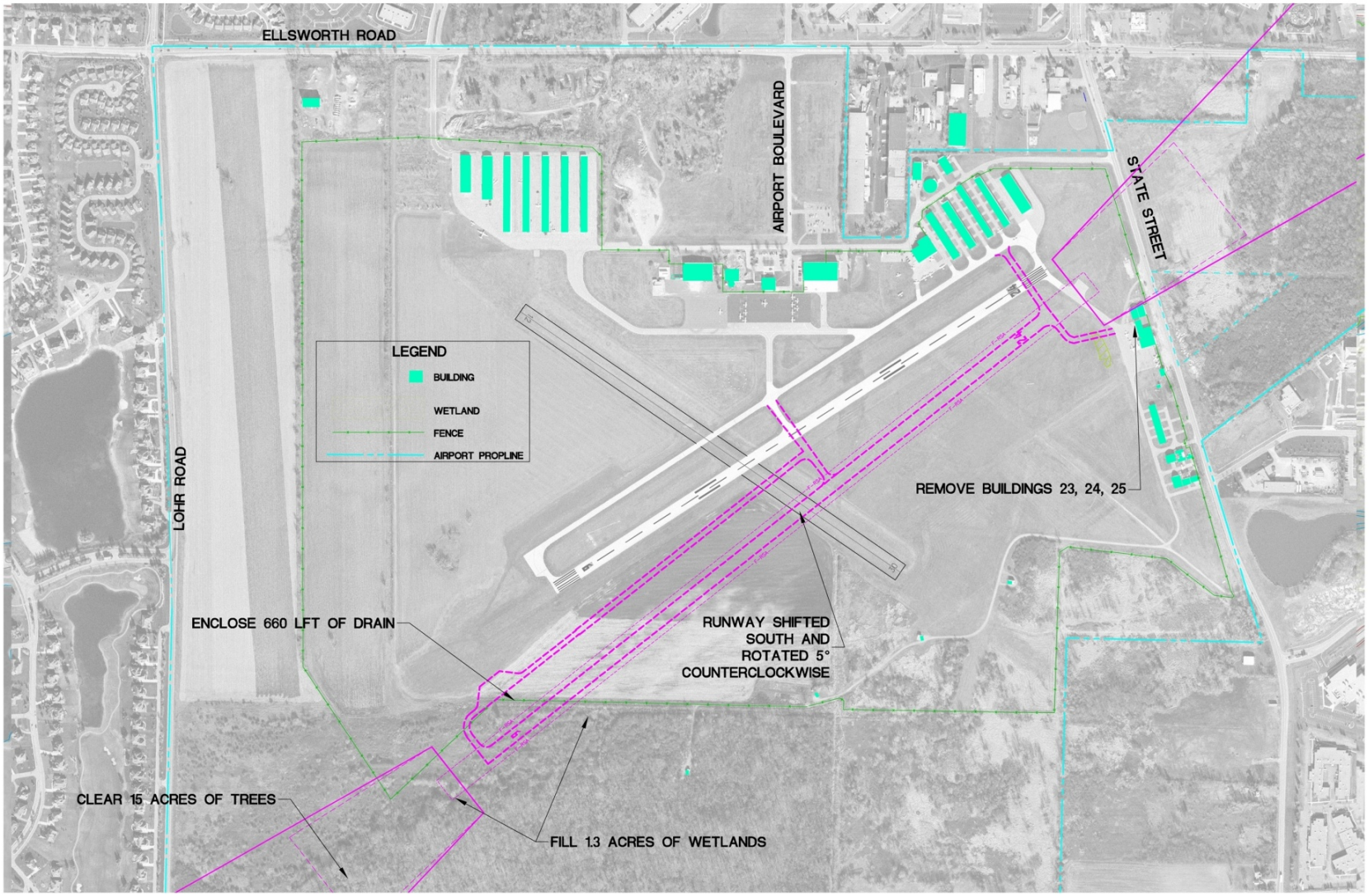

Figure 3.2: Build Alternative 1 - Extend and Realign the Existing Runway
Ann Arbor Municipal Airport Environmental Assessment

Figure 3.3: Build Alternative 2 - Extend the Existing Runway to the West
Ann Arbor Municipal Airport Environmental Assessment

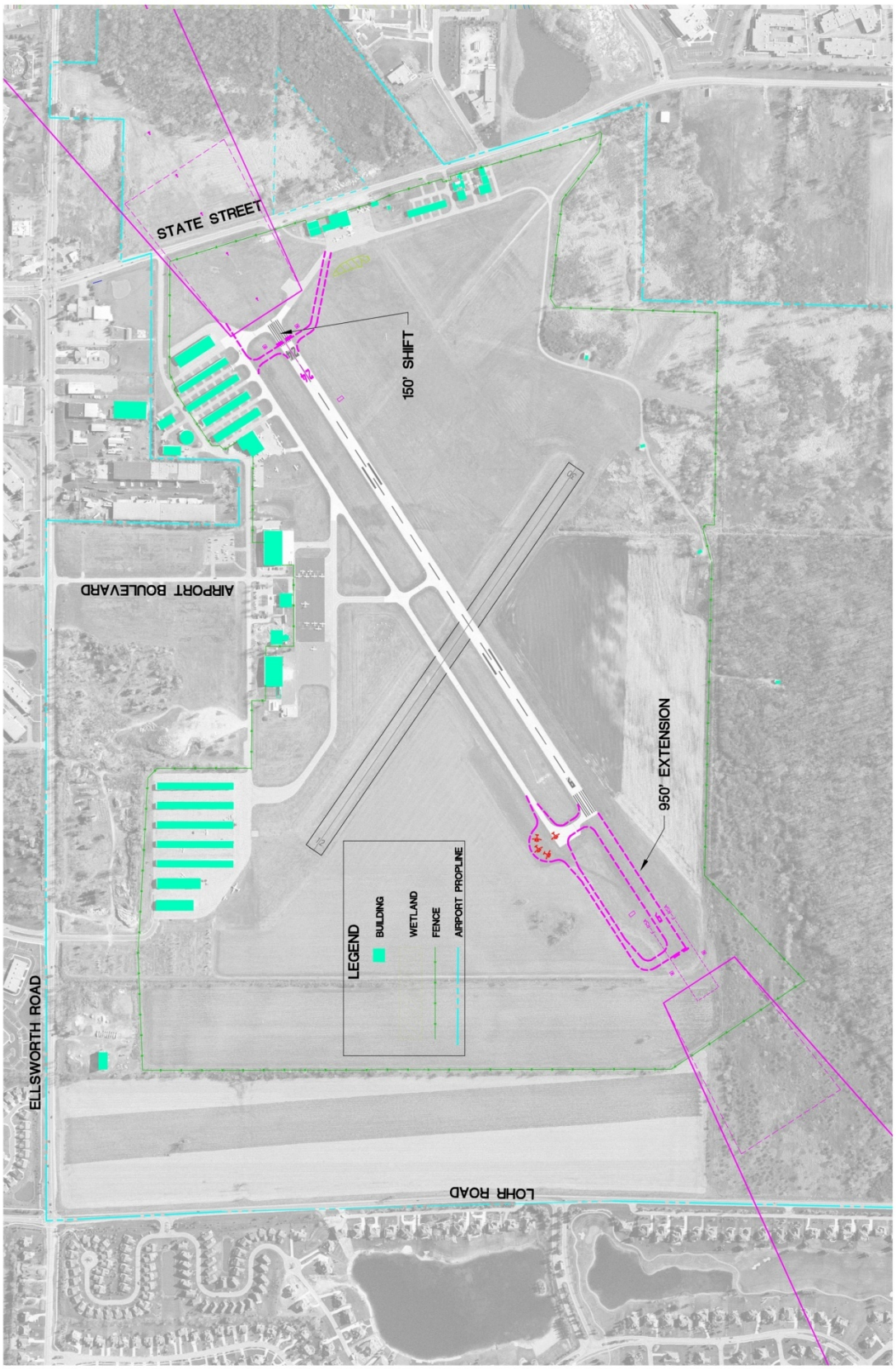

Figure 3.4: Build Alternative 3 - Shift and Extend Existing Runway to the West (Preferred Alternative)
Ann Arbor Municipal Airport Environmental Assessment

3.3 ALTERNATIVES EVALUATION

The alternatives were evaluated for: 1) ability to meet the purpose and need, and 2) extent of impacts to resources (Table 3-1). An alternative was rejected if it did not meet purpose and need, or had a high degree of impacts. The alternatives rejected and reasons for not being further considered follow.

Table 3-1
Summary of Alternatives Carried Forward

Evaluation Factors	Alternatives			
	No Build	**1**	**2**	**3**
Runway Length	3,500 ft.	4,300 ft.	4,300 ft.	4,300 ft.
Full Safety Areas	Yes	Yes	Yes	Yes
Stream Impact – length in feet	None	660	None	None
Direct Wetland Impacts	0 acres	1.3 acres	0 acres	0 acres
Tree clearing	0 acres	15 acres	0 acres	0 acres
Residential Displacements	0	0	0	0
Land Acquisition	0	8 acres	0	0
Airport Buildings Removed	None	3	None	None
Meets Purpose and Need	No	No	No	Yes

3.3.1 No Build Alternative

The No Build Alternative would be the least expensive alternative in the near future; however, it does not meet the objective of ARB to better serve current users, and to increase safety and efficiency. The existing runway length does not allow for the critical aircraft (B-II) to operate at their design capabilities without weight restrictions.

3.3.2 Build Alternative 1 – Extend and Realign the Existing Runway

Implementation of Build Alternative 1 would impact 1.3 acres of wetlands and extend the existing culvert of the stream by additional 660-feet. Fifteen acres of trees would need to be cleared at the west end of the new realigned runway. Three buildings at the east end of the runway would need to be removed. The property line would be 1,000-feet from the start of this approach. This would provide 50-feet of clearance at the 20:1 approach slope on this approach. Approximately 8 acres of land southwest of the runway would require an easement to clear the 20:1 approach in this area. This alternative was rejected due to

the impacts to the natural resources and required land acquisition. In addition, this alternative would not allow for the future expansion of State Road, as recommended in the 2006 State Road Corridor Study.

3.3.3 Build Alternative 2 – Extend the Existing Runway to the West

Build Alternative 2 would not result in impacts to wetlands or the stream. No buildings at ARB would be removed. This alternative was rejected because it would not meet the purpose and need of the project. Keeping the east runway end in its current location would not address the tower line of sight issue or the need for a 34:1 approach on the east end. In addition, this would not allow for the future expansion of State Road, as recommended in the 2006 State Road Corridor Study.

3.3.4 Build Alternative 3 – Shift and Extend the Existing Runway to the West

Build Alternative 3 would avoid impacts to wetlands, the stream, and the buildings at ARB. This alternative would fully meet the project purpose and need. By both shifting and extending the runway, this would accommodate the existing users, improve the tower line of sight issue, and the 34:1 approach surface to Runway 24. This alternative would accommodate future widening of State Road, as recommended in the 2006 State Road Corridor Study.

3.4 PREFERRED ALTERNATIVE

Build Alternative 3 was selected as the Preferred Alternative. This alternative involves shifting and extending Runway 6/24 and the parallel taxiway (Figure 3-4). This alternative would have no significant impacts while meeting the objectives of the project's purpose and need.

This alternative would not impact wetlands or the stream. There would be no displacements, either residential or business, and no removal of buildings at ARB. A noise analysis was conducted to determine if there would be a change in the noise levels as a result of the proposed improvements. According to the noise impact analysis, the 65 Day-Night Average Sound Level (DNL) contour for the proposed runway does not extend beyond airport property and is not within 1000-feet of any residential structure. Therefore, no residents are living within areas exposed to noise levels above the 65 DNL. For more information regarding the noise analysis for this project, please refer to Section 4.1.

Of the alternatives analyzed, Build Alternative 3 is the one that best achieves the goals of the study, while providing the fewest impacts to the surrounding area. The goals include a more efficient accommodation of the critical aircraft that currently use the facility, as well as enhancement of airport operational safety. Operational safety would be enhanced by improving the line-of-sight from the FAA ATCT to the Runway 24 hold area, and by providing a clear 34:1 approach surface to the Runway 24 threshold.

Section 4.
Affected Environment and Environmental Consequences

This section describes existing conditions within ARB and the immediate surrounding areas. Potential environmental impacts associated with the Preferred Alternative are presented and described with regard to the following categories: noise analysis; compatible land use; socio-economics; air quality; historic resources; contaminated sites; and the physical and ecological environment.

There would be unavoidable short-term impacts associated with the Preferred Alternative; however, the project would have a positive impact on the operation and safety of ARB and its role in the community. The project would comply with all federal, state, and local laws and regulations.

4.1. NOISE ANALYSIS

An assessment of the project aircraft noise exposure in the areas surrounding the ARB is provided in this section. A more detailed and technical analysis is provided in Appendix B. Section 4.1.1 provides an overview of the methods used to develop noise exposure maps, and Section 4.1.2 presents the noise exposure maps, which identify the areas affected by aircraft noise.

4.1.1 Methodology

The evaluation of the ARB noise environment, and land use compatibility associated with airport noise, was conducted using the methodologies developed by the FAA and published in FAA Order 5050.4B, FAA Order 1050.1E, and title 14 Code of Federal Regulations (CFR) part 150.

For aviation noise analysis, the FAA has determined that the cumulative noise energy exposure of individuals to noise resulting from aviation activities must be established in terms of yearly DNL. DNL is a 24-hour time-weighted-average noise metric expressed in A-weighted decibels (dBA) that accounts for the noise levels of all individual aircraft events, the number of times those events occur, and the time of day which they occur. In order to represent the added intrusiveness of sounds occurring during nighttime hours (10:00 p.m. to 7:00 a.m.), DNL penalizes, or weights, events occurring during the nighttime periods by 10 dBA. This is due to the increased sensitivity to noise during normal sleeping hours and because ambient (without aircraft) sound levels during nighttime are typically about 10 dB lower than during daytime hours.

The FAA's Integrated Noise Model (INM) Version 7.0a was used to develop noise exposure contours in order to assess the noise impacts associated with the proposed extension of Runway 6/24. The INM has been FAA's standard tool since 1978 for determining the predicted noise impact in the vicinity of airports.

The INM incorporates the number of annual average daily daytime and nighttime flight and run-up operations, flight paths, run-up locations, and flight profiles of the aircraft along with its extensive internal database of aircraft noise and performance information, to calculate the DNL at many points on the ground around an airport. The noise exposure contours represent computer-generated lines connecting these points of equal noise levels resulting from aircraft operations.

The input data required in the INM to develop noise exposure contours includes:

- Aircraft operations
- Aircraft fleet
- Runway end utilization
- Ratio of daytime and nighttime aircraft operations
- Flight tracks

Aircraft operation data was collected from multiple sources, including:

- Flight Explorer®, computer software which obtains N-number (registration number), aircraft type, arrival and departure airport, and time of day from Air Traffic Control Tower radar data;
- USDOT, FAA Airport Master Record, Form 5010 July 2009;
- FAA Terminal Area Forecast (TAF) December 2008;
- FAA Air Traffic Activity Data System (ATADS) May 2009; and,
- Michigan Department of Transportation Airport User's Survey Report 2009.

INM-modeled annual operations for the 2009 existing condition, consisting of operations from April 2008 through March 2009, totaled 61,969 operations, which is approximately 169 daily operations. Jet operations accounted for approximately 2 percent of the total operations. Nighttime operations accounted for 4.2 percent of the total operations.

2014 future condition aircraft operations were obtained from the 2008 FAA TAF for ARB. Modeled annual operations for the 2014 future condition totaled 69,717 operations, or approximately 191 daily operations. The percent of night and jet operations would remain constant between the existing condition and the future years. In addition, fleet mix between the 2009 Existing Condition and the 2014 Future Alternatives would remain static. The existing and future fleet mix with annual operations is shown in Appendix B as Table B-2.

Runway end utilization was based on discussions with the ATCT staff. Runway utilization is approximately 30 percent on Runway 6 (west end) and 70 percent on Runway 24 (east end). Discussions with ATCT staff also indicate that approximately 5 percent of single engine piston aircraft operations occur on Runway 12/30 with a 50/50 split (north end versus south end). Helicopters operate to and from the east edge of the terminal apron. Table B-3 in Appendix B provides runway utilization by aircraft category. The 2014 No-Action and Proposed Project Alternatives would maintain the same runway utilization.

Flight tracks are the aircraft's actual path through the air projected vertically onto the ground. Due to the level of operations occurring at ARB, a single arrival and departure track for each runway end was appropriate for the noise modeling. Straight out departures tracks were modeled for all runways. Straight in arrivals to Runway 12/30 were modeled and arrivals to Runway 6/24 followed the published instrument approach (Very High Frequency Omni Range (VOR)) procedures.

Unique helicopter and touch-and-go flight tracks were also modeled based on ATCT interviews. Eighty percent of the helicopter operations arrive from or depart to the north, with the remaining 20 percent distributed evenly between arrivals from and departures to the east, south, and west.

4.1.2 Aircraft Noise Exposure

The INM was used to develop 65, 70, and 75 DNL noise contours for the following scenarios:

- Existing conditions (Year 2009) – 6/24 Runway length 3,500 feet.
- No Action future conditions (Year 2014) – 6/24 Runway length 3,500 feet.
- Preferred Alternative future conditions (Year 2014) – 6/24 Runway length 4,300 feet.

DNL contours are a graphical representation of how the noise from the airport's average annual daily aircraft operations is distributed over the surrounding area. The INM can calculate sound levels at any specified point so that noise exposure at representative locations around an airport can be obtained.

The noise exposure maps developed by the INM program for the three scenarios are presented in Figure 4-1 through Figure 4-3.The noise contours (65, 70, and 75) for each scenario are super-imposed over an aerial. For the purposes of assessing the impacts related to aircraft noise, the contour maps were evaluated with respect to the number of dwelling units and number of people located within the 65 DNL contours. As stated in the FAA Order 1050.1E, Environmental Impacts: Policies and Procedures, "*A significant noise impact would occur if analysis shows that the proposed action will 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*."

Existing Conditions
No homes or noise sensitive land uses are located within the 65 DNL contour for the existing conditions (Figure 4-1). The existing condition 65 DNL contour does not extend beyond airport property.

No Build Alternative (2014)
Noise exposure resulting from aircraft operations for the 2014 No Build Alternative does not impact homes or noise sensitive land uses (Figure 4-2). The 2014 No Build Alternative DNL 65 dBA noise contour does not extend beyond airport property.

Figure 4.1: Noise Contour Map - Existing Conditions
Ann Arbor Municipal Airport Environmental Assessment

JJR

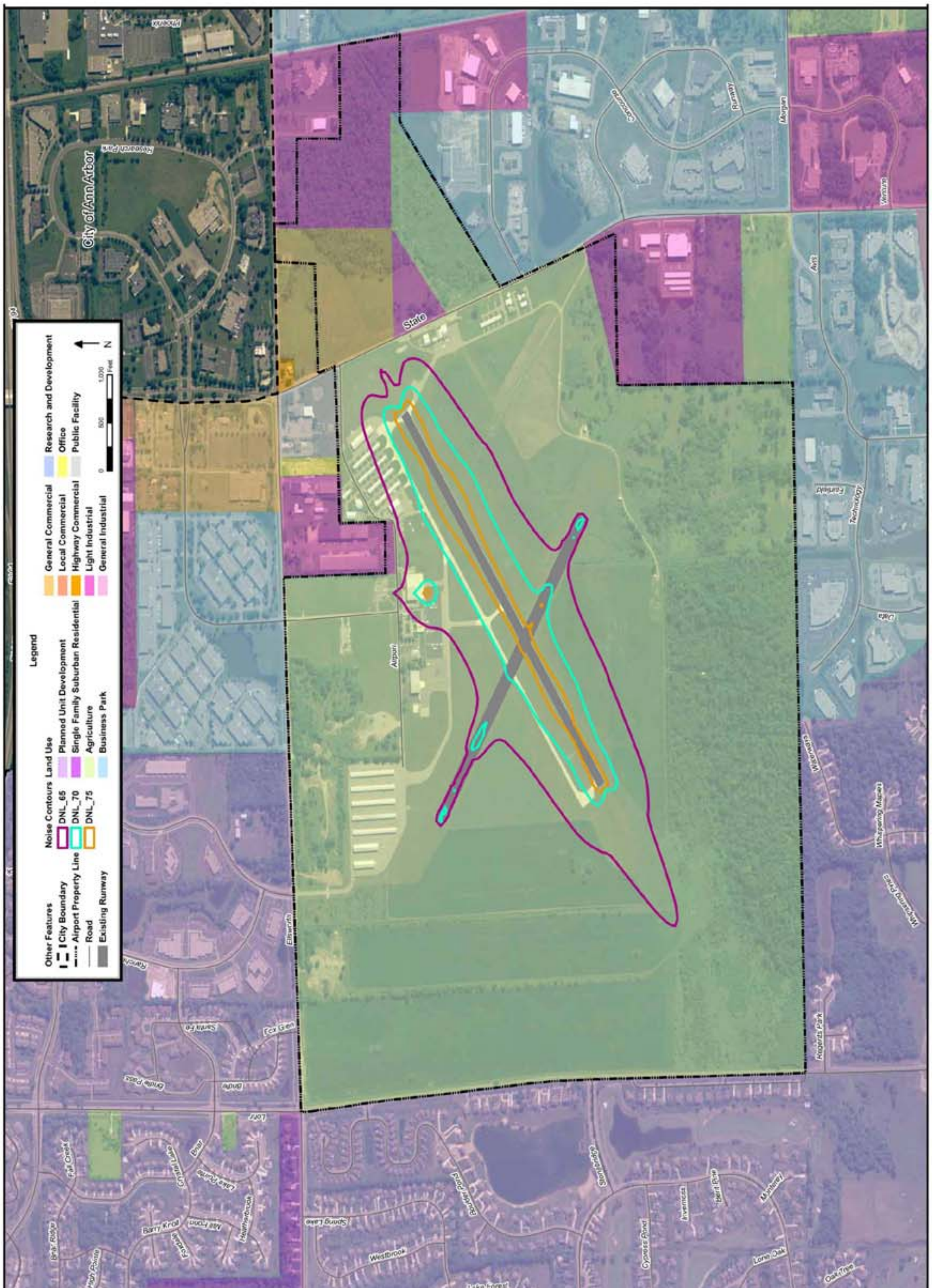

Figure 4.2: Noise Contour Map - No Build Alternative (2014)
Ann Arbor Municipal Airport Environmental Assessment

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Consequences of the Preferred Alternative
No homes or noise sensitive land uses are located within the 65 DNL contour for the Preferred Alternative future conditions (Figure 4-3). This 65 DNL noise contour does not extend beyond airport property. Therefore, no people are living within areas exposed to noise levels above the 65 DNL. The Preferred Alternative is not expected to have any significant aircraft noise impacts as defined in FAA Order 5050.4B.

Proposed Mitigation Measures
The proposed Runway 6/24 extension would not result in exposure of noise levels greater than 65 DNL to residents or noise sensitive land uses. Therefore, mitigation measures are not necessary or planned in association with the proposed runway extension.

4.2 COMPATIBLE LAND USE

Existing Conditions
Land use immediately surrounding ARB includes residential, commercial, industrial, recreational, undeveloped, and agricultural areas. Access to the airport is from either Ellsworth Road to the north or State Road to the east. Along Ellsworth Road, between Lohr Road and State Road, the land use is a mix of residential (Fox Glen) and commercial, including two research and business parks (Valley Ranch, Airport Plaza). The land use along Lohr Road is residential (Stonebridge) and agricultural. Along State Road south of Ellsworth Road is either undeveloped or commercial, including a research and business park: Runway Plaza. Residential areas (St. James Woods and Waterways) and a research and business park (Avis Farms) are located immediately to the south of ARB. Existing land use and zoning is illustrated in Figure 4-4 and 4-5, respectively.

The land surrounding ARB in Pittsfield Township is predominately zoned as planned unit development (PUD), business park, and light industrial (Pittsfield Township, 2009). Immediately to the west of ARB, along Lohr Road, these areas are zoned as PUD (Figure 4-5). The land east of ARB, along State Road, is zoned as either business park or light industrial (Figure 4-5). Lohr Road is a mix of residential and public facilities and public and private recreation/open space. Residential is also identified immediately south of ARB. There is also a small area identified as office south of Ellsworth Road near the northeastern airport boundary. The land adjacent to ARB, within the city limits, (north of Ellsworth Road and east of State Road) is zoned as either fringe commercial, research, or industrial (City of Ann Arbor, 2008) (Figure 4-6).

As illustrated in Figure 4-7, Pittsfield Township's future land use plan identifies the area along State Road, along most of Ellsworth Road, and immediately south of ARB as research and development (Pittsfield Township, 2008). At the corner of State Road and Ellsworth Road the area is identified as community commercial and local commercial. There is also a small area identified as office south of Ellsworth Road near the northeastern airport boundary.

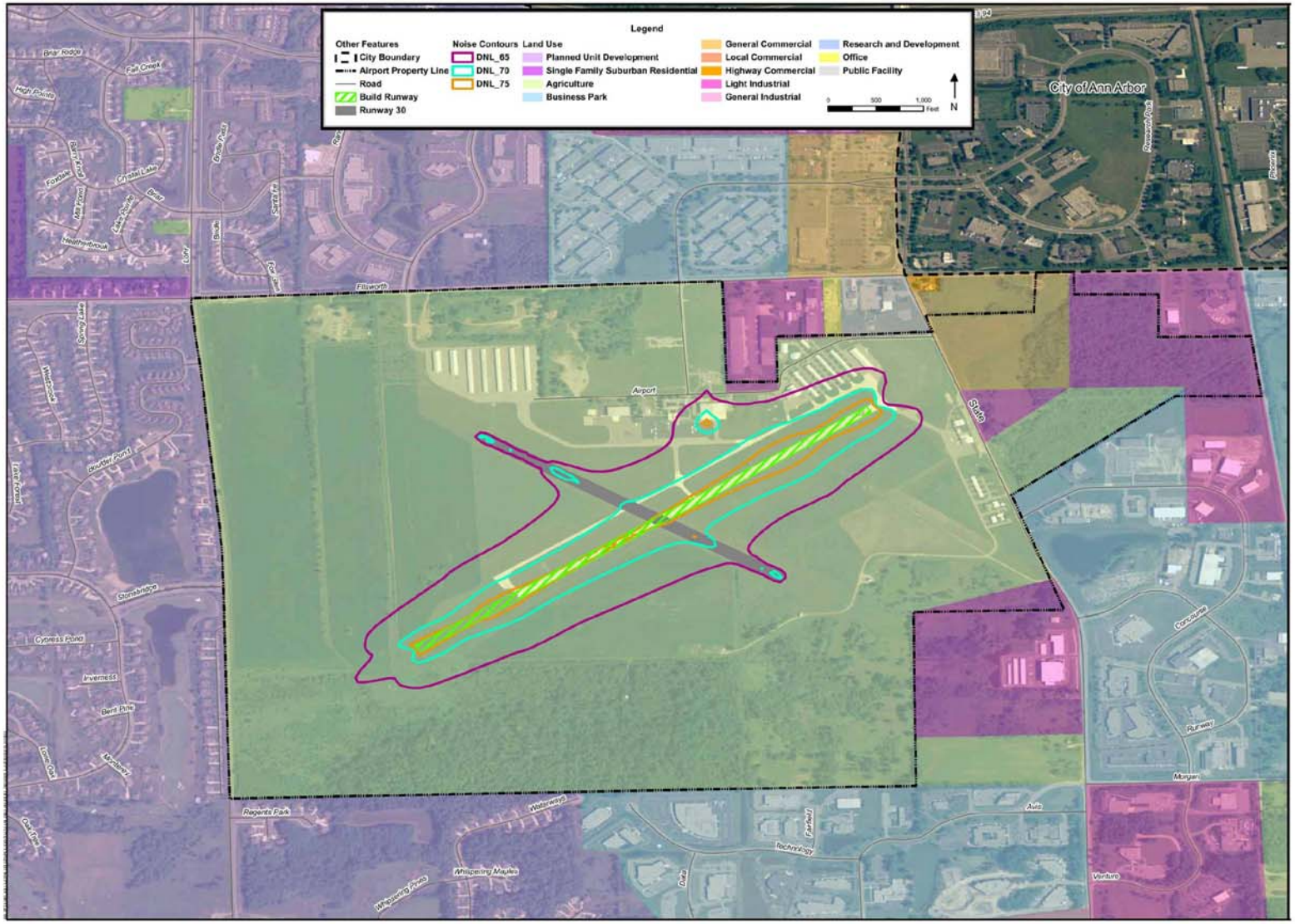

Figure 4.3: Noise Contour Map - Preferred Alternative (2014)
Ann Arbor Municipal Airport Environmental Assessment

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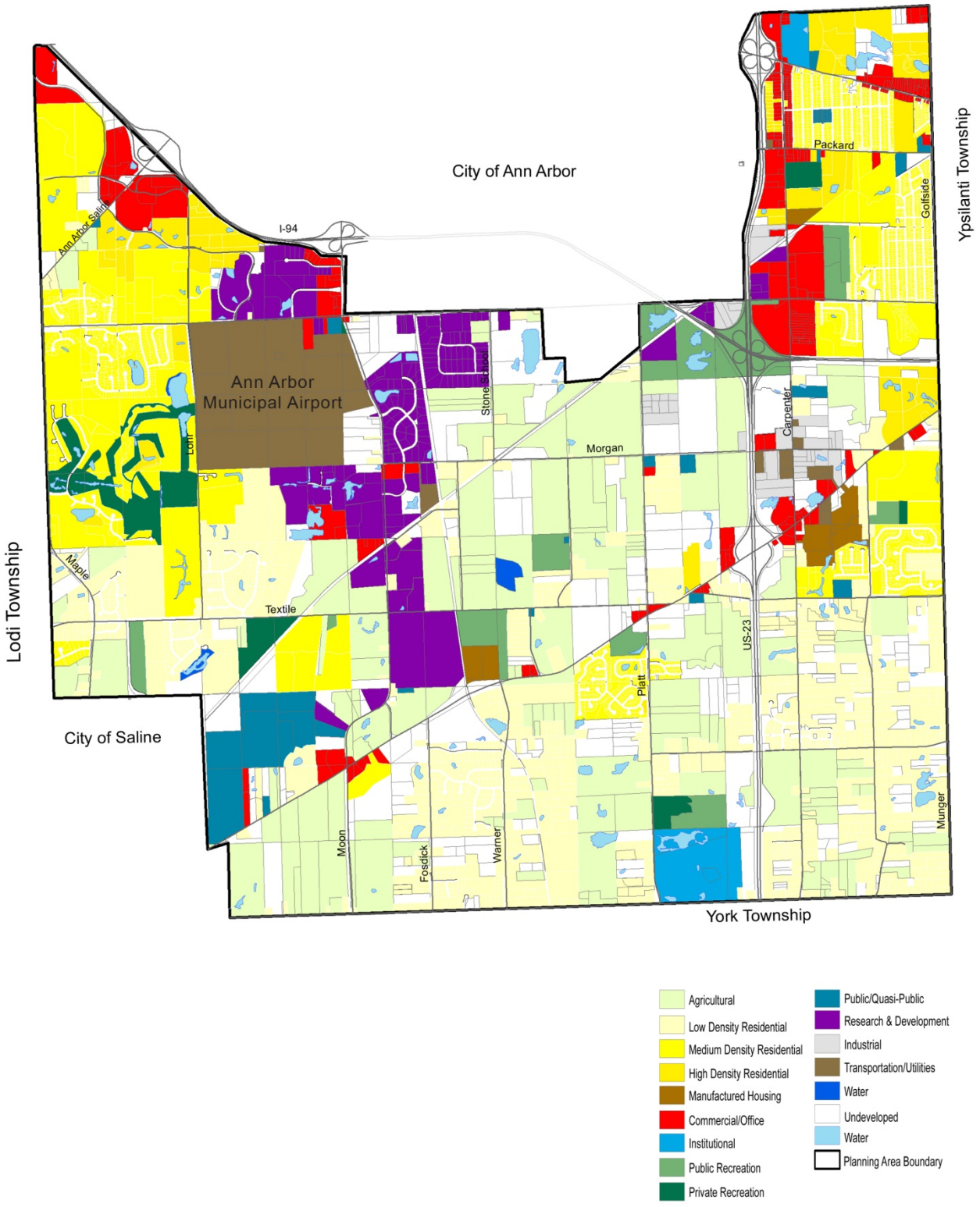

Figure 4.4: Pittsfield Township Existing Land Use
Ann Arbor Municipal Airport Environmental Assessment

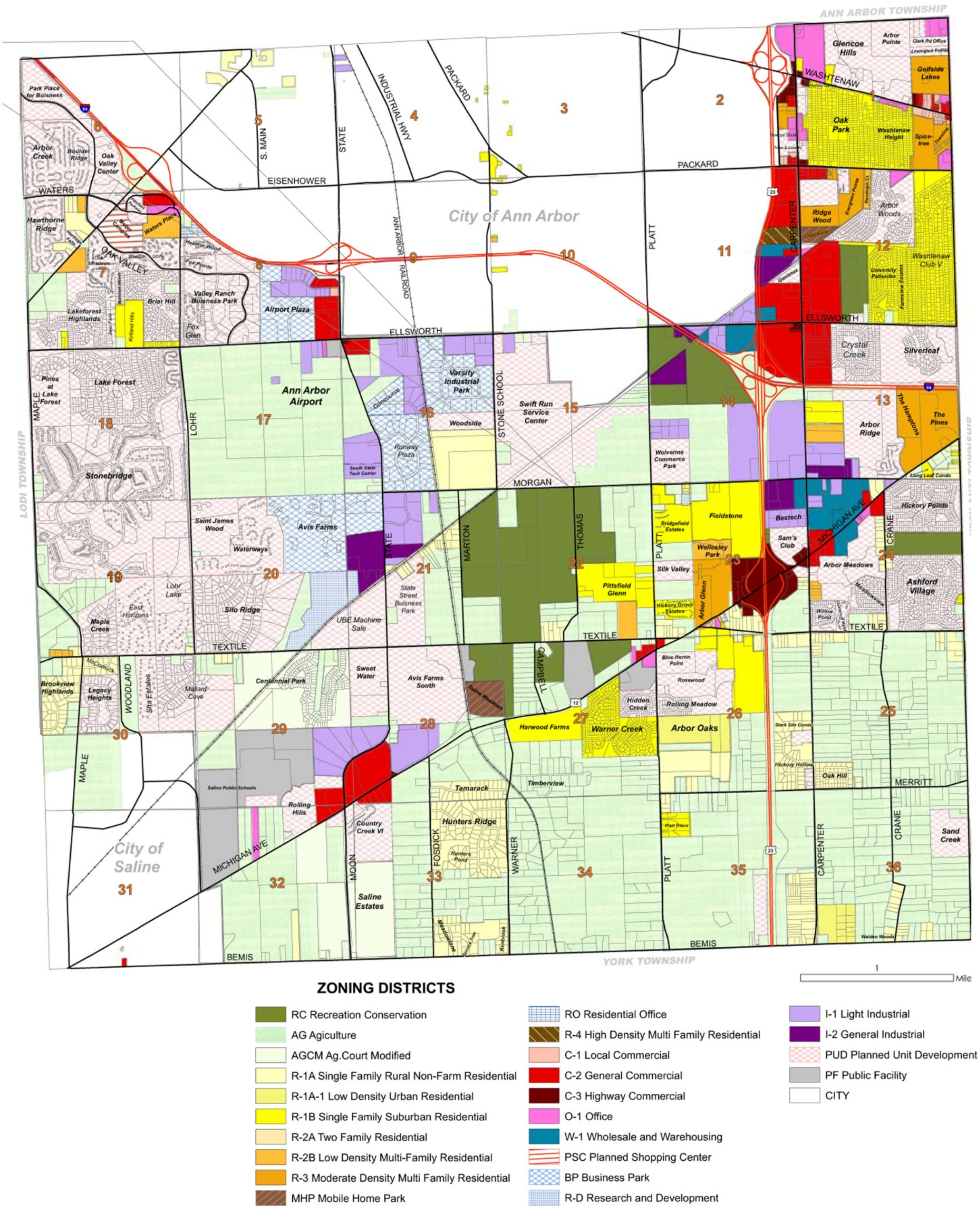

Figure 4.5: Pittsfield Township Zoning Map
Ann Arbor Municipal Airport Environmental Assessment

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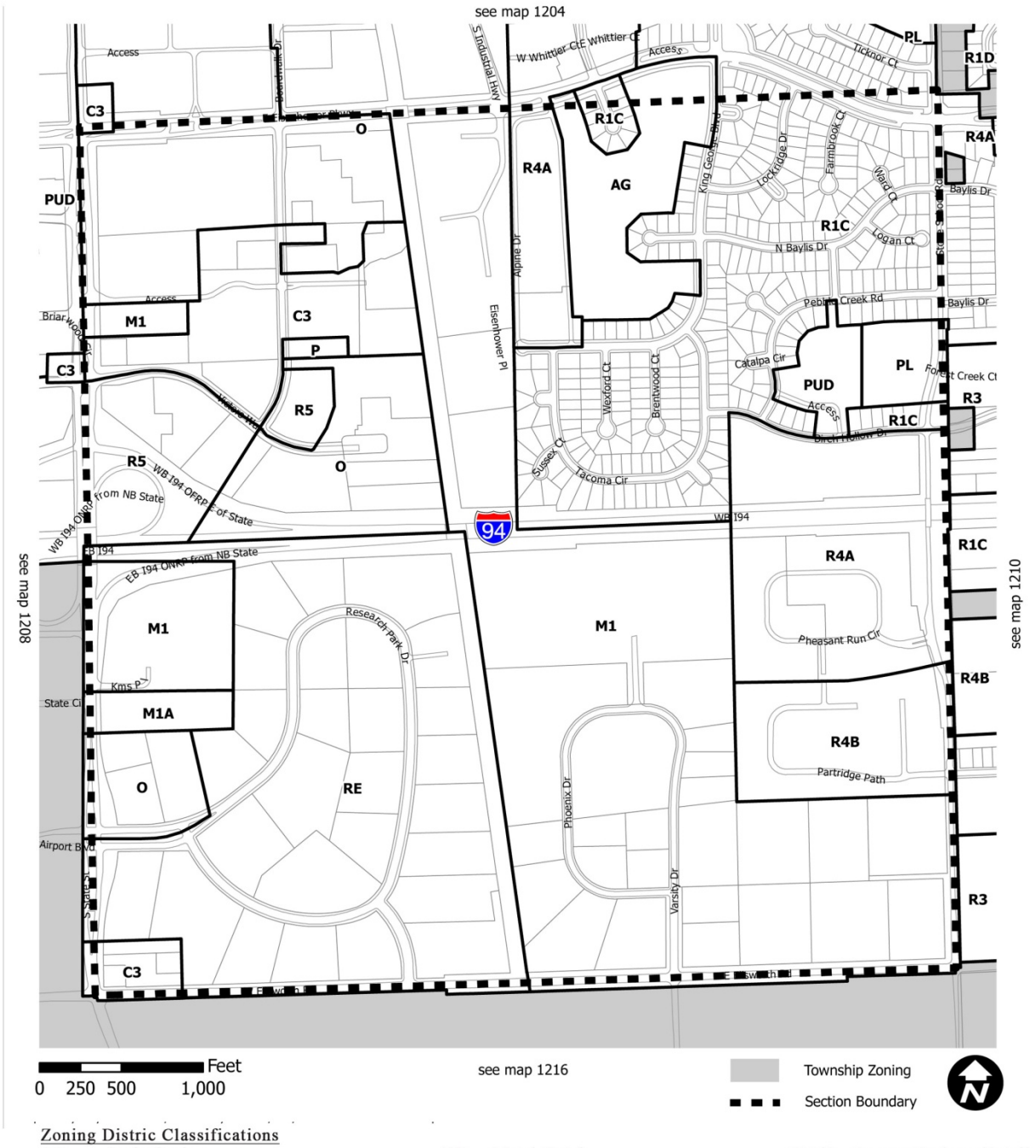

Zoning Distric Classifications

AG	Agricultral	R5	Motel-Hotel	C1A/R	Campus Business/Retail
R1A, R1B, R1C, R1D	1-Family Dwelling	R6	Mobile Home Park	C2A	Central Business
R2A	2-Family Dwelling	P	Parking	C2A/R	Commercial/Residential
R2B	2-Family Dwelling	PUD	Planned Urban Development	C2B	Business Service
R3	Townhouse Dwelling	O	Office	C3	Finge Commercial
R4A	Multiple-Family Dwelling	PL	Public Land	M1	Limited Industrial
R4B	Multiple-Family Dwelling	RE	Research	M1A	Light Industrial
R4C	Multiple-Family Dwelling	C1	Local Business	M2	Heavy Industrial
R4C/D	Multiple-Family Dwelling	C1A	Campus Business	ORL	Office/Research/Limited Industrial
R4D	Multiple-Family Dwelling	C1B	Community Convenience Center		

Figure 4.6: Ann Arbor Zoning Map
Ann Arbor Municipal Airport Environmental Assessment

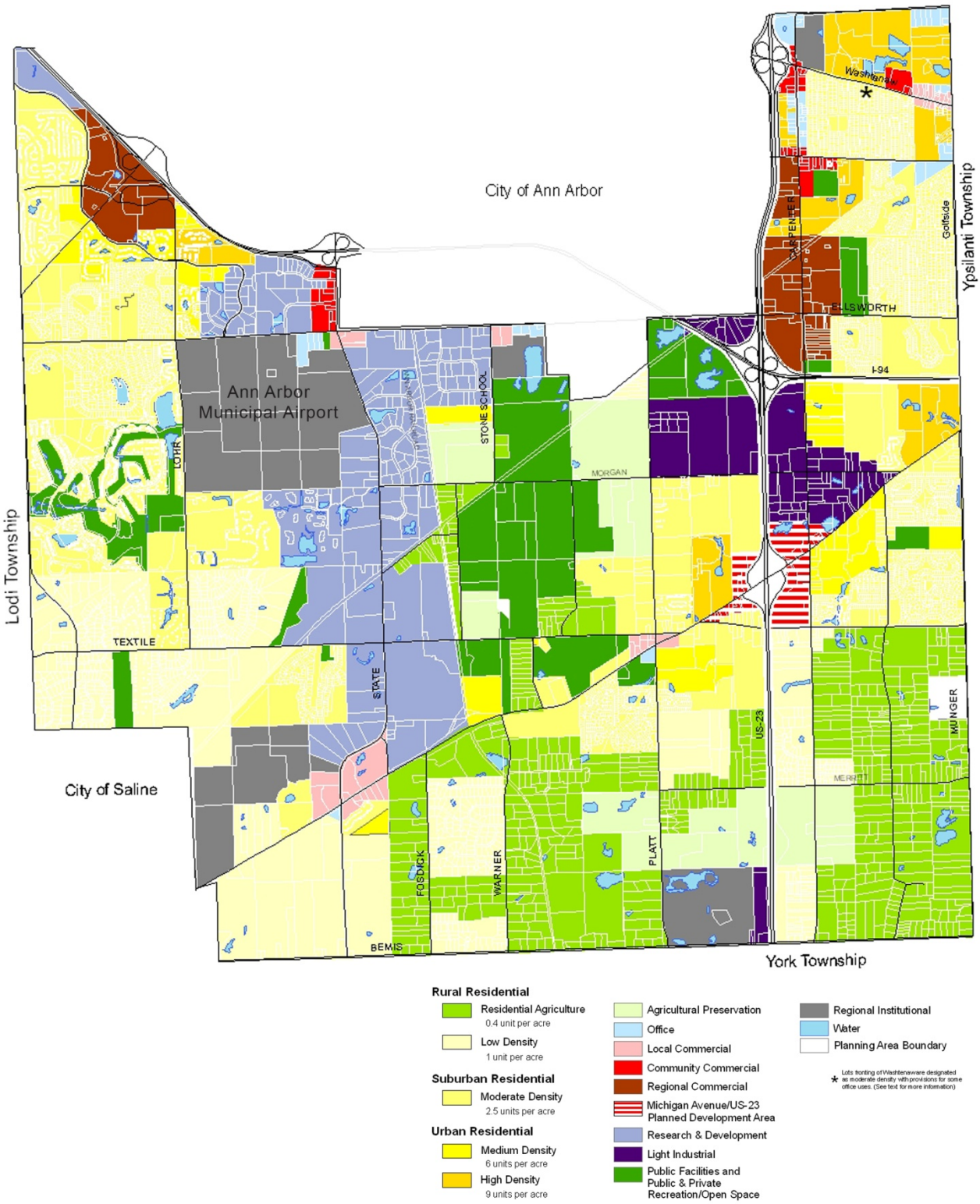

Figure 4.7: Pittsfield Township Future Land Use
Ann Arbor Municipal Airport Environmental Assessment

Consequences of the Preferred Alternative
Aircraft noise is one of the major concerns of both airport operators and airport neighbors when evaluating impacts of a proposed airport development project. Estimates of noise effects resulting from aircraft operations can be interpreted in terms of the probable effect on human activities characteristic of specific land uses. Guidelines for evaluation of land use compatibility in aircraft noise exposure areas were developed by the FAA and are presented in Table B-1 in Appendix B. The guidelines reflect the average response of large groups of people to noise and might not reflect an individual's perception of an actual noise environment. Compatible or incompatible land use is determined by comparing the predicted or measured daily noise level at a specific site with the compatibility guidelines. According to FAA, all land uses are normally compatible with aircraft noise levels below 65 DNL. For noise exposure levels greater than 65 DNL, compatibility is dependent on land use. For example, commercial and manufacturing land uses are more tolerant of higher noise levels than a hospital or church. In general, most land uses are considered incompatible when noise levels exceed 75 DNL.

If the Preferred Alternative is implemented, the 65, 70, and 75 DNL contours would all still remain within airport property. As a result, the land use within the vicinity of ARB would remain compatible with the airport under the Preferred Alternative, which involves the extension of Runway 6/24.

The FAA and MDOT have reviewed the Runway Safety Area (RSA), Object Free Area (OFA), and Runway Protection Zone (RPZ) requirements for the approach areas of Runway 6/24. Even with the implementation of the Preferred Alternative, and the shift and extension of the runway to the southwest, the RSA, OFA, and RPZ in the southwest approach area will continue to remain totally clear of obstruction and entirely on airport property. Since the runway approach areas will continue to meet all FAA and MDOT safety standards, there is no indication that the development of the Preferred Alternative will result in increased hazards to people or structures on the ground. Existing and proposed land use adjacent to and in the immediate vicinity of ARB is compatible with normal airport operations.

4.3 INDUCED SOCIOECONOMIC IMPACTS

4.3.1 Community Displacement

No land would be acquired as either fee or easement acquisition and no displacements would occur as a result of the Preferred Alternative.

Consequences of the Preferred Alternative
There would be no community displacement impacts, no residential or business displacements, and no land acquisition resulting from the Preferred Alternatives.

4.3.2 Environmental Justice

Existing Conditions

The federal government's policy on nondiscrimination in all federally funded activities formally began with Title VI of the 1964 Civil Rights Act. Title VI requires all federal agencies to ensure that "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."

Further guidance was provided in 1994 with *Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. The intent of the Executive Order is to identify and avoid disproportionately high and adverse human health or environmental effects on minority and low-income populations.

The presence of minority or low-income populations in the project area was determined by an evaluation of U.S. Census data, and Michigan State Housing Development Authority (MSHDA) data. ARB is owned and operated by Ann Arbor, yet is located in Pittsfield Township. Census data for the city and township was compared to Washtenaw County to make a determination regarding the presence of an environmental justice population.

Minority Populations

Race data from the 2000 U.S. Census (U.S. Census Bureau, 2009) was used to determine the presence of minority populations within the immediate area surrounding ARB. According to the Council on Environmental Quality (CEQ), minorities are defined as individuals who are members of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black, not of Hispanic origin, or Hispanic (1997).

An analysis of the U.S. Census data indicates that minority populations are present near ARB, totaling 28 percent of the total population within the Pittsfield Township and 24 percent in the City of Ann Arbor. The percentage of minorities present in Washtenaw County totals 22 percent.

Low-Income Populations

U.S. Census economic data from the 2000 U.S. Census was used to determine the presence of low-income populations in the project area. The economic data identifies the income required to be below the poverty level and the number of people that are below that level. The U.S. Census Bureau measures poverty according to poverty thresholds, which is most simply defined as a measure of income inadequacy. This method of defining poverty thresholds was developed based on the income level that would cause a family to cut back on food expenditures sharply, assuming food expenses and non-food expenses would be cut at the same rate (Fisher, 1997).

According to the 2000 economic data, there is a percentage of the population below the poverty level near ARB, accounting for 9 percent of the total population in Pittsfield

Township and 17 percent in the City of Ann Arbor. These percentages are similar to 11 percent in Washtenaw County. Reviewing economic data at the block level indicates that in the immediate area surrounding ARB, there is a lower percentage of low-income populations, ranging from a high of 8 percent to a low of 0.7 percent.

Consequences of the Preferred Alternative
In conclusion, this project would not have a disproportionately high or adverse effect on either minority or low-income populations. All improvements at ARB would occur within the airport property. There would be no noise impacts or residential displacements. No property acquisition would occur as a result of the Preferred Alternative.

While there are not any environmental justice issues associated with the proposed improvements identified at this time, a continuing effort would be made to identify disproportionately high and adverse impacts to minority and low-income populations as this project advances. If such impacts are identified, every effort would be made to involve impacted groups in the project development process and to avoid or mitigate these impacts. A public hearing would be held to allow the public, local officials, and agencies to comment on the proposed improvements. The hearing would be advertised according to FAA guidelines. Section 5 provides a detailed discussion of all public involvement activities.

4.3.3 Community Cohesion and Community Facilities

Existing Conditions
As noted in Section 4.2, residential, commercial, industrial, recreational, undeveloped, and agricultural areas immediately surround ARB. The closest community facility is the Pittsfield Township Fire Station 3, which is located at 705 W. Ellsworth Road, just west of State Street. East of Fire Station 3 is the Pittsfield Community Center at 701 W. Ellsworth Road. This facility houses the Pittsfield Senior Center. Pittsfield Township Park, located south of the Senor Center, is a 7-acre park with an accessible pathway, a softball field, three t-ball fields, a playground, and picnic tables and grills. The Ann Arbor United Soccer Club operates seven soccer fields on city-owned land located at 801 Airport Road between the ARB entrance and Ellsworth Road.

Consequences of the Preferred Alternative
There would be no displacements as a result of the Preferred Alternative. All of the surrounding roads would remain open during and after construction, and there are no anticipated impacts to circulation. Noise levels would not be significantly increased and flight paths would not change. Therefore, the Preferred Alternative would not result in impacts to community cohesion or facilities.

4.3.4 Demographics

Existing Conditions
Population data for 1990 and 2000 were obtained from the U.S. Census Bureau. Historical data and the population projections for 2015 and 2025 were obtained from the

Southeast Michigan Council of Governments (SEMCOG) (SEMCOG, 2009). This information indicates that since 1970, overall, the population has grown in the Ann Arbor area (Table 4-1). Pittsfield Township has experienced the highest growth trend from 1970 through 2000 (Table 4-1). As shown, these growth trends are projected to continue through 2025 (SEMCOG, 2009).

Table 4-1
Ann Arbor Area Population (1970 – 2000) and Projections

Community	1970	1980	1990	2000	2015	2025
City of Ann Arbor	100,035	107,969	109,592	114,024	114,081	114,810
Pittsfield Township	8,073	12,986	17,668	30,167	34,969	35,750
Washtenaw County	234,103	264,740	282,937	322,895	353,327	361,715

Source: U.S. Census Bureau and SEMCOG

According to the U.S. Census, the total number of housing units has been increasing in the Ann Arbor area. In 1990, the City of Ann Arbor had 44,010 total housing units, which increased to 47,218 in 2000. Pittsfield Township had 7,794 total housing units in 1990, with an increase to 12,337 units in 2000 (Table 4-2).

Table 4-2
Summary of Demographic Data

	1990 Census		2000 Census	
	City of Ann Arbor	Pittsfield Township	City of Ann Arbor	Pittsfield Township
U.S. Census Population	109,592	17,668	114,042	30,167
Total Housing	44,010	7,794	47,218	12,337
Total Vacant Housing Units	2,353	774	1,525	520
Percent Vacant Housing Units	5%	10%	3%	4%
Total Owner Occupied Housing Units	17,996	2,791	20,685	6,620
Percent Owner Occupied Housing Units	41%	36%	44%	54%
Total Renter Occupied Housing Units	23,661	4,229	25,008	5,197
Percent Renter Occupied Housing Units	54%	54%	53%	42%
Average Household Income	$33,344	$34,639	$46,299	$61,292
Average Family Income	$50,192	$45,597	$71,293	$82,600
Per Capita Income	$17,786	$16,936	$26,419	$29,645

Source: U.S. Census Bureau

U.S. Census data indicate renter occupied housing dominates the housing stock in the City of Ann Arbor at 53 percent and owner occupied housing accounts for 44 percent. In Pittsfield Township, owner occupied housing dominates at 54 percent and renter occupied housing accounts for 42 percent.

According to U.S. Census data, average household, family, and per capita incomes within the Ann Arbor area exhibited substantial increases between 1990 and 2000 (Table 4-2). In 1990, the average household income was $33,344 in the City of Ann Arbor and $34,639 in Pittsfield Township. This increased to $46,299 in the City of Ann Arbor and $61,292 in Pittsfield Township in 2000, a change of 39 percent and 77 percent, respectively.

The per capita income showed similar trends with increases of 49 percent in the City of Ann Arbor, increasing from $17,786 in 1990 to $26,419 in 2000. Pittsfield Township increased 75 percent, from $16,936 in 1990 to $29,645 in 2000 (Table 4-2).

The racial composition of the area surrounding the airport is described in Section 4.3.2, Environmental Justice.

Consequences of the Preferred Alternative
Impacts to demographics associated with the Preferred Alternative are not expected. There would be no displacements as a result of the Preferred Alternative; therefore, little impact to the local area population, number of households, or racial make-up is anticipated. In addition, no impact to average incomes within the local area would be anticipated as a result of the Preferred Alternative.

4.3.5 Economics

Existing Conditions
Businesses within the area surrounding ARB are primarily industrial and commercial. Research and business parks that are located around the airport include:

- Valley Ranch
- Airport Plaza
- Ann Arbor Commerce Park
- Runway Plaza
- Columbia Center
- Avis Farms
- State Street Executive Park

These types of businesses often locate near airports and are dependent, or may be dependent, on the airport for transportation services.

At the airport, there are fixed-wing FBOs, a helicopter FBO, three national rental car agencies, two flying clubs, four flight schools and pilot training centers, city airport staff, FAA air traffic control tower, air taxi, aircraft sales, aviation insurance, and aviation fueling businesses.

Consequences of the Preferred Alternative
No businesses would be displaced as a result of the Preferred Alternative. Access would not be affected during airport construction. As a result, no negative economic impacts are anticipated to the surrounding businesses and the airport businesses. A positive result of the improvements is the ability for business owners to achieve improved fleet efficiency for critical aircraft my maximizing their passenger and/or cargo loads.

4.4 AIR QUALITY

Existing Conditions
Air pollutants are contaminants in the atmosphere. Many man-made pollutants are a direct result of the incomplete combustion of fuels including coal, oil, natural gas, and gasoline. The establishment of the National Ambient Air Quality Standards (NAAQS) by the Environmental Protection Agency (EPA) was directed in the Clean Air Act (CAA), and attainment and maintenance of the NAAQS was reinforced in later amendments. The goal of air quality monitoring and actions is to ensure that the air quality levels of the various pollutants do not exceed the set standards.

Under the 1990 CAA Amendments, the U.S. Department of Transportation cannot fund, authorize, or approve federal actions to support programs or projects that are not first found to conform to CAA requirements. The air quality provisions of the CAA, as amended, are intended to ensure the integration of air quality planning in all transportation-related projects.

The Air Quality Division of the Michigan Department of Environmental Quality (MDEQ) produces an Annual Air Quality Report, which outlines the attainment status of the state. According to the 2006 Air Quality Report the project study area is in attainment with the NAAQS for ambient concentrations of carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and coarse particulate matter (PM_{10}) (MDEQ, 2008).

Of growing concern is the impact of proposed projects on climate change. Greenhouse gases are those that trap heat in the earth's atmosphere. Both naturally occurring and anthropogenic (man-made) greenhouse gases include water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone (O_3). Research has shown that there is a direct link between fuel combustion and greenhouse gas emissions. A detailed air quality report can be found in Appendix C.

Consequences of the Preferred Alternative
MDOT Bureau of Aeronautics conducted an Air Quality Study (Landrum and Brown, 1996) of general aviation airports. Seven airports were selected as case study airports. The results of the case study were used to draw conclusions for all general aviation airports. Key findings of the study revealed that typical general aviation airports generate a low level of air pollutants. Comparisons of existing conditions at various airports with future build out conditions indicate that the net change in air emissions is still below standards. The report states that proposed projects at general aviation airports are not expected to cause or contribute to any new violations of the NAAQS.

There would be no revisions to the existing roadway system as a result of the Preferred Alternative. Consequently, the air model results for the Preferred Alternative would be identical to those for the No Build Condition. Since the No Build Condition analysis shows that no sites would exceed the one-hour or eight-hour NAAQS standard, the Preferred Alternative would also have no sites exceeding the NAAQS standard.

During construction, appropriate mitigation measures, such as covering and spraying stock piles with water, should be utilized to minimize potential short term negative impacts which may be experienced locally due to fugitive dust, construction vehicle exhaust, or other fumes related to construction materials and equipment.

Based on FAA data, operations activity at the ARB represents less than one (0.1) percent of U.S. aviation activity. Therefore, assuming that greenhouse gases occur in proportion to the level of activity, greenhouse gas emissions associated with existing and future aviation activity at ARB would be expected to represent less than 1 percent of U.S.-based greenhouse gases. Therefore, we would not expect the emissions of greenhouse gases from this project to be significant.

4.5 WATER RESOURCES

4.5.1 Surface Hydrology

Existing Conditions
An unnamed steam located on the ARB property (Figure 4-8) flows south through an open ditch. It is enclosed in a concrete culvert south and west of the existing runway. It then flows east through an open ditch ultimately to the Wood Outlet Drain to the south. The upstream drainage area of approximately 0.5 square miles north and west of the airport flows through multiple subdivisions and business parks prior to entering the airport property. The stream appears to be perennial in nature with low flow water levels 8 to 10 inches deep. The streambed is 2- to 3-feet wide and is composed mostly of silty clay. While the channel is deeply incised in some locations, flows are expected to be variable as indicated by eroded banks 2- to 3-feet high throughout the corridor. Water quality is likely degraded as surface water contributions from runoff over turf and numerous storm outlets draining adjacent parking lots and streets are common.

Consequences of the Preferred Alternative
The stream would not be altered as a result of the improvements at ARB. The enclosure would not be extended.

The amount of impervious surface on site would increase slightly due to the extension of the runway and the taxiway from the existing 7 percent of the 837 acres site to 7.4 percent. An approved Storm Water Pollution Prevention Program is in place for ARB. Implementation of appropriate best management practices (BMPs) would continue to control the rate of stormwater runoff and maintain water quality standards.

Figure 4.8: Existing Water Resources and Land Cover
Ann Arbor Municipal Airport Environmental Assessment

NOT TO SCALE

North

JJR

4.5.2 Geology, Groundwater, and Soils

Existing Conditions
Millstein (1987) identified nine bedrock formations in Washtenaw County. Coldwater Shale is the primary bedrock in central Washtenaw County, composed primarily of shale, with some limestone, dolomite, sandstone, and siltstone.

There are 14 soil mapping units in the project area (USDA, 1997). The soils south of the runway are predominately hydric soils, either Palms muck, Adrian muck, or Edwards muck. Matherton sandy loam, Fox sandy loam, and Wasepi sandy loam are the soils located in the area of the runway and to the north of the runway. The muck soils have a high water table with water often at the surface. The Fox soils have a water table at a depth of greater than 6-feet, and the Matherton and Wasepi soils have a water table at 1- to 2-feet below the surface (USDA, 1997).

ARB is located in a wellhead protection area known as the Three Fires Aquifer Wellhead Protection Area. The Three Fires Aquifer supplies the City of Ann Arbor with a portion of their public drinking water supply. Three of the City's municipal wells are located at ARB. The purpose of the protection area is to prevent contamination of the aquifer.

The City of Ann Arbor has plans to construct a new water supply line from the wells. No new wells are planned at this time.

Consequences of the Preferred Alternative
Surface and subsurface geological conditions do not represent a constraint to implementation of the Preferred Alternative and, consequently, would not be impacted. Based on coordination with the City of Ann Arbor, the proposed runway extension would not impact the water supply wells or the new water supply line (Bahl, 2009).

4.6 SECTION 4(f) RESOURCES

Existing Conditions
Section 4(f) of the Department of Transportation Act (1966) specifies that publicly-owned land, such as a park, recreational area, or wildlife and waterfowl refuge, of national, state, or local significance, or any land from a historic site of national, state, or local significance, may not be used for transportation projects unless there is no other prudent and feasible alternative. If there are no other prudent and feasible alternatives, the proposed project must include all possible efforts to minimize impacts to Section 4(f) properties.

A Pittsfield Township park is located along the northern airport property line. There are no historic resources within ARB and its surrounding areas that are considered Section 4(f) resources. The review process that has been used for evaluating the Section 4(f) properties has included coordination with the Michigan State Historic Preservation Office (SHPO) (Appendix D), and an archaeological resource survey (CCRG, 2009) that

identified historic resources either currently listed on, or potentially eligible for listing on, the National Register of Historic Places (NRHP).

Consequences of the Preferred Alternative
The Preferred Alternative would not result in impacts to a publicly owned park, recreation area, or refuge, and ARB has coordinated with the SHPO to determine that there are no historic, archeological or architectural resources within the airport and its surrounding areas (Appendix D). The Pittsfield Township park would not be impacted and would not be acquired. No impacts to Section 4(f) resources are anticipated from the Preferred Alternative.

4.7 HISTORIC, ARCHEOLOGICAL, AND ARCHITECTURAL RESOURCES

Existing Conditions
An evaluation was conducted to determine the need for archaeological and/or above-ground surveys at ARB (CCRG, 2009). The evaluation included a field review of the area of the proposed improvements, a review of state archaeological files and above-ground resource files, and shovel tests at the site.

Consequences of the Preferred Alternative
ARB has coordinated with the SHPO to determine the presence of any historic, archeological, or architectural resources within the airport and its surrounding areas (Appendix D). Based on the file review and state files, no impact to historic, archeological or architectural resources is anticipated.

4.8 BIOTIC COMMUNITIES

Existing Conditions
Botanical communities within ARB and its immediately surrounding areas include active agricultural fields, unmown grassy meadows, a perennial stream, wet meadow, and a forested wetland. The developed portions of the airport property consist of structures, paved surfaces, a runway, access roads and parking lots, and maintained grassy areas.

Three predominant communities were observed on the property: upland, wet meadow, and forest (Figure 4-8). Plant species lists for these areas are shown in Appendix E. Most of the airport property and surrounding land has been altered by human activities. The least altered biotic communities are the grassy meadows surrounding the runway and the forested wetland to the south. The grassy meadow areas are only mowed periodically because of an agreement with the local Audubon Society.

The area at the end of the runway, where proposed expansion would occur, is kept mowed and the dominant plants in this area consisted of old field weeds and grassy species, with disturbed areas of bare dirt. Plants include rough-fruited cinquefoil (*Potentilla recta*), Canada thistle (*Circium arvense*), and an unidentified grass.

The sides of the stream contained upland weedy herbaceous species such as sweet clover (*Melilotus officinalis*), smooth brome (*Bromus inermis*), giant ragweed (*Ambrosia trifida*), Virginia creeper (*Parthenocissus quinquefolia*), lamb's quarters (*Chenopodium album*), riverbank grape (*Vitis riparia*), dame's rocket (*Hesperis matronalis*), teasel (*Dipsacus fullonum*), cow parsnip (*Heracleum maximum*), yellow goatsbeard (*Tragopogon pratensis*), yarrow (*Achillea millifolium*), a few reed canary grass, wheat or rye (*Triticum* or *Secale* spp), and mixed upland and wetland trees such as American elm (*Ulmus americana*), box elder (*Acer negundo*), staghorn sumac (*Rhus typhina*), Russian olive (*Eleagnus angustifolia*),buckthorn (*Rhamnus catharticus*) cottonwood (*Populus deltoides*), bur oak (*Quercus macrocarpa*), and American linden (*Tilia americana*).

Several examples of wildlife were observed, including robins (*Turdus migratorius*), goldfinch (*Carduelis tistis*), purple martins (*Progyne subis*), killdeer (*Charadrius viciferus*), and a mating pair of redtail hawks (*Buteo jamaicensis*). Other observations include evidence of rodent tunneling (field mice or voles) and pheasants (*Phasianus colchicus*) that were heard calling. Airport staff stated that coyote (*Canis latrans*) and white tail deer (*Odocoileus virginianus*) have been observed on the airport property as well as wild turkeys (*Meleagris gallopavo*). A comprehensive list of all the bird species observed by the Audubon Society at ARB is included in Appendix F.

Consequences of the Preferred Alternative
Implementation of the Preferred Alternative would require grading and construction of the extended runway. The areas to be impacted by grading are currently maintained and mowed for ARB or leased as agricultural land. A portion of the grading for the new taxiway near State Road would be in an area currently under restricted mowing per the agreement with the Audubon Society. The remaining areas would continue to be maintained with limited mowing as agreed by ARB and the Audubon Society. No trees would be cut or directly impacted by construction due to height obstructions.

The overall populations of wildlife species utilizing the area are not anticipated to be impacted as the maintenance of open grassy areas would continue. Wildlife may be temporarily impacted due to the presence of construction equipment in the vicinity.

4.9 THREATENED AND ENDANGERED SPECIES

Existing Conditions
Coordination with the US Fish and Wildlife Service (USFWS) (Appendix D) indicated that this agency has no records of federal-listed endangered, threatened, or otherwise significant species, natural plant communities, or natural features in the vicinity of ARB. The Michigan Department of Natural Resources (MDNR) indicated that Henslow's sparrow, state endangered, (*Ammodramus henslowii*) and Grasshopper sparrow, state special concern, (*Ammodramus savannarum*) are known to occur on or in the vicinity of the area. The presence of these species has been confirmed by the Audubon Society during their annual counts at ARB over the last three years.

All habitats within the project area have been impacted to varying degrees by human activities. No plant species listed as threatened or endangered by the MDNR or USFWS were found during the botanical survey conducted in June 2009.

Consequences of the Preferred Alternative
No known legally protected plants were observed within the project area. Grading for the new taxiway near State Road would be in an area currently under restricted mowing per the agreement with the Audubon Society. ARB revises the boundaries of this mowing agreement annually, with the Audubon Society, based on their most current bird count data. There would be no grading within agreed upon restricted mowing areas during the breeding season for either species which extends through late August for Henslow's sparrow and mid-July for Grasshopper sparrow.

4.10 WETLAND RESOURCES

Existing Conditions
Field surveys conducted in June 2009 revealed the presence of wetland vegetation at the east end of the runway. The MDEQ conducted a field visit in July 2009 to confirm whether the area would be classified as a wetland (Appendix D). A 5-acre area was reviewed for dominate vegetation, hydrology, and soils. A wetland was identified; however, the wetland does not constitute a wetland that is regulated by the state. The wetland is further than 500-feet from an inland lake, river, or stream, is less than 5 acres in size, and there is no surface connection with other wetlands in the area (MDEQ, 2009).

This area was a mix of mostly wetland species and scattered upland species, including reed canary grass (*Phalaris arundinacea*), sedge (*Carex granularis*), swamp milkweed (*Asclepias incarnata*), dandelion (*Taraxicum officinale*), sowthistle species (*Sonchus* sp.), buckthorn (*Rhamnus cathartica*), curly dock (*Rumex crispus*), and either goldenrod or aster species (*Solidago* or *Aster* sp.).

Consequences of the Preferred Alternative
The wetland at the east end of the runway would not be impacted by the proposed improvements, but it would be adjacent to the taxiway. This area would be protected with silt fence during construction and the 25-foot wetland buffer would be restored following construction.

4.11 FLOODPLAINS

Existing Conditions
An unnamed perennial stream is located within ARB, flowing to the south and ultimately connecting to the Wood Outlet Drain south of the airport. In accordance with FAA Order 5050.4B *Airport Environmental Handbook,* a review of the floodplains in the area and the impacts that may occur as a result of the development was undertaken.

Consequences of the Preferred Alternative
Review of the Federal Emergency Management Agencies (FEMA) flood boundary maps identified a floodplain boundary for the stream. The proposed grading for the expansion would not occur within the designated floodplain boundary and no fill would be placed in the floodplain. Therefore, there would be no impacts to the floodplain located within ARB.

4.12 COASTAL ZONE MANAGEMENT PROGRAM

The area surrounding ARB is not located within a coastal zone management area and, thus, the Preferred Alternative would have no impact on the Coastal Zone Management Program.

4.13 COASTAL BARRIERS

The area surrounding ARB is not located within a coastal zone management area, and the Preferred Alternative would have no impact on coastal barriers.

4.14 WILD AND SCENIC RIVERS

There are no waterbodies within the immediate vicinity of ARB that are designated as state or federal Wild and Scenic Rivers; therefore, the Preferred Alternative would have no impact on Wild and Scenic Rivers.

4.15 FARMLAND

ARB currently leases 168 acres of its property to a local farmer. If the Preferred Alternative is implemented, 18 acres of land would no longer be farmed. U.S. Department of Agriculture (USDA) requires a form, AD 1006, to be filed when agricultural land would be impacted. This agency estimates the total acres of prime and unique farmland, the total acres of statewide and local important farmland, and the percentage of farmland in the county to be converted. The relative overall value of farmland to be converted is also provided.

Prime farmlands are identified as land that has the best combination of physical and chemical characteristics for producing food, forage, fiber, and oilseed crops (USDA, 1983). Unique farmland is land, other than prime farmland, that has special characteristics, such as unique soil types and topographic features, which make it suitable for the production of specific high value crops. Land classified as prime or unique farmland is not necessarily actively farmed, it also may include other vegetated lands such as fallow fields and woodlands. Farmland of local importance includes those lands with nearly prime farmland characteristics that could economically produce high yields when treated and managed according to modern farming methods (USDA, 1983).

Consequences of the Preferred Alternative
ARB would not be acquiring any farmland for the proposed project. Based on coordination with the Washtenaw County Natural Resources Conservation Service (NRCS) (Appendix D), some prime farmland and farmland of local importance would be impacted by this project. The limits of grading have been minimized to the extent possible. The land outside of these limits would continue to be leased as farmland.

4.16 ENERGY SUPPLY AND NATURAL RESOURCES

Development of the Preferred Alternative would have the potential to increase the amount of air traffic utilizing ARB, which can potentially result in an increase in the amount of airplane fuel distributed by the airport and used by aircraft at the facility. A small amount of additional fuel would be used during construction of the runway and taxiway. However, these minimal increases in gas/fuel consumption are not considered significant.

ARB is installing approximately 250 LED taxiway lights which would decrease facility energy usage.

4.17 LIGHT EMISSIONS

The Preferred Alternative includes the addition of edge lights and the relocation of runway end identifier lights (REILS) to the end of the newly extended runway. Light emission impacts to adjacent homes would be minimized because lights within the light lane would be directed upwards. The REILS would be closer to Lohr Road and the adjacent homes; however, the existing lights would be replaced with a smaller LED unit.

Light emissions created by the Preferred Alternative are not considered significant. However, if impacts are noted, appropriate mitigation for the impacts would occur. Examples of mitigation include shielding the lights from below so that the light is reflected up to the sky or reducing light intensities, if the FAA makes a determination that a reduction would not affect the safety of the aircraft.

4.18 SOLID WASTE IMPACTS

Minimal waste would be generated during construction of the Preferred Alternative. No building demolition would occur. The existing runway and taxiway would remain and new material would be used for the extended portions of the runway and taxiway. The portions of the runway that would no longer be used would still exist, but marked accordingly. The nearest operational landfill is the Arbor Hills Landfill in Salem Township on 6 Mile Road in Northville, which is a Type II landfill that accepts household, commercial, and non-hazardous industrial waste. The Preferred Alternative would have minimal anticipated impact on nearby landfill facilities. In addition, these facilities have no impact on the Preferred Alternative given the distance separating them from ARB.

4.19 EXISTING AND FUTURE TRAFFIC CONDITIONS

The Preferred Alternative would not require either temporary or permanent closure of local roads surrounding ARB. During construction, it is expected that minor increases in traffic would occur from the construction crews traveling to and from ARB. Overall, the Preferred Alternative would have no significant impact on existing or future traffic volumes in the surrounding area.

4.20 CONSTRUCTION IMPACTS

The Preferred Alternative may result in temporary, localized air, water, and noise quality impacts during construction. Construction documents would identify specific environmental control methods to minimize air and water quality impacts. Air quality impacts, such as fugitive dust and exhaust from construction equipment, may be minimized by seeding disturbed areas, covering haul trucks, and wetting down construction areas. Sediment and erosion control measures would be used to minimize any water quality impacts during construction. Construction would comply with FAA specifications (FAA Advisory Circulars 150/5370-2C – Operational Safety on Airports During Construction, and 150/5370-10A Changes 1-12 – Standards for Specifying Construction of Airports), and State of Michigan regulations would be followed as required to prevent air pollution.

4.21 CONTAMINATED SITES REVIEW

Existing Conditions
A review of federal and state records was completed to identify known properties listed by state and/or federal agencies as either contaminated or sites of environmental concern (EDR, 2009). The intent of this review was to assist in the evaluation of study alternatives; the review was not a Phase I Environmental Site Assessment in accordance with American Society of Testing and Materials (ASTM) (Standard E1527-94). Several mapped sites were found on ARB or within the immediate area (within a one mile radius of the airport). These mostly include underground and above-ground storage tanks and small quantity generators.

There are no underground storage tanks on the airport property. ARB has two small (approximately 250 gallon) tanks that are used for maintenance operations. The City of Ann Arbor does not store or sell aviation fuel products.

The University of Michigan Flyers have an aboveground tank (approximately 3,000 gallons) with avgas (100LL fuel). Avfuel has three large aboveground tanks at ARB (approximately 20,000 gallons each) with avgas (100LL fuel) and Jet A fuel. Avfuel stores the aviation fuel and the FBO's sell it.

All fuel near the airport property is stored in tanks in accordance with MDEQ licensure guidelines and all tanks currently meet regulations.

Consequences of the Preferred Alternative

The Preferred Alternative is not anticipated to have an impact on known properties listed by state and/or federal agencies as either contaminated or sites of environmental concern. There would be no impacts to the fuel storage tanks during construction. Further, if contaminated soil is encountered during construction, proper disposal methods and construction procedures that minimize disturbance of contaminated soils would be utilized.

Section 5.
Environmental Consequences - Other Considerations

5.1 MITIGATION MEASURES

General Area and Project Information
ARB is planning to shift and extend Runway 6/24 and the parallel taxiway by approximately 800-feet.

Noise
The FAA's INM Version 7.0a was used to develop noise exposure contours in order to assess the noise impacts associated with the proposed extension of Runway 6/24. No homes or noise sensitive land uses are located within the 65 DNL contour for the Preferred Alternative future conditions. The Preferred Alternative is not expected to have any significant aircraft noise impacts; therefore, no mitigation is proposed.

Social Impacts and Community Disruption
There would be no land acquisition and no displacements as part of this project. If acquisition was required, it would follow the Uniform Relocation Assistance Act of 1970, as amended, and FAA AC 150/5100-17.

Wetland Impacts
Impacts to affected wetlands would require mitigation under Section 404 of the Clean Water Act, Executive Order 11990, and Part 303 of the Natural Resources and Environmental Protection Act (P. A. 451). When unavoidable impacts occur to regulated wetlands, both state and federal regulations require compensatory mitigation. The intent of the mitigation is the replacement of the lost functions of the wetland areas to be displaced. There would be no wetland impacts as a result of this project; therefore, no mitigation is required.

Threatened and Endangered Species
No known threatened or endangered species were identified within the project site; therefore, no mitigation is required.

5.2 DEGREE OF CONTROVERSY

During the course of this project, there has been input by local citizens regarding the need for the project and the potential impacts. Most of the input received focused on the need for the project and how it potentially would impact adjacent homes. A Citizen's Advisory Committee (CAC) was formed (see Section 6.2). These topics were presented and discussed during the CAC meetings. A public hearing would be held during the public comment period to allow the public an opportunity to comment on the proposed improvements and the EA. A more detailed discussion of public involvement activities can be found in Section 6.2.

Section 6.
Agency Coordination and Public Participation

Agency coordination was initiated early in this study. Input and feedback from agency representatives for this project was solicited via consultation and coordination with local, state, and federal regulatory and resource agencies, and the CAC. The public would be asked to provide feedback at a public hearing that would be held in early 2010.

6.1 AGENCY COORDINATION

Early agency coordination for the project began in 2009 with local, state, and federal agencies regarding issues such as threatened and endangered species, wetlands, farmland, and archeological and architectural resources. This has included consultation with the U.S. Fish and Wildlife Service (USFWS); U.S. Department of Agriculture (USDA); Natural Resources Conservation Service (NRCS); State Historic Preservation Office (SHPO); Michigan Department of Natural Resources (MDNR); U.S. Environmental Protection Agency (USEPA); and the Michigan Department of Environmental Quality (MDEQ) (Appendix D). Staff from MDOT – Airports Division and FAA – Detroit Airports District Office have also been consulted throughout the project.

In the project planning phase, coordination and correspondence has occurred with MDEQ. MDEQ conducted a site visit and a wetland delineation at ARB and provided a letter and wetland report documenting their findings (Appendix D).

Local tribes were also contacted. Response letters are provided in Appendix D.

6.2 PUBLIC PARTICIPATION

6.2.1 Citizen's Advisory Committee

The CAC was formed in spring 2009 and is comprised of 14 individuals representing a variety of affiliations including: local residents, local commercial and business establishments, pilots, and representatives from the City of Ann Arbor, and Pittsfield Townships. The CAC was formed to receive input from CAC members on project issues, to inform them of project activities and events, and to assist CAC members in communicating project activities to each member's constituents (affiliated organizations). Public participation was formally initiated with the first CAC meeting held in May 2009. This meeting focused on the proposed improvements to ARB, the purpose and need for these changes, and project history. At that meeting, questions and comments from CAC members included primarily on project justification and the history of the project.

The second CAC meeting was held in July 2009, and provided an update on the noise analysis, historic resources, plant communities, and wetlands. An overview of the User Survey Report was also provided. During this meeting, each CAC member was asked to provide an update on what they have been hearing from their constituency.

A third CAC meeting will be held in early 2010. This meeting will provide an update on the environmental studies along with a preview of the public hearing. Meeting summaries and a list of invitees and attendees for each CAC meeting were mailed to all meeting participants. A list of CAC members is provided in Appendix G.

6.2.2 Public Hearing

The Draft EA will be published and available for review for 30 days prior to the public hearing. The public comment period closes 10 days after the public hearing date. A legal notice will be published in the local Ann Arbor newspaper to announce the availability of the Draft EA and the date, time, and location of the public hearing.

Copies of the Draft EA will be forwarded to appropriate local, state, and federal regulatory and resource agencies and will be available for public review at ARB, Ann Arbor City Hall, Pittsfield Township Municipal office, and the Ann Arbor Public Library.

A public hearing on this study will be held in early 2010. The format of the public hearing will be an informal open house. The purpose of this hearing will be to provide the general public with information regarding the study purpose and need, alternatives considered, and selection of a Preferred Alternative. Exhibits and display stations will be set up to cover each aspect of the project, and the study team will be available to personally respond to questions regarding the proposed project. A public hearing handout will also be provided to attendees. Opportunities will be provided to submit both written and oral comments. All of the public and agency comments received will be reviewed and summarized in the Final EA.

Section 7.
Conclusion

Based on the information in this EA and coordination with local, state, and federal regulatory agencies and the public, it is anticipated that this project will have no significant impact on the natural or human environment. If review and comment by the public and interested agencies support this determination, this EA will be forwarded to the Michigan Department of Transportation's Bureau of Aeronautics and Freight Services and the Federal Aviation Administration with a request that a Finding of No Significant Impact (FONSI) be prepared and location/design approval be granted.

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Section 10.
Glossary

ACIP – Airport Capital Improvement Plan **–** The ACIP is a document that serves as the primary planning tool for identifying and prioritizing critical airport development and associated capital needs.

ADG – Airplane Design Group

ALP – Airport Layout Plan **–** The ALP is a set of drawings or an individual drawing that identifies future development at the airport. The ALP is part of the airport Master Plan.

ARB – Ann Arbor Municipal Airport

ARC – Airport Reference Code– The ARC is a coding system developed by the FAA to relate airport design criteria to the operational and physical characteristics of the airplane types that will operate at a particular airport.

ATCT – Air Traffic Control Tower

DNL – Day/Night Level (Noise)

EA – Environmental Assessment

EJ – Environmental Justice– An EJ is an Executive Order intended to identify and avoid disproportionately high and adverse human health or environmental effects on minority and low-income populations.

FAA – Federal Aviation Administration

Farmlands of State or Local Importance – The Natural Resources Conservation Service (NRCS) defines these farmlands as: "Those lands that are nearly prime and that economically produce high yields when treated and managed according to modern farming methods. Some may produce as high a yield as prime farmlands, if conditions are favorable." (USDA, 1983.)

FBO – Fixed Base Operator

FEMA – Flood Emergency Management Administration

FONSI – Finding of No Significant Impact

IFR – Instrument Flight Rules

ILS – Instrument Landing System

INM – Integrated Noise Model

MALSF - Medium Intensity Approach Lighting System with Sequenced Flashers

MASP – Michigan Airport System Plan

Master Plan – The airport Master Plan is a long-range planning (i.e., generally good for 20 years) document that inventories airport conditions, identifies facility requirements, and recommends future development. The Master Plan includes written text, as well as the ALP drawing(s) (see Airport Layout Plan above).

MDEQ – Michigan Department of Environmental Quality

MDNR – Michigan Department of Natural Resources

MDOT – Michigan Department of Transportation - Airports Division

Mitigation – Compensatory measures for impacts occurring as a result of an activity

MNFI – Michigan Natural Features Inventory

MSHDA – Michigan State Housing Development Authority

MTOW – Maximum Takeoff Weight

NAAQS – National Ambient Air Quality Standards

NEPA – National Environmental Policy Act

NPIAS – National Plan of Integrated Airport Systems

NRCS – Natural Resources Conservation Service (formerly the Soil Conservation Service)

ODALS - Omni-Directional Approach Lighting System

Prime Farmland – The NRCS has designated prime farmland as: "Land that has the best combination of physical and chemical characteristics for producing food, forage, fiber, and oilseed crops. The land could be crop, pasture, range, forest, or other uses, but does not include urban built-up land or water bodies, since these two are considered irreversible uses. It has soil quality, growing season, and moisture supply needed to economically produce/sustain high yields when treated and managed according to modern farming methods, including water management." (USDA, 1983.)

REILS – Runway End Identifier Lights.

RPZ – Runway Protection Zone – The RPZ is a three dimensional trapezoid, which controls the height of objects within the boundaries of this surface. These areas vary in size, depending on the type of approach category of a particular runway. The RPZ does not have to be cleared or graded, but does require air rights.

RSA – Runway Safety Area – The RSA is a prepared or suitable surface area that surrounds the runway in order to reduce the risk of damage to airplanes and injury to pilots and passengers in the event of an undershoot, overshoot, or excursion from the runway. This area, which parallels the runway, is 500 feet wide and preferably extends 1000 feet from the end of runway. The RSA must be clear of all objects and graded for aircraft and emergency vehicle use.

SHPO – State Historic Preservation Office

Site of Environmental Concern – An identified site of potential contamination due to the presence or handling of hazardous materials on site (e.g., site containing underground storage tanks).

Site of Environmental Contamination – Site of known contamination which falls under Michigan's Natural Resources and Environmental Protection Act 451, Part 201 (formerly Part 307) PA of 1994.

TAF – Terminal Area Forecast

Unique Farmlands – The NRCS has defined unique farmlands as: "Land other than prime farmland that is used for the production of specific high value food and fiber crops. These lands have a special combination of factors needed to economically produce sustained high quality yields of a specific crop when treated and managed according to modern farm methods. The special factors that make the land unique include soil quality, growing season, temperature, humidity, elevation, aspect, moisture supply, or other conditions such as nearness to market that favor growth of a specific crop. Moisture supply is the form of stored moisture, precipitation, or a developed irrigation system." (USDA, 1983.)

USEPA – United States Environmental Protection Agency

USFWS – United States Fish and Wildlife Service

VFR – Visual Flight Rules

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AIRPORT USER SURVEY REPORT

ANN ARBOR MUNICIPAL AIRPORT (ARB)
ANN ARBOR, MICHIGAN

July 2009

An airport user survey for Ann Arbor Municipal Airport (ARB) has been conducted by the Michigan Department of Transportation - Airports Division (MDOT). The purpose of the survey was to determine if there is justification of need for a proposed extension of primary Runway 6/24, based on current MDOT and Federal Aviation Administration (FAA) standards.

Runway 6/24 is presently 3,505 feet in length and 75 feet wide. The current Airport Layout Plan shows a proposed extension of this runway to an ultimate length of 4,300 feet.

Planning activities associated with the potential development of the extension began in 2007, and in that year the airport manager was requested to collect supporting aircraft operational data. Other data sources listed below were also examined as part of the survey analysis. In order to maintain consistency among the various data sources, only operational data from year 2007 was analyzed.

Based aircraft operational information was collected by Mr. Matthew Kulhanek, airport manager at ARB. The information provided was accurate as of October 18, 2007.

Itinerant (visiting) aircraft operational data was collected by the two Fixed Base Operators (FBOs) that are located on the airport. The FBOs are Solo Aviation and Ann Arbor Aviation Center. Their data collection processes were conducted over a six-month time frame, ranging from April 1, 2007 to September 30, 2007.

Records of operational activity at ARB for the entire calendar year 2007 were also obtained from the FlightAware flight tracking resource agency. FlightAware is a company that records and offers flight tracking information for both private and commercial air traffic in the United States.

During the user survey analysis, every aircraft-type listed in the various data sources was categorized according to FAA approach category, design group, and weight classifications. The various aircraft classifications and associated dimensional standards are shown on the next page. All of the operational records were carefully screened, counted, and cross-checked in order to eliminate the possibility of counting the same aircraft twice, if it was listed in more than one data source.

AIRCRAFT CLASSIFICATIONS (FAA):

APPROACH CATEGORY:

Category A:	Approach speed less than 91 knots.
Category B:	Approach speed 91 to 120 knots.
Category C:	Approach speed 121 to 140 knots.
Category D:	Approach speed 141 to 165 knots.
Category E:	Approach speed 166 knots +

DESIGN GROUP:

Group I:	Wingspan up to but not including 49 feet, tail height up to 20 feet.
Group II:	Wingspan 49 feet up to but not including 79 feet, tail heights 20 to 30 feet.
Group III:	Wingspan 79 feet up to but not including 118 feet, tail heights 30 to 45 ft.
Group IV:	Wingspan 118 feet up to but not including 171 feet, tail heights 45 to 60 ft.
Group V:	Wingspan 171 feet up to but not including 214 feet, tail heights 60 to 66 ft.
Group VI:	Wingspan 214 feet up to but not including 262 feet, tail heights 66 to 80 ft.

SMALL AIRPLANE:

An airplane of 12,500 lbs. or less maximum certificated takeoff weight.

LARGE AIRPLANE:

An airplane of more than 12,500 lbs. maximum certificated takeoff weight.

BASED AIRCRAFT ANALYSIS:

According to the Based Aircraft survey data compiled on October 18, 2007, there were 166 aircraft based at ARB. Five were helicopters, 152 were of the A-I classification, eight were of the B-I classification, and one (the only jet based at the airport) was of the B-II Large (greater than 12,500 lbs. maximum certificated takeoff weight) classification. An estimated 200 annual operations were performed by the jet aircraft.

An operation can be either a takeoff or a landing. Therefore, if a based aircraft departs the airport, and later returns, this equals a total of two operations even though it may have only been one actual flight.

Aircraft by FAA Classification:		Estimated Annual Operations:
Helicopter:	5	N/A
A-I:	152	*
A-II:	0	*
B-I:	8	*
B-II Small (<12,500 lbs.):	0	0
B-II Large (>12,500 lbs.):	1	200
C-I Large:	0	0
C-II Large:	0	0
Total:	166	

* Note: Estimated Annual Operations for A-I, A-II, and B-I classifications were not calculated as part of this analysis, as they are not a factor to the Critical Aircraft determination, nor do they provide justification for the proposed extension of the runway.

ITINERANT AIRCRAFT ANALYSIS:

Itinerant (visiting) aircraft are those that perform operations at a particular airport, but are actually based somewhere else. Itinerant aircraft information for ARB was compiled by the two FBOs that are located on the airport - Solo Aviation and Ann Arbor Aviation Center. The data sources were the pilot registration logs (airport registers) from each of their businesses. Since pilot sign-in is strictly voluntary, the registers do not account for all itinerant activity at ARB.

During the user survey analysis, two operations were awarded to each aircraft listed on the FBO airport registers. This is due to the FAA standard of considering each landing and subsequent takeoff by each visiting aircraft, two separate operations. Also, since the data was collected over a six-month time frame (April 1, 2007 to September 30, 2007) instead of a full year, operations were again multiplied by two in order to achieve an equivalent annual operational rate for the full calendar year 2007. This resulted in a total multiplier factor of four for each aircraft listed on the registers. This method is standard procedure during the analysis phase of all airport user surveys.

Data collected from the two FBOs is shown in the following tables. Note that aircraft operations that are already accounted for in the FlightAware database have not been included in the number of estimated annual operations listed in these tables. None of the estimated annual operations listed by the Solo Aviation FBO were performed by jet aircraft. Thirty-six of the operations listed by the Ann Arbor Aviation Center FBO were performed by jets.

FBO – Solo Aviation

Aircraft by FAA Classification:		Estimated Annual Operations:
Helicopter:	1	N/A
A-I:	183	*
A-II:	3	*
B-I:	40	*
B-II Small (<12,500 lbs.):	2 **	8 **
B-II Large (>12,500 lbs.):	2 **	8 **
C-I Large:	0	0
C-II Large:	0	0
Total:	231 **	

ITINERANT AIRCRAFT ANALYSIS (continued):

FBO – Ann Arbor Aviation Center

Aircraft by FAA Classification:		Estimated Annual Operations:
Helicopter:	3	N/A
A-I:	205	*
A-II:	13	*
B-I:	59	*
B-II Small (<12,500 lbs.):	5 **	20 **
B-II Large (>12,500 lbs.):	7 **	28 **
C-I Large:	3 **	12 **
C-II Large:	1 **	4 **
Total:	296 **	

* Note: Estimated Annual Operations for A-I, A-II, and B-I classifications were not calculated as part of this analysis, as they are not a factor to the Critical Aircraft determination, nor do they provide justification for the proposed extension of the runway.

** Note: Aircraft numbers and Estimated Annual Operations shown have been corrected to avoid duplication of records already included in the FlightAware database.

FLIGHTAWARE DATABASE ANALYSIS:

As stated earlier, FlightAware is a company that records and offers flight tracking information for both private and commercial air traffic in the United States. The company maintains records of all flight activity for which Instrument Flight Rule (IFR) flight plans have been filed by pilots. The company does not keep records of flight activity that is conducted without flight plans under Visual Flight Rule (VFR) conditions.

Aircraft owners are allowed the opportunity to block specific information from the FlightAware database for security and/or privacy reasons. Unfortunately, the aircraft-types, owner or corporate names, and aircraft registration numbers are not listed in the database when aircraft owners elect to block their information. Origin and destination airport locations and dates of flights are still listed in the database for the blocked operations.

FlightAware provided records that were associated with flight activity to and from ARB during the entire calendar year 2007. Out of over 4,300 records of flight operations, 274 had blocked information. Since the FlightAware records do not include VFR flight activity, and do not include specific aircraft information for the blocked operations, they do not provide a complete history of all activity at the airport.

Judging by the distant locations associated with many of the blocked operations, some of the aircraft flown were likely of the larger categories. However, since the aircraft-type was not provided for these operations, none of them are included in the annual operations listed below. Had aircraft-type information been available for the blocked operations, the resulting operational numbers would likely have been higher.

Annual operations for all classifications of B-II and greater were calculated and are listed in the table shown below. Sixty-nine of the annual operations listed in the FlightAware database were performed by jet aircraft.

FAA Classification:	Annual Operations Included in Database:
B-II Small (<12,500 lbs.):	265
B-II Large (>12,500 lbs.):	85
C-I Large:	0
C-II Large:	0

COMBINED TOTALS OF ALL DATA SOURCES FOR YEAR 2007:

FAA Classification:	Estimated Annual Operations:
B-II Small (<12,500 lbs.):	293
B-II Large (>12,500 lbs.):	321
C-I Large:	12
C-II Large:	4

TOTAL ESTIMATED ANNUAL OPERATIONS USED IN DETERMINATION OF CRITICAL AIRCRAFT CLASSIFICATION:

Total Annual Operations, "B-II Small and Greater": **630** (293+321+12+4)

Total Annual Operations, "B-II Large and Greater": **337** (321+12+4)

Total Annual Operations, "C-I Large and Greater": **16** (12+4)

Total Annual Operations, "C-II Large": **4**

JET AIRCRAFT:	Estimated Annual Operations
Combined total from all classifications, including B-I:	**305**

CRITICAL AIRCRAFT DETERMINATION:

The Critical Aircraft is defined by the FAA as the most demanding aircraft-type that performs a minimum of 500 annual operations at a particular airport. In cases where the Critical Aircraft weigh less than 60,000 lbs, a classification of aircraft is used rather than a specific individual aircraft model.

As shown on the previous page, a total of **630** estimated annual operations were documented by aircraft in the "B-II Small and Greater" classification, which also includes some B-II Large, C-I Large, and C-II Large category aircraft. Since none of the greater categories had operational levels in excess of 500 at ARB, the current Critical Aircraft classification has been determined to be **B-II Small Aircraft**. Note that in establishing the 500-minimum annual operational threshold, it is standard procedure to also include operations from the greater categories in the determination of the Critical Aircraft classification.

Aircraft in the "B-II Small Aircraft" classification have approach speeds between 91 and 120 knots, wingspans between 49 and 79 feet, and maximum certificated takeoff weights of 12,500 lbs. or less. A representative aircraft of this class is the Beechcraft King Air 200, a twin-engine turboprop aircraft that typically seats 10-12 people, including the flight crew.

RUNWAY LENGTH RECOMMENDATIONS:

For airports with "B-II Small Aircraft" Critical Aircraft classifications, primary runway length recommendations by MDOT and FAA are as follows:

MDOT – *Source: Michigan Airport System Plan (MASP 2008):* **4,300 feet**
(statewide standard)

FAA – *Source: FAA Advisory Circular 150/5325-4B,* **4,200 feet ***
"Runway Length Requirements for Airport Design"
(airport-specific standard)

** Note: The FAA runway length recommendation was obtained from Figure 2-2 in Advisory Circular 150/5325-4B. The following specifics for ARB were used in the determination: Airport Elevation: 839 feet above mean sea level*
Temperature: 83 degrees F mean daily maximum temp of hottest month of year (July)

RUNWAY LENGTH RECOMMENDATIONS (continued):

The FAA recommended runway length of 4,200 feet at ARB was obtained by calculation from FAA Advisory Circular 150/5325-4B, *"Runway Length Requirements for Airport Design"*, a publication that is used nationally by the agency. The resulting recommended runway lengths are airport-specific, and can vary by hundreds of feet from site to site, depending on the specific airport elevations and mean daily maximum temperatures used in the calculations.

The MDOT recommendation of 4,300 feet is a statewide standard for all airports in the state with B-II Small Critical Aircraft classifications. Since airport elevations and mean maximum temperatures do not vary significantly from airport to airport in Michigan, as opposed to many other states, MDOT uses a single runway length recommendation for all airports of the same Critical Aircraft classification. The FAA-Airports District Office that oversees the state of Michigan supports our statewide runway length recommendation of 4,300 feet for all airports classified with a B-II Small Aircraft reference code.

As stated in FAA Advisory Circular 150/5325-4B, "*The design objective for the main primary runway is to provide a runway length for all airplanes that will regularly use it without causing operational weight restrictions.*" Airplanes that are classified within an airport's Critical Aircraft category are considered by the FAA to be the "regular use" aircraft of the main primary runway.

Development of the primary runway at ARB to the recommended length of 4,300 feet would allow the majority of B-II Small classification aircraft to operate at their optimum capabilities (without weight restrictions). Interstate commerce into and out of a community can be negatively impacted if business aircraft are forced to operate with load restrictions (i.e. reductions in passengers, cargo, and fuel associated with aircraft range) due to lack of suitable runway length.

Extension of the runway to the recommended length would also enhance airport operational safety. A 4,300-foot long runway would not only provide enough runway for takeoff by most regular use (Critical Aircraft category) airplanes operating at optimum capabilities, but also provide additional runway for the purpose of bringing the aircraft to a stop in an aborted-takeoff situation. In situations where pilots detect a problem with the aircraft while on the takeoff roll, they are forced to continue the takeoff and contend with the problem in the air if there is not enough runway remaining to bring the aircraft to a stop. By having enough remaining runway to safely abort a takeoff and stop the aircraft while still on the ground, a pilot would be able to avoid a potentially hazardous situation of taking to the air with a mechanically-deficient aircraft.

CONCLUSION:

This user survey analysis has shown that justification of need for the proposed extension of Runway 6/24, based on a determination of the Critical Aircraft, has been substantiated according to MDOT and FAA standards. Even though records that were analyzed likely did not include all operations performed at ARB in 2007 by category B-II and greater aircraft, the operations that were substantiated with available information were more than sufficient to make the determination that the Critical Aircraft is of the "B-II Small Aircraft" classification. With this confirmation, we find the proposed project eligible to receive state and federal funding, and recommend that the airport sponsor proceed with the planning and environmental processes associated with the proposed extension of the primary runway to an overall length of 4,300 feet.

Mark W. Noel

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MDOT – Airports Division

***NOTE**: A Supplemental Report to this July 2009 Airport User Survey Report was issued in December 2009. The Supplemental Report provides additional details and updates to the information contained in this original report. The information published in the Supplemental Report provides additional justification to further support the findings and recommendations of this original July 2009 Airport User Survey Report.*

Appendix A-2. Supplemental Report
Airport User Survey
Ann Arbor Municipal Airport (ARB)
Ann Arbor, Michigan
December, 2009

SUPPLEMENTAL REPORT
AIRPORT USER SURVEY

ANN ARBOR MUNICIPAL AIRPORT (ARB)
ANN ARBOR, MICHIGAN

December 2009

This Supplemental Report is associated with the original Airport User Survey Report for Ann Arbor Municipal Airport (ARB), dated July 2009. The information contained in this supplement provides additional details and updates to the information contained in the original report.

Additional analysis of the aircraft operational data has resulted in the generation of supplemental information, three new exhibits, and updates to the numbers of annual operations performed by category B-II critical aircraft. The following paragraphs explain in detail the information provided in the new exhibits, as well as the supplemental information and updates to the operational numbers listed in the original user survey report.

EXHIBIT No. 1: ***Annual Operations Analysis by Specific Aircraft Model***

This exhibit shows annual operations at ARB by specific aircraft model, rather than only by their FAA aircraft classification as shown in the original user survey report. The various aircraft models are listed in three separate tables, based upon groupings of their FAA classifications (B-II, C-I, and C-II).

Supplemental data associated with annual operations by the Beechcraft King Air C90 has been included in the B-II category table of this exhibit. Operations by this particular model of aircraft were not included in the original July 2009 Airport User Survey Report.

EXHIBIT No. 2: ***Origin / Destination Analysis by State***

Exhibit No. 2 shows the results of an origin and destination analysis of aircraft operations conducted at ARB, based on examination of the FlightAware database from survey year 2007. Although 274 of the operations had aircraft model and ownership information blocked from the database at the aircraft owner's request, the origin and destination cities of each flight were still included.

The first column of the table shown in this exhibit lists 31 states (and Washington DC) from which operations into ARB originated, or operations out of ARB were going to as a destination. The second column lists operations attributed to each state by the 274 total operations with blocked aircraft and ownership records. The third and fourth columns list operations attributed to each state by B-II Small and B-II Large category aircraft. The last column lists the total number of operations attributed to each state.

The numbers of operations associated with each state are from the FlightAware Instrument Flight Rule (IFR) flight plan database only, and do not include records of all itinerant operations between ARB and other states. Nonetheless, the numbers shown in this exhibit confirm that in 2007, flight operations were conducted between ARB and at least 31 other states (approximately 63% of the continental US). Also, approximately 67% of the IFR flight records for the category B-II critical aircraft were between ARB and out-of-state locations. These factors confirm that there is a significant amount of flight operations being conducted at ARB that are either going to, or coming from, distant locations in other states.

EXHIBIT No. 3: ***Small 10-Seat Aircraft Analysis***

The table in this exhibit lists *Small* aircraft models (less than or equal to 12,500 lbs. maximum certificated takeoff weight) that have 10 or more passenger seats, and that conducted operations at ARB in survey year 2007. The numbers of annual operations listed in the table are from the FlightAware IFR flight plan database only, and do not include records of all operations by aircraft of this type. The FlightAware records show that there were 425 annual operations by Small 10-seat or higher aircraft.

Exhibit No. 3 also shows that there were 211 annual operations by *Large* category (greater than 12,500 lbs. maximum certificated takeoff weight) B-II aircraft from the Based Aircraft data source and another 85 annual operations by Large category B-II aircraft from the FlightAware data source. The number of annual operations performed by the Small 10-seat or higher aircraft and the Large category aircraft combined is shown as 721.

The operational numbers listed in Exhibit No. 3 do not include blocked FlightAware operations, Visual Flight Rule (VFR) operations, or operations logged by pilots on the Fixed Base Operator (FBO) airport registers. Although the information shown is only a partial representation of all applicable aircraft, the 721 annual operations that were substantiated significantly confirm that Figure 2-2 in FAA Advisory Circular 150/5325-4B is the appropriate chart to reference in the determination of the FAA-recommended runway length of 4,200 feet at ARB.

UPDATED BASED AIRCRAFT ANALYSIS:

The Based Aircraft Analysis of the original user survey report listed 200 estimated annual operations by AvFuel's B-II Large category aircraft (see page 3 of the original report). AvFuel's Chief Pilot has since confirmed in writing that the actual number of operations by their Cessna Citation XL 560 aircraft at ARB over the past three calendar years has been 224 operations in 2006, 211 operations in 2007, and 223 operations in 2008.

In order to maintain consistency with the other survey year 2007 operational records analyzed, Exhibit No. 1 of this Supplemental Report shows the 211 actual annual operations by this aircraft in the "Based Aircraft Data Source" column of the category B-II table, instead of the original estimate of 200.

UPDATED ITINERANT AIRCRAFT ANALYSIS: (FBO Data Sources)

Itinerant (visiting) aircraft operational data that was evaluated as part of the original user survey analysis was obtained from the pilot registration logs (airport registers) of two of the airport's FBOs - Solo Aviation and Ann Arbor Aviation Center. Data was examined for a six-month survey time frame, and cross-checked against FlightAware records in order to prevent counting the same aircraft twice. Any operations that were already included in the FlightAware records were not included in the operational totals that were generated from the FBO records.

The FBO records provided 40 additional operations by B-II and greater category aircraft (32 by category B-II aircraft, 6 by category C-I aircraft, and 2 by category C-II aircraft). Since this data was based on a six-month time frame instead of the full calendar year 2007, these 40 actual operations were prorated into an estimated equivalent annual rate of 80 operations. The additional 40 estimated operations were the only operations in the original user survey analysis that were obtained by prorating actual partial-year data into an estimated equivalent annual rate.

As part of the supplemental analysis, estimated operations that were originally generated as a result of prorating partial-year data were not considered in the determination of the annual operations at ARB. This eliminates the potential effect of seasonal variation in flight activity levels negatively influencing annual operational estimates. Only the 40 actual operations that were documented by the FBOs as having occurred within the six-month survey period were counted as valid operations, since they did in fact occur in 2007. No operations were attributed to the remaining six months.

Exhibit No. 1 of this supplemental report shows only the 40 actual documented operations (32 by category B-II aircraft, 6 by category C-I aircraft, and 2 by category C-II aircraft) in the column that is labeled "2 FBO Register Data Sources".

UPDATED FLIGHTAWARE DATABASE ANALYSIS:

The FlightAware database analysis that was performed for the original July 2009 Airport User Survey Report resulted in the determination of 265 actual annual operations by B-II Small aircraft, and another 85 actual annual operations by B-II Large aircraft (see page 6 of the original report). However, the resulting numbers did not include operations by the Beechcraft King Air C90 model.

The King Air C90 is a B-II Small category aircraft, with a wingspan of 50'3". Earlier versions of the King Air 90 models (A90 and B90) have wingspans of less than 49', and are therefore category B-I Small aircraft. Since the FlightAware records that were originally analyzed for ARB did not include information which identified the specific model of each King Air 90 operation, no operations by King Air 90s were included in the original user survey analysis and report.

Although the FlightAware records do not provide information regarding the specific model of each King Air 90 operation listed, they do provide the aircraft registration N-number of each aircraft. By entering the N-number into the computerized FAA aircraft registration database, the specific model of each King Air 90 operation was able to be determined. A total of 157 operations by the B-II Small category King Air C90 model have been identified, out of 220 operations by King Air 90 models of all types.

Exhibit No. 1 of this supplemental report shows the 157 King Air C90 operations included in the "Flight Aware Data Source" column of the category B-II table. By adding these operations to the 265 operations by B-II Small aircraft and 85 operations by B-II Large aircraft that were previously identified in the original user survey report, the updated total number of actual annual operations by B-II category aircraft obtained from the FlightAware data source is 507.

The FlightAware database also confirmed usage of the airport by many large corporations, in addition to AvFuel, which is the only one actually based at ARB. Some of the other corporate users of ARB include Synergy International, Wells Fargo, Polaris Industries, Bombardier Aerospace, Avis Industrial Corporation, Thumb Energy, and NetJets. NetJets provides on-demand air charter services and corporate aircraft fractional ownership opportunities to a large number of other corporations that are located throughout the country.

AIRCRAFT OPERATIONAL FORECASTS:

Year 2007 was the onset year of the current planning activities associated with the potential extension of Runway 6/24. At that time, the airport manager and FBOs were requested to collect based and itinerant aircraft operational data over the course of year 2007 for the purpose of determining project justification. This data was reviewed during the user survey analysis, which was conducted in early 2009.

FlightAware records for any given year are not published until that particular calendar year has ended, and all operations that took place during the course of that year counted. Since the user survey analysis was conducted in early 2009, the most current operational records available at the time from FlightAware were associated with calendar year 2008. Although year 2008 records were available, year 2007 records from FlightAware were used in the user survey analytical process. This was due to the importance of maintaining consistency of year of operational records in the analysis, and not combining operational data collected by the airport manager and FBOs over year 2007 with the more recent FlightAware records from year 2008. The FlightAware records, airport manager records, and FBO records from calendar year 2007 that were used in the user survey analysis were all only one-year old at the time, and still considered valid for use in determining project justification.

The FAA Terminal Area Forecast (TAF) does project a short-term approximate 22% decrease in total annual operations at ARB from user survey year 2007 through year 2009 (from 72,895 actual in 2007 to 56,956 estimated for 2009). However, beginning in year 2010, the TAF projects continuously increasing annual operations at ARB, from the year 2009 low-point through year 2030. Itinerant annual operations are even projected to surpass survey year 2007 levels prior to the end of the 2030 forecast period.

Even if the worst case short-term projected 22% decrease in total annual operations is applied to the user survey results, there is still significant justification for the runway extension. The user survey report documents a total of 750 actual annual operations by B-II category critical aircraft that justify the runway extension. A 22% decrease in this number is 585 - still well above the FAA's substantial use threshold of 500. And again, beginning in 2010, operations at ARB are projected by the FAA to begin increasing every single year from that point forward, through year 2030.

Forecasts from the MDOT Michigan Airport System Plan (MASP 2008) also project increasing itinerant and total operations at ARB from years 2010 through 2030. The MDOT forecasts further substantiate the mid-term and long-term FAA projections of a rebound in current operational activity at ARB to survey year 2007 levels.

AvFuel Corporation, which bases a B-II Large category Citation 560 Excel jet at ARB, has confirmed that their operations at ARB actually increased from 211 operations in 2007 to 223 operations in 2008. Their Chief Pilot estimates that their future operational levels could potentially increase to 350 to 450 operations per year at ARB.

The FAA TAF forecast, MDOT MASP forecast, and AvFuel's operational forecasts all provide support to the fact that survey year 2007 operational data is a very pertinent representation of estimated future operational levels at ARB.

SUMMARY:

The supplemental analysis that was conducted after publication of the July 2009 Airport User Survey Report has resulted in additional justification in support of extension of Runway 6/24 to 4,300' in length.

Further analysis of the FlightAware IFR flight plan database has confirmed 507 actual operations at ARB in survey year 2007 by B-II category aircraft. This number does not include operations in the FlightAware records with aircraft information blocked at the owner's request, or VFR operations that were conducted without flight plans. Judging by the high number of out-of-state origin and destination locations of operations listed in the blocked category (see Exhibit No. 2), it is very likely that many of the associated aircraft were of the B-II or greater categories. Therefore, actual operations at ARB by aircraft of these categories are likely considerably higher than the 507 substantiated operations obtained from the FlightAware database.

The 507 actual operations by B-II category aircraft that were obtained from the FlightAware database also do not include operations conducted by AvFuel's based Cessna Citation XL 560, or operations obtained from the two FBO airport registers. AvFuel has confirmed 211 actual operations at ARB in 2007 with their B-II category aircraft, and data provided by the FBOs has confirmed 32 actual operations in 2007 by B-II category aircraft.

In summary, the supplemental analysis of this user survey has confirmed a total of 750 actual annual operations at ARB by category B-II aircraft. FlightAware records also confirmed that operations by aircraft in this critical aircraft category were performed by many large corporations, some of which are listed on page 4 of this report.

CONCLUSION:

In the majority of airport user survey processes, determinations and recommendations are issued based on analysis of estimated annual operations obtained from various airport users. In conducting the user survey at ARB, the analysis focused on evaluation of actual annual operations performed at the airport. This is obviously a much more accurate method of calculating the total number of annual operations associated with the determination of the critical aircraft and Airport Reference Code. It also eliminates the possibility of an airport user inflating their estimated operational numbers, in the hopes of obtaining a longer runway that is not truly justified.

While the numbers listed in this report do not include every operation that occurred at ARB in survey year 2007 with B-II category aircraft, they do confirm substantial usage of the airport by aircraft of this critical aircraft category. The Origin/Destination Analysis has shown a significant number of operations between ARB and distant out-of-state locations, which is a very good indicator of corporate activity associated with interstate commerce, as opposed to pleasure flying by general aviation pilots. FlightAware records also confirmed usage of the airport by many large corporations.

The information contained in this Supplemental Report provides additional justification in support of the findings and recommendations of the original July 2009 Airport User Survey Report. The user survey analysis has shown that justification for the proposed extension of primary Runway 6/24 to 4,300-feet has been confirmed, and the proposed project has been determined to be eligible to receive state and federal funding.

Although justification for the proposed project has been substantiated according to current MDOT and FAA standards associated with runway length recommendations, neither agency requires that the runway be extended. It is ultimately – and entirely – the decision of the city of Ann Arbor whether or not to proceed with the development of the project.

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Project Development Section
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ANN ARBOR MUNICIPAL AIRPORT USER SURVEY - SUPPLEMENTAL REPORT - DECEMBER 2009

EXHIBIT NO. 1

ANNUAL OPERATIONS ANALYSIS BY SPECIFIC AIRCRAFT MODEL

Aircraft Model	FAA Approach Category	FAA Design Group	FAA Weight Class	Seating	Maximum Takeoff Weight (lbs.)	Aircraft Engine Type	Flight-Aware Data Source	Based Aircraft Data Source	2 FBO Register Data Sources	Total Annual Operations by Model
Aero Commander 695	B	II	Small	<10	<12,500	Multi-Eng	4	0	0	4
Beechcraft King Air C90	B	II	Small	10+	<12,500	Multi-Eng	157	0	0	157
Beechcraft King Air 100	B	II	Small	10+	<12,500	Multi-Eng	39	0	2	41
Beechcraft King Air 200	B	II	Small	10+	<12,500	Multi-Eng	215	0	8	223
Cessna 441 Conquest II	B	II	Small	<10	<12,500	Multi-Eng	7	0	4	11
Beechcraft King Air 300	B	II	Large	10+	12,500+	Multi-Eng	11	0	8	19
Beechcraft King Air 350	B	II	Large	10+	12,500+	Multi-Eng	43	0	4	47
Cessna Citation II 550	B	II	Large	<10	12,500+	Jet	6	0	2	8
Cessna Citation XL 560	B	II	Large	<10	12,500+	Jet	25	211	2	238
Cessna Citation 680	B	II	Large	<10	12,500+	Jet	0	0	2	2
Total B-II Category Annual Operations							507	211	32	**760**
Learjet 25	C	I	Large	<10	12,500+	Jet	0	0	2	2
Learjet 31	C	I	Large	<10	12,500+	Jet	0	0	2	2
Learjet 45	C	I	Large	<10	12,500+	Jet	0	0	2	2
Total C-I Category Annual Operations							0	0	6	**6**
IAI Westwind 1125	C	II	Large	<10	12,500+	Jet	0	0	2	4
Total C-II Category Annual Operations							0	0	2	**4**

CRITICAL AIRCRAFT CATEGORY DETERMINATION: B-II (Based on 760 Total Annual Operations by Aircraft of this Category)

NOTE: The annual operations listed in the above tables are ACTUAL documented operations from calendar year 2007.
The numbers do NOT include any ESTIMATED operations obtained through proration of partial-year data, or other methods.
Operations recorded by the FBOs and listed above represent only a partial-year (six-month) time frame.

A total of 274 operations in the FlightAware database had aircraft model and ownership information blocked at the owner's request.
As a result, their operational numbers are NOT included in the information shown above.
Judging by the high number of out-of-state origin and destination locations of aircraft in the blocked category (see Exhibit No. 2),
it is very likely that many of the associated aircraft were of the B-II and greater categories.
Therefore, actual operations at ARB by aircraft of these categories are likely considerably higher than the numbers shown above.

EXHIBIT NO. 2 ORIGIN / DESTINATION ANALYSIS BY STATE

Origin / Destination Analysis of IFR Aircraft Operations Between ARB and Other States (Records from FlightAware 2007 Database)

	STATE	Aircraft Type & Category Blocked	B-II Small Category	B-II Large Category	Totals by State
1	Alabama	0	1	0	1
2	Arizona	1	0	0	1
3	Arkansas	2	1	0	3
4	Connecticut	5	2	0	7
5	Florida	29	3	3	35
6	Georgia	5	6	12	23
7	Illinois	25	64	5	94
8	Indiana	6	21	1	28
9	Iowa	1	20	3	24
10	Kansas	3	0	0	3
11	Kentucky	2	13	0	15
12	Maine	2	0	0	2
13	Maryland	1	3	7	11
14	Massachusetts	5	0	1	6
15	**Michigan**	**79**	**162**	**20**	**261**
16	Minnesota	2	3	2	7
17	Missouri	0	5	0	5
18	Nebraska	3	0	1	4
19	New Hampshire	1	2	0	3
20	New Jersey	9	2	4	15
21	New York	6	5	1	12
22	North Carolina	4	1	1	6
23	Ohio	16	38	13	67
24	Pennsylvania	14	23	4	41
25	South Carolina	0	4	0	4
26	South Dakota	4	18	0	22
27	Tennessee	2	5	0	7
28	Texas	30	0	0	30
29	Virginia	1	3	0	4
30	Washington DC	5	1	2	8
31	West Virginia	1	7	0	8
32	Wisconsin	10	9	4	23
	No Record	0	0	1	1
	Totals by Category	**274**	**422**	**85**	**781**

IFR Aircraft Operation Totals by Category:

Within Michigan	**79**	**162**	**20**	**261**
Outside of Michigan	**195**	**260**	**64**	**519**
No Record	0	0	1	1

NOTE: The numbers of operations listed above are ACTUAL documented operations from calendar year 2007. The numbers do NOT include any ESTIMATED operations obtained through proration of partial-year data, or other methods.

The numbers shown above are from the FlightAware IFR Flight Plan Database only, and do NOT include records of all itinerant operations between ARB and other states. Nonetheless, the numbers shown above confirm that in 2007, flight operations were conducted between ARB and at least 31 other states and Washington DC (approx 63% of the continental US). Approximately 67% of these IFR flight records were between ARB and out-of-state locations.

ANN ARBOR MUNICIPAL AIRPORT - SUPPLEMENTAL REPORT - DECEMBER 2009

EXHIBIT NO. 3 SMALL 10-SEAT AIRCRAFT ANALYSIS

Small Airplanes Having 10 or More Passenger Seats (Records from FlightAware 2007 Database)							
Aircraft Model	FAA Approach Category	FAA Design Group	FAA Weight Class	Seating	Maximum Takeoff Weight	Aircraft Engine Type	Annual Operations
Cessna Caravan 208	A	II	Small	10+	<12,500	Single-Eng	11
Swearingen Merlin III	B	I	Small	10+	<12,500	Multi-Eng	3
Beechcraft King Air C90	B	II	Small	10+	<12,500	Multi-Eng	157
Beechcraft King Air 100	B	II	Small	10+	<12,500	Multi-Eng	39
Beechcraft King Air 200	B	II	Small	10+	<12,500	Multi-Eng	215

Total Small 10-Seat Aircraft Annual Operations **425**

Total B-II Large Category Aircraft Annual Operations

Based Aircraft Data Source (B-II Large):	**211**
FlightAware Data Source (B-II Large):	**85**

Grand Total Annual Operations at ARB Applicable to Figure 2-2 in FAA Advisory Circular 150/5325-4B: **721**

NOTE: The annual operations listed above are ACTUAL documented operations from canendar year 2007. The numbers do NOT include any ESTIMATED operations obtained through proration of partial-year data, or other methods.

The numbers shown in the table above are from the FlightAware IFR Flight Plan Database only, and do NOT include records of all small aircraft operations at ARB with 10-seat or greater aircraft models. Nonetheless, the above analysis confirms that Figure 2-2 in FAA AC 150/5325-4B is the appropriate chart to reference in the determination of the FAA-recommended runway length for Ann Arbor Municipal Airport.

Appendix B. Noise Analysis Report

(prepared by URS/July, 2009)

APPENDIX B-1

NOISE IMPACT ANALYSIS

B.1 AIRCRAFT NOISE

The compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of the airport's noise impacts. Airport development actions to accommodate fleet mix changes, the number of aircraft operations, or air traffic changes are examples of activities that can alter aviation-related noise impacts and affected land uses subjected to those impacts. This section describes the baseline noise environment and the associated land use compatibility.

B.1.1 APPLICABLE REGULATIONS

The evaluation of the Ann Arbor Municipal Airport (ARB) noise environment, and land use compatibility associated with airport noise, was conducted using the methodologies developed by the Federal Aviation Administration (FAA) and published in FAA Order 5050.4B, FAA Order 1050.1E, and title 14 Code of Federal Regulations (CFR) part 150.

For aviation noise analysis, the FAA has determined that the cumulative noise energy exposure of individuals to noise resulting from aviation activities must be established in terms of yearly day/night average sound level (DNL); this is FAA's primary metric. Title 14 CFR part 150 provides Federal compatible land use guidelines for several land uses as a function of DNL values. The ranges of DNL values in Table B-1 reflect the statistical variability for the responses of large groups of people to noise. Compatible or non-compatible land use is determined by comparing the predicted or measured DNL values at a site to the values listed in Table B-1. Land use compatibility with yearly day-night average sound levels is shown in Table B-1.

B.1.2 METHODOLOGY

Aircraft Noise Descriptors and Effects
The terms and metrics associated with aircraft noise relative to this analysis are complex and are discussed in detail in Appendix B-2 along with potential effects of aircraft noise. In general and in this document, noise or sound levels are expressed in terms of A-weighted decibels (dBA).

DNL is a 24-hour time-weighted-average noise metric expressed in dBA which accounts for the noise levels of all individual aircraft events, the number of times those events occur, and the time of day which they occur. DNL has two time periods: daytime (7:00 a.m. to 9:59 p.m.) and nighttime (10:00 p.m. to 6:59 a.m.). In order to represent the added intrusiveness of sounds occurring during nighttime hours, DNL penalizes, or weights, events occurring during the nighttime periods by 10 dBA.

Noise and Compatible Land Use Prediction Methodology
The Integrated Noise Model (INM) has been FAA's standard tool since 1978 for determining the predicted noise impact in the vicinity of airports. Statutory requirements for INM use are defined in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*; Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*; and title 14 CFR part 150, *Airport Noise Compatibility Planning*. INM Version 7.0a, released September 17, 2008, was the version used for this document (http://www.faa.gov/about/office_org/headquarters_offices/aep/models/ inm_model/).

The INM incorporates the number of annual average daily daytime and nighttime flight and run-up operations, flight paths, run-up locations, and flight profiles of the aircraft along with its extensive internal database of aircraft noise and performance information, to calculate the DNL at many points on the ground around an airport. From a grid of points, the INM contouring program draws contours of equal DNL to be superimposed onto land use maps. For this document, DNL contours of 65, 70, and 75 dBA were developed. DNL contours are a graphical representation of how the noise from the airport's average annual daily aircraft operations is distributed over the surrounding area. The INM can calculate sound levels at any specified point so that noise exposure at representative locations around an airport can be obtained.

TABLE B-1
LAND USE COMPATIBILITY WITH YEARLY DAY-NIGHT AVERAGE SOUND LEVELS

	Yearly Day-Night Average Sound Level (DNL)					
	Below 65 Decibels	65-70 Decibels	70-75 Decibels	75-80 Decibels	80-85 Decibels	Over 85 Decibels
Residential						
Residential (Other than mobile homes & transient lodges)	Y	N[1]	N[1]	N	N	N
Mobile Home Parks	Y	N	N	N	N	N
Transient Lodging	Y	N[1]	N[1]	N[1]	N	N
Public Use						
Schools	Y	N[1]	N[1]	N	N	N
Hospitals, Nursing Homes	Y	25	30	N	N	N
Churches, Auditoriums, Concert Halls	Y	25	30	N	N	N
Governmental Services	Y	Y	25	30	N	N
Transportation	Y	Y	Y[2]	Y[3]	Y[4]	Y[4]
Parking	Y	Y	Y[2]	Y[3]	Y[4]	N
Commercial Use						
Offices, Business & Professional	Y	Y	25	30	N	N
Wholesale & Retail Building Materials, Hardware & Farm Equipment	Y	Y	Y[2]	Y[3]	Y[4]	N
Retail Trade - General	Y	Y	25	30	N	N
Utilities	Y	Y	Y[2]	Y[3]	Y[4]	N
Communications	Y	Y	25	30	N	N
Manufacturing & Production						
Manufacturing, General	Y	Y	Y[2]	Y[3]	Y[4]	N
Photographic and Optical	Y	Y	25	30	N	N
Agriculture (Except Livestock) & Forestry	Y	Y[6]	Y[7]	Y[8]	Y[8]	Y[8]
Livestock Farming & Breeding	Y	Y[6]	Y[7]	N	N	N
Mining & Fishing, Resource Production & Extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor Sports Arenas, Spectator Sports	Y	Y[5]	Y[5]	N	N	N
Outdoor Music Shells, Amphitheaters	Y	N	N	N	N	N
Nature Exhibits & Zoos	Y	Y	N	N	N	N
Amusement, Parks, Resorts, Camps	Y	Y	Y	N	N	N
Golf Courses, Riding Stables, Water Recreation	Y	Y	25	30	N	N

NOTE: The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties remains with the local authorities. FAA determinations under Part 150 are not intended to substitute Federally determined land use for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise-compatible land uses.

KEY TO TABLE:

SLUCM	Standard Land Use Coding Manual.
Y (Yes)	Land Use and related structures are compatible without restrictions.
N (No)	Land Use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) are to be achieved through incorporation of noise attenuation into the design and construction of structure.
25,30, or 35	Land use and related structures are generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated in design and construction of structure.

[1] Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems

[2] Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of the buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

[3] Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of the buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

[4] Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of the buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

[5] Land use compatible provided special sound reinforcement systems are installed.

[6] Residential buildings require an NLR of 25 dB.

[7] Residential buildings require an NLR of 30 dB.

[8] Residential buildings not permitted.

Noncompatible land use.

Source: Title 14 CFR part 150, Appendix A, Table 1, January 1998.

The INM is an average-value-model and is designed to estimate long-term average effects using average annual input conditions. Because of this, differences between predicated and measured values can occur because certain local acoustical variables are not averaged, or because they may not be explicitly modeled in INM. Difference may also occur due to errors or improper procedures employed during the collection of the measured data.

Examples of detailed local acoustical variables include:

- Temperature profiles;
- Wind gradients;
- Humidity effects;
- Ground absorption;
- Individual aircraft directivity patterns; and
- Sound diffraction caused by water, buildings, barriers, etc.

The results of the INM analysis provide a relative measure of noise levels around airfield facilities. When the calculations are made in a consistent manner, the INM is most accurate for comparing before and after noise effects resulting from forecast changes or alternative noise control actions. It allows noise levels to be predicted for such proposed projects without the actual implementation and noise monitoring of those actions.

B.1.3 DATA

Sources
Data was collected from multiple sources, examined, and utilized to ensure that this aircraft noise analysis provides an accurate depiction of the existing ARB aircraft noise environment. The data sources utilized for this analysis included:

- Flight Explorer®, computer software which obtains N-number (registration number), aircraft type, arrival and departure airport, and time of day from Air Traffic Control Tower radar data,
- USDOT, FAA Airport Master Record, Form 5010 July 2009;
- FAA Terminal Area Forecast (TAF) December 2008;
- FAA Air Traffic Activity Data System (ATADS) May 2009;
- Michigan Department of Transportation (MDOT) Airport User Survey Report 2009;
- National Oceanic and Atmospheric Administration, Climatography of the United States No. 81, 2002; and
- Ann Arbor Municipal Airport, Airport Layout Plan.

Modeled Aircraft Operations
This section describes the sources and derivation of the INM input data for the existing conditions, which are based on aircraft operations occurring from April 2008 through March 2009, and 2014 future conditions. Items also discussed includes the airport layout, weather, flight operations, fleet mix, runway use, flight tracks, and track use.

Airport Layout
ARB has a single paved runway, which is designated as Runway 06/24. It is 3,505 feet long by 75 feet wide. A full parallel taxiway system, 30 feet wide, supports this runway. The Proposed Project consists of extending Runway 06/24 795 feet to a length of 4,300 feet. There is a secondary turf runway, designated Runway 12/30. Runway 12/30 is 2,750 feet long by 110 feet wide with a 25 foot wide full length turf taxiway. The field elevation at ARB is approximately 829 feet above sea level. Apron and hangar facilities are available for based and transient aircraft.

Weather and Climate
The INM default for pressure, humidity, and headwind was not changed in the model. INM uses temperature, pressure, and headwind when computing procedural profiles. Humidity is only used in calculating atmospheric absorption. The average temperature at Ann Arbor, the University of Michigan, the closest monitoring station, is 49 degrees Fahrenheit (NOAA Climatography of the United States No. 81, 2002). The INM default airport pressure is 29.92 inches of mercury and the default humidity is 70% and the default average headwind is 8 knots.

Flight Operations
INM-modeled annual operations for the 2009 existing condition, consisting of operations from April 2008 through March 2009, totaled 61,969 operations, which is approximately 169 daily operations. Jet operations accounted for approximately 2 percent of the total operations. Nighttime operations accounted for 4.2 percent of the total operations. The total number of operations were obtained from the FAA's ATADS. Air taxi / commuter operations fleet mix was obtained from Flight Explorer® data and general aviation aircraft fleet mix was obtained from the MDOT Airport User's Survey.

2014 future condition aircraft operations were obtained from the 2008 FAA TAF for ARB. Modeled annual operations for the 2014 condition totaled 69,717 operations, or approximately 191 daily operations. It is assumed that the percent of night and jet operations will remain constant between the existing condition and the future years. In addition, it is also assumed that the fleet mix between the 2009 Existing Condition and the 2014 Future Alternatives will remain static. The existing and future fleet mix with annual operations is shown in Table B-2.

Table B-2
Fleet Mix and Annual Operations
Ann Arbor Municipal Airport
Runway Extension EA

Aircraft Category	INM Aircraft	Aircraft Name	Aircraft Type	Fleet Mix Percentage (%)		Annual			
				Itinerant	Local	Itinerant		Local	
						2009	2014	2009	2014
Air Taxi / Commuter	BEC58P	Beech 58 Baron	MEP	48.6	---	439	745	---	---
	CNA172	Cessna 172 Skyhawk	SEP	3.4	---	31	52	---	---
	CNA206	Cessna 206 Super Skywagon/Stationair	SEP	1.4	---	12	21	---	---
	CNA441	Cessna 441 Conquest II	TP	14.4	---	130	220	---	---
	CNA500	Cessna 500 / Citation II	Jet	1.4	---	12	21	---	---
	DC910	Douglas DC 9-10	Jet	0.7	---	6	10	---	---
	DHC6	de Havilland Dash 6*	TP	8.2	---	74	126	---	---
	GASEPF	Composite - Single Engine Fixed Pitch Prop	SEP	0.7	---	6	10	---	---
	GASEPV	Composite - Single Engine Variable Pitch Prop	SEP	4.1	---	37	63	---	---
	LEAR35	Lear 35	Jet	2.7	---	25	42	---	---
	MU3001	Mitsubishi 300-10 Diamond	Jet	2.7	---	25	42	---	---
	PA28	Piper 28 Cherokee	SEP	7.5	---	68	115	---	---
	PA31	Piper 31 Navajo	MEP	4.1	---	37	63	---	---
	Total			**100**	**---**	**902**	**1,532**	**---**	**---**
General Aviation	B206L	Bell 206L LongRanger	Helo	13.5	---	3,039	3,255	---	---
	BEC58P	Beech 58 Baron	MEP	5.6	6.8	1,269	1,360	2,585	2,954
	CIT3	Cessna Citation III	Jet	0.01	---	2	2	---	---
	CNA172	Cessna 172 Skyhawk	SEP	32.6	42.0	7,326	7,848	16,219	18,536
	CNA206	Cessna 206 Super Skywagon/Stationair	SEP	3.8	4.5	863	925	1,732	1,980
	CNA441	Cessna 441 Conquest II	Tp	0.6	0.3	126	135	113	129
	CNA500	Cessna 500 / Citation II	Jet	0.05	---	12	12	---	---
	CNA510	Cessna 510 Mustang	Jet	0.01	---	2	2	---	---
	DHC6	de Havilland Dash 6*	Tp	0.2	---	40	42	---	---
	GASEPF	Composite - Single Engine Fixed Pitch Prop	SEP	3.9	4.8	887	950	1,845	2,109
	GASEPV	Composite - Single Engine Variable Pitch Prop	SEP	10.3	11.9	2,315	2,480	4,613	5,272
	H500D	Hughes 500D	Helo	4.4	---	990	1,060	---	---
	IA1125	IAI Astra	Jet	0.01	---	2	2	---	---
	LEAR25	Lear 25	Jet	0.01	---	2	2	---	---
	LEAR35	Lear 35	Jet	0.01	---	3	4	---	---
	MU3001	Mitsubishi 300-10 Diamond	Jet	1.5	---	338	362	---	---
	PA28	Piper 28 Cherokee	SEP	23.1	29.7	5,180	5,550	11,472	13,111
	PA30	Piper 30 Twin Comanche	MEP	0.1	0.1	22	24	42	48
	PA31	Piper 31 Navajo	MEp	0.1	---	25	27	---	---
	R22	Robinson R22B	Helo	0.01	---	3	4	---	---
	SA365N	Aerospatiale (Eurocopter) SA-365N Dauphin	Helo	0.01	---	2	2	---	---
	Total			**100**	**100**	**22,446**	**24,047**	**38,621**	**44,138**
TOTAL				**---**	**---**	**23,348**	**25,579**	**38,621**	**44,138**

Source: Flight Explorer®, 2009
Michigan DOT ARB User's Survey, 2009,
URS Corporation 2009.

Note: Numbers may not add due to rounding
SEP – Single Engine Piston
MEP – Multi Engine Piston
Jet – Turbofan/Turbo Jet
TP – Turbo Prop

** de Havilland Dash 6 is INM substitution for the King Air 200, 300, and 350*

Runway Use
Runway use at ARB was determined through discussions with the Air Traffic Control Tower (ATCT) staff. Runway utilization is approximately 30/70 percent on Runway 06/24, respectively. Discussions with ATCT staff also indicate that approximately 5 percent of single engine piston aircraft operations occur on Runway 12/30 with a 50/50 split. Helicopters operate to and from the east edge of the terminal apron. Table B-3 provides runway utilization by aircraft category. The 2014 No Action and Proposed Project Alternatives will maintain the same runway utilization.

Table B-3
Runway Utilization
Ann Arbor Municipal Airport
Runway Extension EA

Aircraft Type	Runway Utilization[1]			
	06	24	12	30
Jet	30 %	70 %	---	---
Turboprop	30 %	70 %	---	---
Multi-Engine Piston	30 %	70 %	---	---
Single Engine Piston	27.5 %	67.5 %	2.5 %	2.5 %

Source: ARB Air Traffic Control Tower
Note: 1. Utilization applies to arrival, departure, and touch-and-go operations.

Flight Tracks and Utilization
Flight tracks are the aircraft's actual path through the air projected vertically onto the ground. Due to the level of operations occurring at ARB, a single arrival and departure track for each runway end was appropriate for the noise modeling. Straight out departures tracks were modeled for all runways. Straight in arrivals to Runway 12/30 were modeled and arrivals to Runway 6/24 followed the published VOR procedures.

Unique helicopter and touch-and-go flight tracks were also modeled based on ATCT interviews. 80 percent of the helicopter operations arrive from or depart to the north, with the remaining 20 percent distributed evenly between arrivals from and departures to the east, south, and west.

B.1.4 IMPACT ANALYSIS

Existing Conditions
Noise exposure resulting from aircraft operations in 2009 at ARB is depicted as DNL 65, 70, and 75 dBA contours, superimposed over the local aerial map of Ann Arbor, on Figure 4-1. The ARB 2009 existing condition DNL 65 dBA noise contour does not extend beyond airport property.

No Action Alternative
Noise exposure resulting from aircraft operations for the 2014 No Action Alternative ARB is depicted as DNL 65, 70, and 75 dBA contours, superimposed over the local aerial map of Ann Arbor, on Figure 4-2. The ARB 2014 No Action Alternative DNL 65 dBA noise contour does not extend beyond airport property.

Proposed Project
Noise exposure resulting from aircraft operations for the 2014 Proposed Project Alternative at ARB is depicted as DNL 65, 70, and 75 dBA contours, superimposed over the local aerial map of Ann Arbor, on Figure 4-3. The ARB 2014 Proposed Project Alternative DNL 65 dBA noise contour does not extend beyond airport property.

APPENDIX B-2

AIRCRAFT NOISE, NOISE METRICS & THE INTEGRATED NOISE MODEL

Appendix B-2 describes the various common noise metrics and human perceptions. It also describes the Integrated Noise Model (INM), and its required inputs.

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APPENDIX B-2

AIRCRAFT NOISE, NOISE METRICS & THE INTEGRATED NOISE MODEL

1.1 AIRCRAFT NOISE

Aircraft noise originates from the engines as well as the airframe or structure of aircraft. The engines are generally the most significant source of noise. While noise generated by propeller-driven aircraft can be annoying, jet aircraft are commonly the source of disturbing noise at airports. Two basic types of jet aircraft are operated today equipped with turbofan or turbojet engines. Aircraft flying faster than the speed of sound generate an intense pressure wave called a sonic boom, in addition to the propulsion and airframe noise.

Turbofan engines produce thrust as reaction to the rate at which high-velocity gas is exhausted from nozzles. The engine core consists of a compressor, combustion chambers, a turbine and a front fan. The major sources of noise include the core engine fan streams, the compressor, turbine blades and exhaust nozzles. In comparison, turbojet aircraft do not have the front fan component. It has been found in several cases that the sound energy produced by a turbojet engine is greater than that of a turbofan engine with an equivalent thrust rating.

The noise produced by jet aircraft flyovers is characterized by an increase in sound energy as the aircraft approaches, up to a maximum level. This sound level begins to lessen as the aircraft passes overhead and then decreases in a series of lesser peaks as the aircraft departs the area.

Noise produced by propeller driven aircraft and helicopters emanates from the blades and rotors. There are two components of this noise, namely vortex and periodic. Vortex noise is generated by the formation and shedding of vortices in the airflow past the blade. Periodic noise is produced by the oscillating pressure field in the air that results from the passage of air past the blade. Blade slap is an additional source of noise in helicopters. This is high-amplitude periodic noise and highly modulated vortex noise caused by fluctuating forces as one blade cuts through the tip vortices of another.

1.2 AIRCRAFT NOISE TERMINOLOGY

The Federal Aviation Administration (FAA) uses a variety of noise metrics to assess potential airport noise impacts. Different noise metrics can be used to describe individual noise events (e.g., a single operation of an aircraft taking off overhead) or groups of events (e.g., the cumulative effect of numerous aircraft operations, the collection of which creates a general noise environment or overall exposure level). Both types of descriptors are helpful in explaining how people tend to respond to a given noise condition. Descriptions of the metrics used in this Part 150 Study are provided in the following text.

Decibel, dB – Sound is a complex physical phenomenon consisting of many minute vibrations traveling through a medium, such as air. The human ear senses these vibrations as sound pressure. Because of the vast range of sound pressure or intensity detectable by the human ear, sound pressure level (SPL) is represented on a logarithmic scale known as decibels (dB). A SPL of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet (laboratory-type) listening conditions. A person begins to feel a SPL of 120 dB inside the ear as discomfort, and pain begins at approximately 140 dB. Most environmental sounds have SPLs ranging from 30 to 100 dB.

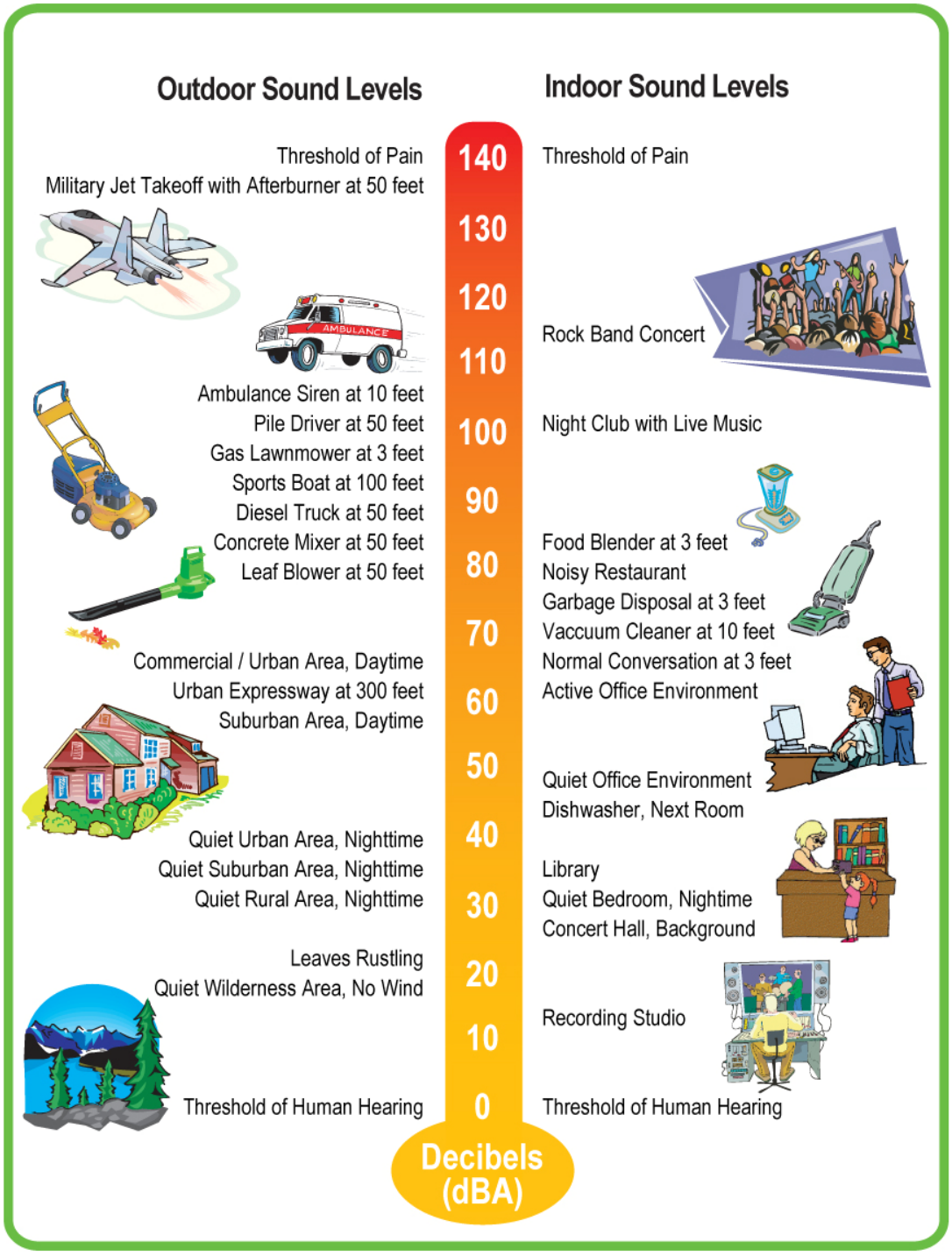
Because decibels are logarithmic, they cannot be added or subtracted directly like other (linear) numbers. For example, if two sound sources each produce 100 dB, when they are operated together they will produce 103 dB, not 200 dB. Four 100 dB sources operating together again double the sound energy, resulting in a total SPL of 106 dB, and so on. In addition, if one source is much louder than another, the two sources operating together will produce the same SPL as if the louder source were operating alone. For example, a 100 dB source plus an 80 dB source produces 100 dB when operating together. The louder source masks the quieter one.

Two useful rules to remember when comparing SPLs are: (1) most people perceive a 6 to 10 dB increase in SPL between two noise events to be about a doubling of loudness, and (2) changes in SPL of less than about 3 dB between two events are not easily detected outside of a laboratory.

A-Weighted Decibel, dBA – Frequency, or pitch, is a basic physical characteristic of sound and is expressed in units of cycles per second or hertz (Hz). The normal frequency range of hearing for most people extends from about 20 to 15,000 Hz. Because the human ear is more sensitive to middle and high frequencies (i.e., 1000 to 4000 Hz), a frequency weighting called “A” weighting is applied to the measurement of sound. The internationally standardized "A" filter approximates the sensitivity of the human ear and helps in assessing the perceived loudness of various sounds. For this Part 150 Study, all sound levels are A-weighted sound levels and the text typically omits the adjective "A-weighted".

Figure 1 charts common indoor and outdoor sound levels. A quiet rural area at nighttime may be 30 dBA or lower, while the operator of a typical gas lawn mower may experience a level of 90 dBA. Similarly, the level in a library may be 30 dBA or lower, while the listener at a rock band concert may experience levels near 110 dBA.

FIGURE 1
COMMON OUTDOOR AND INDOOR SOUND LEVELS



Source: URS Corp, 2008.

Maximum A-Weighted Noise Level, L_{max} – Sound levels vary with time. For example, the sound increases as an aircraft approaches, then falls and blends into the ambient, or background, as the aircraft recedes into the distance. Because of this variation, it is often convenient to describe a particular noise

"event" by its highest or maximum sound level (L_{max}). It should be noted that L_{max} describes only one dimension of an event; it provides no information on the cumulative noise exposure generated by a sound source. In fact, two events with identical L_{max} levels may produce very different total noise exposures. One may be of very short duration, while the other may last much longer.

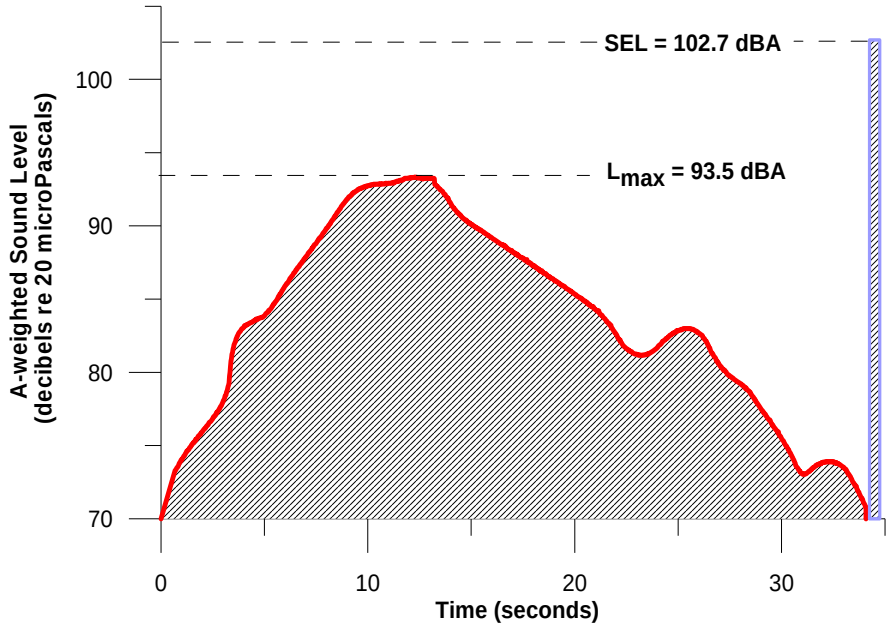
Sound Exposure Level, SEL – The most common measure of noise exposure for a single aircraft flyover event is the SEL. SEL is a summation of the A-weighted sound energy at a particular location over the true duration of a noise event, normalized to a fictional duration of one second. The true noise event duration is defined as the amount of time the noise event exceeds a specified level (that is at least 10 dB below the maximum value measured during the noise event). For noise events lasting more than one second, SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event.

The normalization to the fictional duration of one second enables the comparison of noise events with differing true duration and/or maximum level. Because the SEL is normalized to one second, it will almost always be larger in magnitude than the L_{max} for the event. In fact, for most aircraft events, the SEL is about 7 to 12 dB higher than the L_{max}. Additionally, since it is a cumulative measure, a higher SEL can result from either a louder or longer event, or a combination thereof.

Since SEL combines an event's overall sound level along with its duration, SEL provides a comprehensive way to describe noise events for use in modeling and comparing noise environments. Computer noise models, such as the Integrated Noise Model (INM) that the FAA used for this PART 150 STUDY, base their computations on these SELs.

Figure 2 shows an event's "time history", or the variation of sound level with time. For typical sound events experienced by a stationary listener, like a person experiencing an aircraft flyover, the sound level rises as the source (or aircraft) approaches the listener, peaks and then diminishes as the aircraft flies away from the listener. The area under the time history curve represents the overall sound energy of the noise event. The L_{max} for the event shown in **Figure 2** was 93.5 dBA. Compressing the event's total sound energy into one second yields an SEL of 102.7 dBA.

FIGURE 2
COMPARISON OF MAXIMUM SOUND LEVEL (L_{MAX}) AND SOUND EXPOSURE LEVEL (SEL)



Source: URS Corporation, 2008.

Equivalent Sound Level, L_{eq} – Equivalent sound level (L_{eq}) is a measure of the noise exposure resulting from the accumulation of A-weighted sound levels over a particular period of interest (e.g., an hour, an 8-hour school day, nighttime, or a full 24-hour day). However, because the length of the period can be different depending on the period of interest, the applicable period should always be identified or clearly understood when discussing this metric. Such durations are often identified through a subscript. For example, for an 8 hour or 24 hour day, $L_{eq(8)}$ or $L_{eq(24)}$ is used, respectively.

Conceptually, L_{eq} may be thought of as a constant sound level over the period of interest that contains as much sound energy as the actual time-varying sound level with its normal "peaks" and "dips". In the context of noise from typical aircraft flight events, and as noted earlier for SEL, L_{eq} does not represent the sound level heard at any particular time, but rather represents the total sound exposure for the period of interest. Also, it should be noted that the "average" sound level suggested by L_{eq} is not an arithmetic value, but a logarithmic, or "energy-averaged," sound level. Thus, loud events tend to dominate the noise environment described by the L_{eq} metric.

Day-Night Average Sound Level, DNL – Time-average sound levels are measurements of sound averaged over a specified length of time. These levels provide a measure of the average sound energy during the measurement period. For the evaluation of community noise effects, and particularly aircraft

noise effects, the Day-Night Average Sound Level (abbreviated DNL) is used. DNL logarithmically averages aircraft sound levels at a location over a complete 24-hour period, with a 10-decibel adjustment added to those noise events occurring between 10:00 p.m. and 7:00 a.m. (local time) the following morning. The FAA defines the 10:00 p.m. to 7:00 a.m. period as nighttime (or night) and the 7:00 a.m. to 10:00 p.m. period as daytime (or day). Because of the increased sensitivity to noise during normal sleeping hours and because ambient (without aircraft) sound levels during nighttime are typically about 10 dB lower than during daytime hours, the 10-decibel adjustment, or "penalty," represents the added intrusiveness of sounds occurring during nighttime hours.

DNL accounts for the noise levels (in terms of SEL) of all individual aircraft events, the number of times those events occur and the period of day/night in which they occur. Values of DNL can be measured with standard monitoring equipment or predicted with computer models such as the INM.

Typical DNL values for a variety of noise environments are shown in **Figure 3**. DNL values can be approximately 85 dBA outdoors under an aircraft flight path within a mile of a major airport and 40 dBA or less outdoors in a rural residential area.

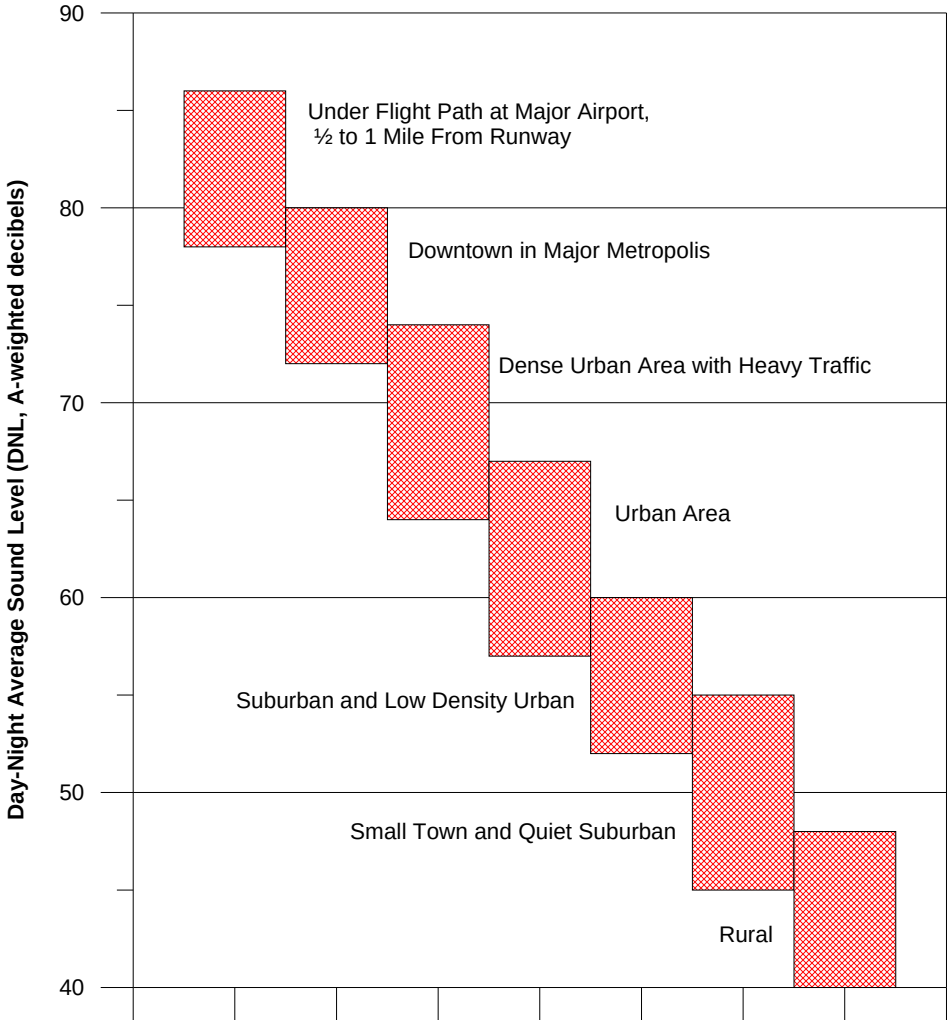
Due to the DNL descriptor's close correlation with the degree of community annoyance from aircraft noise, most federal agencies have formally adopted DNL for measuring and evaluating aircraft noise for land use planning and noise impact assessment. Federal committees such as the Federal Interagency Committee on Urban Noise (FICUN) and the Federal Interagency Committee on Noise (FICON), which include the Environmental Protection Agency (EPA), the FAA, Department of Defense, Department of Housing and Urban Development, and the Veterans Administration, found DNL to be the best metric for land use planning. They also found no new cumulative sound descriptors or metrics of sufficient scientific standing to substitute for DNL. Other cumulative metrics are used only to supplement, not replace, DNL. Furthermore, FAA Order 1050.1E, *Policies and Procedures for Considering Environmental Impacts*, requires DNL be used in describing cumulative noise exposure and in identifying aircraft noise/land use compatibility issues (EPA, 1974; FICUN, 1980; FICON, 1992; title 14 CFR part 150, 2004; FAA, 2006).

The accuracy and validity of DNL calculations depend on the basic information used in the calculations. At airports, the reliability of DNL calculations is affected by a number of uncertainties:

- The noise descriptions used in the DNL procedure represent the typical human response to aircraft noise. Since people vary in their response to noise and because the physical measure of noise accounts for only a portion of an individual's reaction to that noise, the DNL scale can show only an average response to aircraft noise that may be expected from a community.
- Future aviation activity levels such as the forecast number of operations, the operational fleet mix, the times of operation (day versus night) and flight tracks are estimates. Achievement of forecasted levels of activity cannot be assured.
- Aircraft acoustical and performance characteristics for new aircraft designs are estimates.

Outdoor vs. Indoor Noise Levels – INM calculates outdoor noise levels, while some of the supplemental noise analysis effects are based on noise levels experienced indoors. In order to convert outdoor noise levels to indoor noise levels, an Outdoor-to-Indoor Noise Level Reduction (OILR) is identified. The indoor noise level is equal to the outdoor noise level minus the OILR. Based on accepted research, typical OILR values range between 15 dBA to 25 dBA, depending on the structure and whether windows are open or closed (Wyle, 1989).

FIGURE 3
TYPICAL RANGE OF OUTDOOR COMMUNITY DAY-NIGHT AVERAGE SOUND LEVELS



Source: U.S. Department of Defense. Departments of the Air Force, the Army, and the Navy, 1978. *Planning in the Noise Environment.* AFM 19-10. TM 5-803-2, and NAVFAC P-970. Washington, D.C.,: U.S. DoD.

1.3 EFFECTS OF AIRCRAFT NOISE ON PEOPLE

The most common effects regarding aircraft noise are related to annoyance and activity interference (e.g., speech disruption and sleep interference). These effects have been studied extensively and relationships

between various noise metrics and effects have been established. The following sections summarize these effects, and the noise metrics that are used to describe them.

1.3.1 Speech Interference

Speech interference is the most readily quantified adverse effect of noise, and speech is the activity most often affected by environmental noise. The levels of noise that interfere with listening to a desired sound, such as speech, music, or television, can be defined in terms of the level of noise required to mask the desired sound. Such levels have been quantified for speech communications by directly measuring the interference with speech. Several studies have been conducted over the last 30 years resulting in various noise level criteria for speech interference.

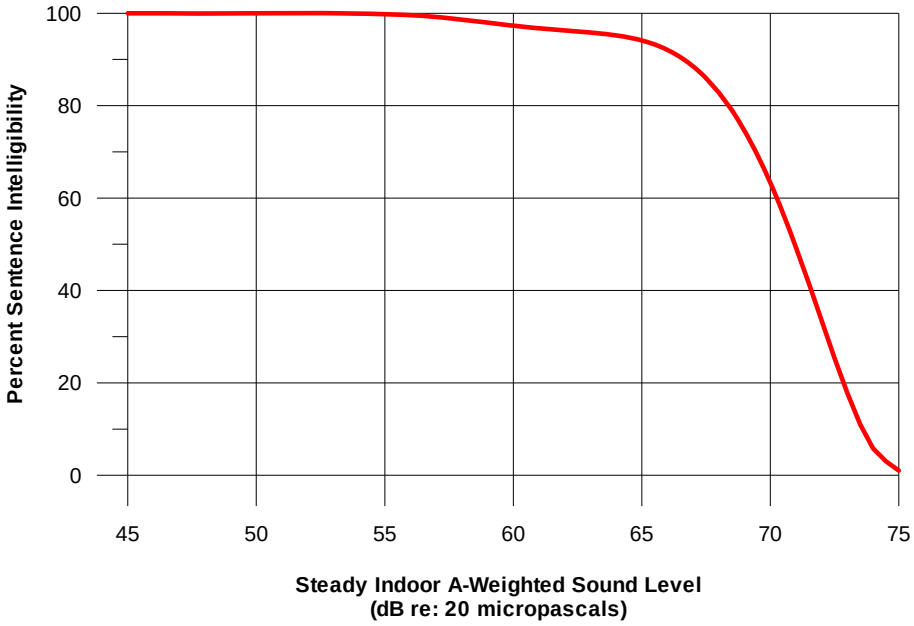
As an aircraft approaches and its sound level increases, speech becomes harder to hear. As the ambient level increases, the speaker must raise his/her voice, or the individuals must get closer together to continue talking. For typical communication distances of 3 or 4 feet (1 to 1.5 meters), acceptable outdoor conversations can be carried on in a normal voice as long as the ambient noise outdoors is less than about 65 dBA (FICON, 1992). If the noise exceeds this level, intelligibility would be lost unless vocal effort was increased or communication distance was decreased.

Indoor speech interference can be expressed as a percentage of sentence intelligibility between two average adults with normal hearing, speaking fluently in relaxed conversation approximately one meter apart in a typical living room or bedroom (EPA, 1974). Intelligibility pertains to the percentage of speech units correctly understood out of those transmitted, and specifies the type of speech material used, i.e. sentence or word intelligibility (ANSI, 1994). As shown in Figure 4, the percentage of sentence intelligibility is a non-linear function of the (steady) indoor ambient or background sound level (energy-average equivalent sound level (L_{eq})). For an average adult with normal hearing and fluency in the language, steady ambient indoor sound levels of up to 45 dBA L_{eq} are expected to allow 100 percent intelligibility of sentences. The curve shows 99 percent sentence intelligibility for L_{eq} at or below 54 dBA and less than 10 percent intelligibility for L_{eq} greater than 73 dBA. It should be noted that the function is especially sensitive to changes in sound level between 65 dBA and 75 dBA. As an example of the sensitivity, a 1 dBA increase in background sound level from 70 dBA to 71 dBA results in a 14 percent decrease in sentence intelligibility. In contrast, a 1 dBA increase in background sound level from 60 dBA to 61 dBA results in less than 1 percent decrease in sentence intelligibility.

The noise from aircraft events is not continuous, but consists of individual events where the noise level can greatly exceed the background level for a limited period as the aircraft flies over. Since speech interference in the presence of aircraft noise is essentially determined by the magnitude and frequency of individual aircraft flyover events, a time-averaged metric (such as L_{eq}) alone, is not necessarily appropriate when setting standards regarding acceptable levels. In addition to the background levels described above, single event criteria, which account for those sporadic intermittent noisy events, are also essential to specifying speech interference criteria. In order for two people to communicate reasonably using normal voice levels indoors, the background noise level should not exceed 60 dBA

(EPA, 1974). In other words, an indoor noise event that exceeds 60 dBA has the potential to cause speech and communication disruption (Eagan, 2007).

Figure 4
PERCENT SENTENCE INTELLIGIBILITY FOR INDOOR SPEECH



Source: U.S. Environmental Protection Agency, 1974.

1.3.2 Effect on Children's Learning

An important application of speech interference criteria is in the classroom where the percent of words (rather than whole sentences) transmitted and received, commonly referred to as 'word intelligibility,' is critical. For teachers to be clearly understood by their students, it is important that regular voice communication is clear and uninterrupted. Not only does the steady background sound level have to be low enough for the teacher to be clearly heard, but intermittent outdoor noise events also need to be unobtrusive. The steady ambient level, the level of voice communication, and the single event level (e.g., aircraft over-flights) that might interfere with speech in the classroom are measures that can be evaluated to quantify the potential for speech interference in the classroom.

Accounting for the typically intermittent nature of aircraft noise where speech is impaired only for the short time when the aircraft noise is close to its maximum value, different researchers and regulatory organizations have recommended maximum allowable indoor noise levels ranging between 40 and 60 dBA L_{max}. (Lind, et. al., 1998; Sharp and Plotkin, 1984; Wesler, 1986; WHO, 1999; ASLHA, 1995; ANSI, 2002). A single event noise level of 50 dBA L_{max} correlates to 90 percent of the words being understood by students with normal hearing and no special needs seated throughout a classroom (Lind, et. al., 1998). At-risk students may be adversely affected at lower sound levels.

ANSI has developed a standard for classrooms that states that the sound level during the noisiest hour should not exceed a one-hour average L_{eq} of 40 dBA for schools exposed to intermittent noise sources such as aircraft noise (ANSI, 2002). The standard further states that the hourly L_{eq} should not be exceeded for more than 10 percent of the noisiest hour (i.e., L_{eq} should not exceed L_{10}). FAA Order 5100.38C, Airport Improvement Program Handbook, Chapter 7, Section 2, Paragraph 812c(1) indicates that schools should have an A-weighted L_{eq} of 45 dB, or less, during school hours, in the classroom environment. Facilities not typically disrupted by aircraft, such as gymnasiums, cafeterias, or hallways, are not usually eligible for noise insulation. However, ANSI recommends that schools have a maximum one-hour average A-weighted unsteady background noise level of L_{eq} of 40 dB, or less, during school hours. Ancillary spaces, such as gymnasiums and cafeterias are recommended to have a maximum L_{eq} of 45 dB.

1.3.3 Sleep Disturbance

The EPA identified an indoor DNL of 45 dB as necessary to protect against sleep interference (EPA, 1974). Prior to and after the EPA's 1974 guidelines, research on sleep disruption from noise has led to widely varying observations. In part, this is because: (1) sleep can be disturbed without causing awakening, (2) the deeper the sleep the more noise it takes to cause arousal, (3) the tendency to awaken increases with age, and (4) the person's previous exposure to the intruding noise and other physiological, psychological, and situational factors. The most readily measurable effect of noise on a sleeping person is the number of arousals or awakenings.

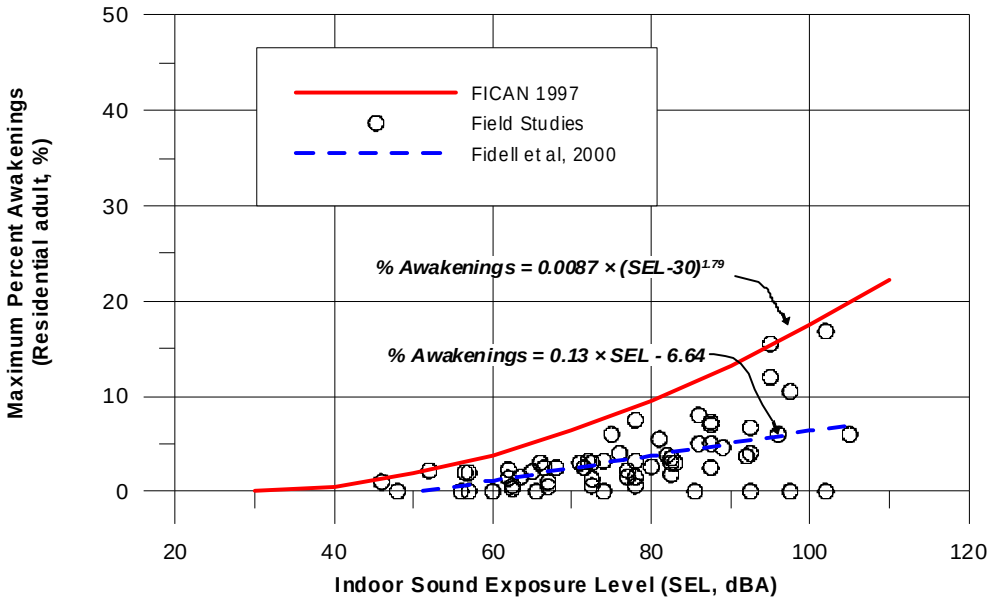
A study performed in 1992 by the Civil Aviation Policy Directorate of the Department of Transportation in the United Kingdom concluded that average sleep disturbance rates (those that are unrelated to outdoor noise) are unlikely to be affected by aircraft noise at outdoor levels below an L_{max} of 80 dBA (Ollerhead, 1992). At higher levels of 80-95 dBA L_{max} the chance of the average person being awakened is about 1 in 75. The study concludes that there is no evidence to suggest that aircraft noise at these levels is likely to increase the overall rates of sleep disturbance experienced during normal sleep. However, the authors emphasize that these conclusions are based on 'average' effects, and that there are more susceptible individuals and there are periods during the night when people are more sensitive to noise, especially during the lighter stages of sleep.

In June 1997, the U.S. Federal Interagency Committee on Aviation Noise (FICAN) reviewed the sleep disturbance issue along with data from the 1992 FICON recommendations (which was primarily the result of many laboratory studies) and presented a new sleep disturbance dose-response prediction curve (FICAN, 1997) as the recommended tool for analysis of potential sleep disturbance for residential areas. The FICAN curve, shown in Figure A-5, was based on data from field studies of major civilian and military airports. For an indoor SEL of 60 dBA, Figure 5 predicts a maximum of approximately 5 percent of the exposed residential population would be behaviorally awakened. FICAN cautions that this curve should only be applied to long-term adult residents.

The focus of this research was the human response to individual SELs rather than the response to multiple events in the same night. The relationship of SEL and percent awakenings presented in the figure is for each event, not a cumulative percent awakening for all events during a sleep period.

Other studies indicate that for a good night's sleep, the number of noise occurrences plays a role as important as the level of the noise. Vallet & Vernet (1991) recommend that, to avoid any adverse effects on sleep, indoor noise levels should not exceed approximately 45 dBA L_{max} more than 10-15 times per night and that lower levels might be appropriate to provide protection for sensitive people. This L_{max} level is equivalent to an SEL of approximately 55 dBA indoors.

FIGURE 5
SLEEP DISTURBANCE DOSE-RESPONSE RELATIONSHIP

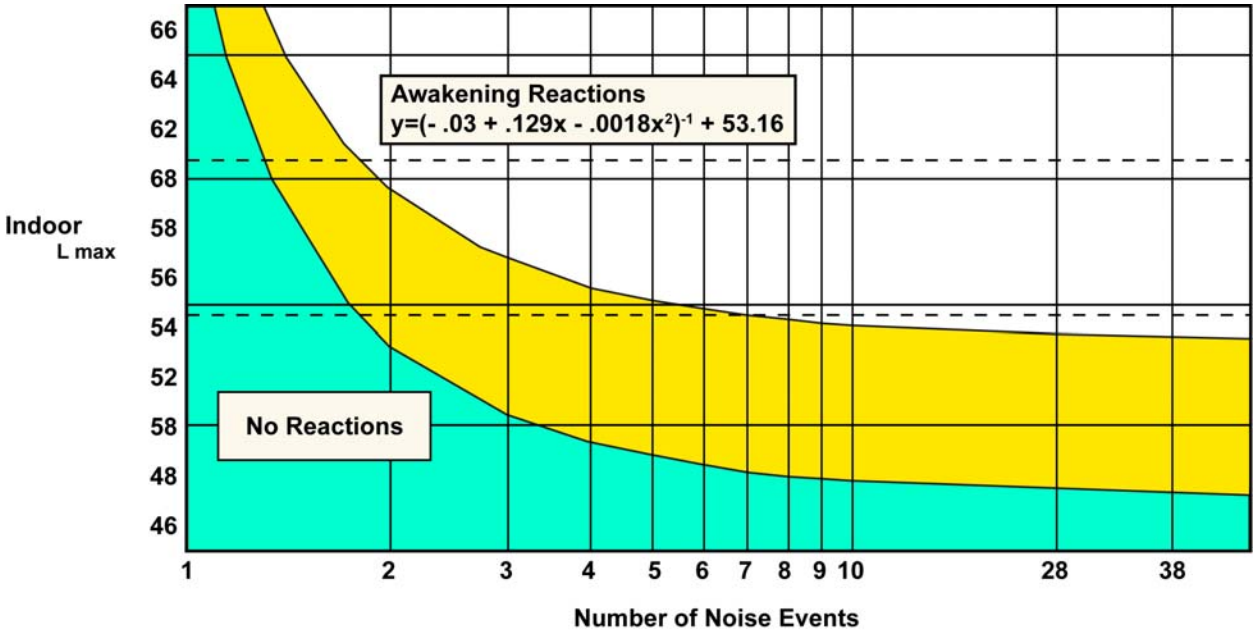


Source: FICAN, 1997; Fidell, et. al., 2000;

Griefahn (1978) suggests that awakenings from aircraft overflights are dependent upon the number of events and their sound levels. Figure 6 illustrates Griefahn's compilation of data indicating the number of events and noise level that constitute a threshold for sleep. The data in her research were based on levels at which the most sensitive 10 percent of the population would be disturbed, and includes a correction to these levels to represent the most sensitive sleep state and age group. The lower curve represents the indoor noise level (expressed in terms of L_{max}) and number of noise event combinations at which fewer than 10 percent of the population will show signs of sleep interference. The upper curve indicates the level at which more than 90 percent of the population will be awakened for the given combination of noise levels and noise events. Griefahn suggests that, to avoid any long-term health effects, the upper curve should not be exceeded. The bottom curve represents a preferred, preventative

goal. The curves indicate that nearly 90 percent of people will show signs of sleep interference in the presence of 10 to 30 flights per night at an approximate indoor L_{max} of 54 dB. They also show that for the same number of flights but at an indoor L_{max} of 48 dB, the percentage of the most sensitive population affected is much lower, at less than 10 percent, (with 'no reaction' for the less sensitive population).

FIGURE 6
NUMBER OF AWAKENINGS AS A FUNCTION OF MAXIMUM INDOOR NOISE LEVEL



Source: Griefahn, B. (1990). "Critical Loads for Noise Exposure During the Night," InterNoise 90, pg. 1165.

1.3.4 Vibration from Aircraft Operations

The effects of vibration in a residence are observed in two ways; it is felt by the occupant, or it causes physical damage to the structure. Subjective detection can be one of direct perception from rattling of windows and ornaments, or dislodgement of hanging pictures and other loose objects. Structural damage may be either architectural (cosmetic or minor effects) such as plaster cracking, movement or dislodgements of wall tiles, cracked glass, etc., or major, such as cracking walls, complete collapsing of ceilings, etc., which is generally considered to impair the function or use of the dwelling.

Research has shown that vibration can be felt at levels well below those considered to cause structural damage. Complaints from occupants are usually due to the belief that if vibration can be felt, then it is likely to cause damage. Residents living in proximity to airports often complain that aircraft operations cause vibration induced damage to their homes. Research has also shown however, that the slamming of doors or footfalls within a building can produce vibration levels above those produced by aircraft activities (Reverb Acoustics Noise and Vibration Consultants, 2005).

Since people spend the majority of time indoors, the perceptions of aircraft noise leading to annoyance or complaint response and potentially to structural/architectural effects are directly and indirectly affected by the building structure. The acoustic loads resulting from aircraft noise can induce vibration in the structure, which can in turn, result in radiation of noise into its interior, rattling of items in contact with the structure, the perception of the occupants that the structure is vibrating, and the assumption that the vibration is causing structural/architectural effects. Consequently, the response of buildings, particularly older residential structures, to aircraft noise and the resulting effects on human and structural response has been the subject of considerable research.

C-weighted metrics appear to correlate well with subjective evaluations of low frequency noise from aircraft operations (Fidell, et al, 2002; Eagan, 2006). Perceptible wall vibrations in homes are likely to occur for C-weighted levels between 75 and 80 dB (Eagan, 2006). The likelihood of rattle due to low frequency noise increases notably for C-weighted levels within the range of 75 to 80 dB (Hubbard, 1982, Fidell, et. al, 2002). Rattle always occurs above a threshold of roughly 97 dB L_{max} (Hodgdon, 2007). In addition, C-weighting is the only weighting scale currently in the Integrated Noise Model (INM) that addresses low-frequency noise. However, it should be noted that INM predictions are based on extrapolation of A-weighted aircraft sound levels. The same data are used in C-weighted predictions by simply reverse filtering the A-weighted levels. The predictions do not extend to frequencies less than 50 Hz where much of rattle and structural response can be attributed. This is a major limitation of INM C-weighted predictions for vibration assessment.

Generally, fixed-wing subsonic aircraft do not generate vibration levels of a frequency or intensity high enough to result in damage to structures. It has been found that exposure to normal weather conditions, such as thunder and wind, usually have more potential to result in significant structural vibration than aircraft (FAA, 1985). Two studies involving the measurement of vibration levels resulting from aircraft operations upon sensitive historic structures concluded that aircraft operations did not result in significant structural vibration.

1.4 FAA METHODOLOGY FOR EVALUATING AIRCRAFT NOISE

1.4.1 Impact Analysis Criteria and Thresholds

The evaluation of the Key West International Airport (KWIA) airport noise environment was completed using the methodologies and standards specified in title 14 CFR Part 150 (Part 150, 2004). The following paragraphs summarize the pertinent requirements of these documents applicable to conducting a noise analysis and how they were applied in this NEM.

The regulations and guidance documents require that the cumulative noise energy exposure of individuals to noise resulting from aviation activities be established in terms of yearly day/night average sound level (DNL) as the FAA's primary metric. All detailed noise analyses must be performed using the most current version of the FAA's Integrated Noise Model (INM). For this analysis, INM, Version 7.0a, was used to model aircraft noise exposure.

The noise analysis was conducted to reflect current conditions (2008) and forecast conditions (2013). This analysis includes maps and other means to depict land uses within the noise impact area. The addition of flight tracks is helpful in illustrating where aircraft normally fly.

The following information was disclosed for the current conditions (2008) and forecast conditions (2013).

1. The number of people living or residences within each noise contour above DNL 65 for both the Existing and Future Noise Exposure Map (NEM).
2. The location and number of noise sensitive uses (e.g., schools, churches, hospitals, parks, recreation areas) exposed to DNL 65 or greater for both the Existing and Future NEM.
3. Mitigation measures in effect or proposed and their relationship to the Existing and Future NEM.

1.4.2 The Integrated Noise Model

Noise contours generated by the FAA's INM do not depict a strict demarcation of where the noise levels end or begin. Their purpose is to describe the generally expected noise exposure. It must be recognized that although the INM is the current state-of-the-art aircraft noise modeling software, input variables to the INM require several simplifying assumptions to be made, such as: aircraft types flown, flight track utilization, day/night operational patterns, and arrival/departures profiles flown. Further, the noise contours represent average annual conditions rather than single event occurrences. Noise exposure on any one day may be greater or less than the average day. The noise model is useful for comparison of noise impacts between scenarios and provides a consistent and reasonable method to conduct airport noise compatibility planning.

The INM has been the FAA's standard tool since 1978 for determining the predicted noise impact near airports. The FAA developed the INM computer model and it is the required method to predict airport noise contours. The FAA continually enhances the INM to take advantage of increased computer speed, to incorporate new aircraft types into the aircraft noise database, and to improve its noise computation

algorithms. INM Version 7.0a was used to produce the noise contours and to analyze noise levels at sensitive sites.

INM includes the capability to turn off lateral attenuation for helicopters and propeller aircraft, in order to simulate propagation over acoustically hard surfaces such as water or rocks. This capability was utilized to take into account the effect of the water surrounding the airport.

The model produces noise exposure contours that are used for land use compatibility maps. Its program includes built in tools for comparing contours and utilities that facilitate easy export to Geographic Information Systems (GIS). The model can also calculate predicted noise at specific sites such as hospitals, schools, or other sensitive locations. For these grid points, the model reports detailed information for the analyst to determine which events contribute most significantly to the noise at that location.

The INM is a computer model that, during an average 24-hour period, accounts for each aircraft flight along flight tracks leading to or from the airport, or overflying the area of interest. Flight track definitions are coupled with information in the program database relating to noise levels at varying distances and flight performance data for each distinct type of aircraft selected. In general, the model computes noise levels at regular grid locations at ground level around the airport and within the area of interest. The distance to each aircraft in flight is computed, and the associated noise exposure of each aircraft flying along each flight track within the vicinity of the grid location is determined. The logarithmic acoustical energy levels for each individual aircraft are then summed for each grid location. The model can create contours of specific noise levels based on the acoustical energy summed at each of the grid points. The cumulative values of noise exposure at each grid location are used to interpolate contours of equal noise exposure. The model can also compute noise levels at user-defined points on the ground.

The noise analyses must be performed using the INM standard and default data, unless there is sufficient justification for modification. Modification to standard or default data requires written approval from the FAA's Office of Environment and Energy (AEE). Standard INM modeling of departure operations begins at the start of takeoff roll and ends when aircraft reach an altitude of 10,000 feet above field elevation (AFE). Standard modeling of arrival operations begins when the aircraft is at an altitude of 6,000 feet and ends when the aircraft land and completes the application of reverse thrust.

All computer model input data should reasonably reflect current and forecasted conditions. User-supplied information required to run the model includes:

- A physical description of the airport layout, including location, length and orientation of all runways, and airport elevation,
- The aircraft fleet mix for the average day,
- The number of daytime flight and run-up operations (7 a.m. to 9:59 p.m.),
- The number of nighttime flight and run-up operations (10 p.m. to 6:59 a.m.),
- Runway utilization rates,
- Primary departure and arrival flight tracks, and

- Flight track utilization rates.

1.4.2.1 Aircraft Operations and Fleet Mix

Fleet mix defines the various types of aircraft and allows development of very specific input data, such as engine type, title 14 CFR part 36 Noise Stage Certification, gross weight, and departure stage length. The INM aircraft database contains actual noise and performance data for 253 types of aircraft. Although the INM aircraft database provides a large selection of aircraft to model, it does not contain every known aircraft. For this reason, the FAA has developed an official aircraft substitution list, containing 259 types of aircraft, which allows the modeler to substitute similar aircraft when necessary for modeling purposes. These substitutions represent a very close estimate of the noise produced by the actual aircraft. All modeled aircraft in this study are either a true representative of an aircraft type or an FAA approved substitution.

1.4.2.2 Time of Day

The time of day that aircraft operations occur is a very important factor in the calculation of cumulative noise exposure. The DNL treats nighttime (10:00 p.m. to 6:59 a.m.) noise differently from daytime (7:00 a.m. to 9:59 p.m.) noise. DNL multiplies each nighttime operation by 10. This weighting of the operations effectively adds 10 dB to the A-weighted levels of each nighttime operation. This weighting factor is applied to account for people's greater sensitivity to nighttime noise. In addition, events during the night are often more intrusive because the ambient sound levels during this time are usually lower than daytime ambient sound levels.

1.4.2.3 Runway Utilization

Runway use refers to the frequency with which aircraft utilize each runway during the course of a year as dictated or permitted by wind, weather, aircraft weight, and noise considerations. The more often a runway is used throughout the year, the more noise is created in areas located off each end of that runway.

1.4.2.4 Flight Tracks and Flight Track Utilization

Flight tracks depict the actual path of aircraft over the ground for aircraft arrival, departure, closed pattern (touch-and-go), and overflight operations. In order to calculate the annual average noise exposure, it is necessary to identify the predominant arrival, departure and pattern flight tracks for each runway, and the number of aircraft that used each runway and flight track. These are significant factors in determining the extent and shape of the noise contours and noise levels at noise-sensitive receptors.

The use of individual flight tracks is dependent on a variety of factors including Air Traffic Control procedures, the aircraft's origin or destination, aircraft performance, weather conditions, and any noise abatement policies.

INM representative flight tracks at KWIA were developed by analyzing radar data, and by field observation. These tracks are meant to be representative of the highest concentration of actual flight tracks at KWIA. Modeled flight tracks do not represent the precise paths flown by all aircraft utilizing KWIA. Instead, they represent the primary flight corridors for the aircraft using the airport.

1.4.2.5 Aircraft Profiles

The INM default database includes profiles modeling aircraft departures up to 10,000 feet above field elevation (AFE) and arrivals from 6,000 feet AFE.

Arrival Profiles

The INM contains one approach profile for most standard aircraft, which represents a 3-degree descent from an altitude of 6,000 feet above field elevation. Some standard general aviation aircraft also have an approach profile representing a 5-degree descent. The assumptions used in the INM are based upon "average" operational data; flight procedures etc. and standard practice is to assign standard 3-degree INM approach profiles. All arrival profiles used in this study are INM default profiles.

Departure Profiles

The INM relies on the trip length of a given flight to determine the departure weight and associated departure profile. Default procedural profiles are assumed. Three default procedural profiles are available, these are the "Standard," "ICAO-A," and "ICAO-B" departure profiles. The assumptions used in the INM are based upon "average" operational data; aircraft passenger load factors, fuel reserves, flight procedures etc. and standard practice is to assign INM profiles based on trip length. In some cases, the analysis of aircraft departure weight is also used. All departure profiles used in this study are INM default profiles, and stage length is based on trip length.

1.4.2.6 Departure Stage Length

The INM database contains several departure profiles for each fixed-wing aircraft type representing the varying performance characteristics for that aircraft at a particular takeoff weight. Use of appropriate departure profiles is an important component of calculating DNL noise exposure contours. Historically, it has been easier to obtain trip length data than average weight data, so the INM uses "departure stage length" to best represent typical aircraft takeoff weight.

Departure stage length is the distance between the departure airport and the destination airport. As the departure stage length increases, the aircraft's required fuel load and takeoff weight also increase. The increase in takeoff weight equates to a decrease in aircraft takeoff and climb performance. A decrease in aircraft performance results in a longer takeoff departure roll and decreased climb rates. These performance characteristics produce increased noise exposure impacts. The aircraft's noise impacts are greater because the aircraft is producing noise closer to the ground longer. The departure stage lengths are defined in Table 1.

TABLE 1
INM 7.0 STAGE LENGTH DISTANCES

Stage Number	Distance (nm)
1	0-500
2	501-1,000
3	1,001-1,500
4	1,501-2,500
5	2,501-3,500
6	3,501-4,500
7	4,501-5,500
8	5,501-6,500
9	> 6,500

Source: FAA INM Version 7.0 User's Guide

1.4.2.7 Noise Model Outputs

INM has many output capabilities. Charts, graphics, and tables can be viewed, exported, or printed. The most common outputs are the noise contours that INM produces. Additionally, there are many other outputs, such as aircraft performance characteristics, grid point analyses for several noise metrics, and input characteristics such as runways and flight tracks. A complete description of model outputs can be found in the INM Users Guide (FAA, 2007).

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Appendix C. Air Quality Analysis Report

(prepared by JJR/April 2009)

Technical Memorandum: Air Quality Analysis
Ann Arbor Municipal Airport Environmental Assessment

April 9, 2009
JJR No. 50178.000

Pollutant Health Effects

Air pollutants are contaminants in the atmosphere. Many man-made pollutants are a direct result of the incomplete combustion of fuels including coal, oil, natural gas, and gasoline. The principal factors affecting air pollution concentrations with respect to transportation projects are traffic, emissions factors, roadway type, terrain, meteorological parameters, and ambient air quality. The air pollutants listed here are the most common when dealing with transportation projects.

Carbon Monoxide (2006 Annual Air Quality Report for Michigan, MDEQ, page 4)

Carbon monoxide (CO) is a colorless, odorless, and poisonous gas created when fuel does not burn completely. The primary sources for outdoor exposure to CO are the exhaust from automobiles, industrial processes, non-transportation fuel combustion, and natural sources such as forest fires. Elevated levels of CO can cause visual impairment, interfere with mental acuity, and decrease work performance in the completion of complex tasks. High CO pollution levels can affect anyone; however, people who suffer from cardiovascular disease are most at risk.

Ozone (2006 Annual Air Quality Report for Michigan, MDEQ, page 5)

Ozone (O_3), a key ingredient in urban smog is created at ground-level by photochemical reactions involving nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight. Major sources of NO_x and VOCs are engine exhaust, emissions from industrial facilities, combustion from power plants, gasoline vapors, chemical solvents, and biogenic emissions from natural sources. Elevated O_3 exposure can irritate a person's airways, reduce lung function, aggravate asthma and chronic lung diseases, and inflame and damage the cells lining the lungs. O_3 may also reduce the immune system's ability to fight off bacterial infections in the respiratory system, and long-term, repeated exposure may cause permanent lung damage.

Nitrogen Dioxide (2006 Annual Air Quality Report for Michigan, MDEQ, page 5)

Nitrogen dioxide (NO_2) is a highly reactive gas that is formed through the oxidation of nitric oxide. The major sources of man-made NO2 emissions come from high-temperature combustion processes. Evidence suggests that long-term exposures to NO2 may lead to increased susceptibility to respiratory infection and may cause structural alterations in the lungs.

Particulate Matter (2006 Annual Air Quality Report for Michigan, MDEQ, page 6)

Particulate Matter (PM) is a general term used for a mixture of solid particles and liquid droplets found in the air which is further categorized according to size. PM_{10} are "coarse particles" less than 10 μm in diameter and $PM_{2.5}$ are much smaller "fine particles" equal to or less than 2.5 μm in diameter. PM_{10} consists of primary particles that can originate from power plants, various manufacturing processes, wood stoves and fireplaces, fugitive dust sources, and forest fires. $PM_{2.5}$ can come directly from primary particle emissions or through secondary reactions that include VOCs, SO_2, and NO_x emissions originating from power plants, motor vehicles, industrial facilities, and other types of combustion sources. Exposure to PM affects breathing and the cellular defenses of the lungs, aggravates existing respiratory and cardiovascular ailments, and has been linked with heart and lung disease.

Sulfur Dioxide (2006 Annual Air Quality Report for Michigan, MDEQ, page 6)

Sulfur dioxide (SO_2) is formed by the burning of sulfur-containing material and can react with other atmospheric chemicals to form sulfuric acid. In liquid form, it is found in clouds, fog, rain, aerosol particles, and in surface films on these particles. Coal burning power plants are the largest source of SO_2 emissions. SO_2 is also emitted from smelters, petroleum refineries, pulp and paper mills, transportation sources, and steel mills. Where SO_2 is emitted, PM is often emitted too. Exposure to elevated levels of SO_2 aggravates existing cardiovascular and pulmonary disease. SO_2 and PM together may cause respiratory illness, alteration in the body's defense and clearance mechanisms, and aggravation of existing cardiovascular disease. SO_2 and NO_x together are the major precursors to acid rain, which is associated with the acidification of soils, lakes, and streams and accelerated corrosion of buildings and monuments.

Lead (2006 Annual Air Quality Report for Michigan, MDEQ, page 4)

Lead (Pb) is a highly toxic metal found in coal, oil, and waste oil. It is also found in municipal solid waste and sewage sludge incineration and may be released to the atmosphere during their combustion. The highest air concentrations of Pb are found in the vicinity of smelters and battery manufacturers. Other industrial sources include Pb glass, Portland cement, and solder production. Pb primarily accumulates in the blood, bones, and soft tissues of the body, and can adversely affect the kidneys, liver, nervous system, and other organs.

Regulatory Standards

The Clean Air Act of 1970, the 1977 Clean Air Act Amendments and the 1990 Clean Air Act Amendments (CAAA) are the applicable regulations that govern air quality for the project area. Under the CAAA, the U. S. Department of Transportation cannot fund, authorize, or approve Federal actions to support programs or projects that are not first found to conform to the Clean Air Act requirements. The air quality provisions of the Clean Air Act (CAA), as amended, are intended to ensure the integration of air quality planning in all transportation-related projects.

The establishment of the National Ambient Air Quality Standards (NAAQS) by the Environmental Protection Agency (EPA) was directed in the Clean Air Act, and their attainment and maintenance was reinforced in later amendments. The goal of air quality monitoring and actions is to ensure that the air quality levels of the various pollutants do not exceed the set standards. These standards are summarized in Table 1.

Table 1: National Ambient Air Quality Standards (NAAQS)

Criteria Pollutant	Primary (Health Related)		Secondary (Welfare Related)	
	Type of Average	Standard Level Concentration	Type of Average	Standard Level Concentration
Carbon Monoxide, CO	8-hour 1-hour	9 ppm (10 mg/m^3) 35 ppm (40 mg/m^3)	No Secondary Standard	
Lead, Pb	Maximum Quarterly Average	1.5 μg/m^3	Same as Primary Standard	
Nitrogen Dioxide, NO_2	Annual Arithmetic Mean	0.053 ppm (100 μg/m^3)	Same as Primary Standard	
Ozone, O_3	4th Highest 8-Hour Daily Maximum	0.085 ppm (157 μg/m^3)	Same as Primary Standard	
Particulate Matter, PM_{10}	24-Hour	150 μg/m^3	Same as Primary Standard	
Particulate Matter, $PM_{2.5}$	Annual Arithmetic Mean	15 μg/m^3	Same as Primary Standard	
	98th percentile 24-hour	35 μg/m^3		
Sulfur Dioxide, SO_2	Annual Arithmetic Mean	0.03 ppm (80 μg/m^3)	3-Hour	0.5 ppm (1300 μg/m^3)
	24-Hour	0.14 ppm (365 μg/m^3)		

Attainment Status

The Air Quality Division of the Michigan Department of Environmental Quality (MDEQ) produces an Annual Air Quality Report, which outlines the attainment status of the state. According to the 2006 Air Quality Report the project study area is in attainment with the NAAQS for ambient concentrations of carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and coarse particulate matter (PM_{10}).

Ozone

All Michigan counties are now designated as attainment for the 1-hour O_3 NAAQS. The 1-hour standard has since been revoked by the EPA. In 1997, EPA issued the average-based 8-hour ozone NAAQS (attained when the 3-year average of the 4th highest value is below 0.085 ppm). In 2004, utilizing 2001-2003 monitoring data, EPA designated 25 counties in Michigan as nonattainment for the 8-hour O_3 NAAQS, of which Washtenaw County was included. A nonattainment designation indicates that the area does not meet the national health-based standard, or contributes to violations of the standard in another area. Upon review of the O_3 data collected for the period of 2004-2006, Washtenaw County is now meeting the 8-hour O_3 NAAQS and is designated as marginal nonattainment. The MDEQ Air Quality Division has requested re-designation of Washtenaw County to attainment

Particulate Matter

EPA promulgated the $PM_{2.5}$ NAAQS on July 18, 1997. In the January 5, 2005 Federal Register (FR), EPA announced their $PM_{2.5}$ designations, effective April 5, 2005, utilizing the 2001-2003 three year annual average data. Based upon this data, Washtenaw County was designated as nonattainment for $PM_{2.5}$. As stated in the FR notice, States were allowed to submit 2004 $PM_{2.5}$ quality-assured monitoring data, calculate the 2002-2004 three-year annual average, and request changes in attainment status if this data and supporting rationale showed an area should instead be designated attainment.

On February 22, 2005, MDEQ submitted documentation demonstrating that monitors in the counties surrounding Wayne County (Livingston, Oakland, Macomb, Monroe, St. Clair, and Washtenaw Counties) are not violating the standard and that Wayne County is the only county showing nonattainment. The MDEQ submittal also included information supporting the conclusion that air pollution emissions in the surrounding six counties do not cause the nonattainment levels in Wayne County. However, the EPA denied Michigan's request for reconsideration as they believe the surrounding counties contribute to the overall air quality violations at the Wayne County monitors. The Southeast Michigan Council of Governments (SEMCOG) and the MDEQ are currently developing an emissions control strategy to bring the region into attainment by 2010 as required by the EPA.

Air Traffic Modeling Parameters

The Federal Aviation Administration (FAA) created the Air Quality Procedures for Civilian Airports & Air Force Bases in an effort to aid in assessing the impacts at airports and air bases. Included in the procedures is a flow chart that can be used to determine whether a NAAQS analysis is required. The first step in the flow chart is to determine whether the proposed action is located in a nonattainment or maintenance area. As stated previously, the project area is currently designated as marginal nonattainment for ozone and nonattainment for particulate matter.

Since the project area is in a nonattainment area the next step is to determine whether the proposed project is exempt or presumed to conform. For this analysis, it will be assumed that the project is neither exempt nor presumed to conform.

The next step is to determine whether direct emissions will occur as a result of the proposed project. The FAA defines a direct emission as "an effect that is caused by the implementation and/or operation of an action that occurs at the same time and place" (Air Quality Procedures for Civilian Airports & Air Force Bases, 1997, page xvi). The proposed project is the extension of an existing runway. It can be assumed that direct emissions are already occurring and will increase as a result of increased usage of the airport.

Once it is determined whether direct emissions are occurring, it needs to be determined whether indirect emissions are reasonably feasible as a result of the proposed project. The FAA defines an indirect emission as "those caused by the implementation and/or operation of an action, are reasonably foreseeable, but which occur later in time and/or are farther removed in distance from the action itself" (Air Quality Procedures for Civilian Airports & Air Force Bases, 1997, page xviii). For this project, it can be assumed that no indirect emissions will occur. Therefore, the total emissions are equal to the direct emissions.

After determining whether any indirect emissions occur, an analysis of the airport activity is examined. The Ann Arbor Municipal Airport is considered to be a general aviation airport. For this type of airport, if the activity is forecasted to be 180,000 yearly operations, an NAAQS assessment is

required. The yearly activity for the AAMA is expected to be approximately 70,000 operations per year. Consequently, an NAAQS assessment will not be required.

After examining the direct and indirect emissions, a conformity assessment may also need to be performed based on whether the net emissions exceed general conformity threshold levels and are regionally significant. The Michigan Department of Transportation Bureau of Aeronautics completed the Michigan Airports Air Quality Study in May 1996. In this study, an air pollutant emission inventory was created for seven general aviation airports based on their proposed development. The air pollutant emission inventory indicates that the emissions from all of the airports studied would be well below the general conformity threshold rates. Since the AAMA is comparable in size and activity to the seven airports studied, it can be assumed that the emissions resulting from the proposed project will not exceed the general conformity threshold levels and will not be regionally significant. Therefore, a conformity determination is not required and the proposed project is presumed to conform to the state implementation plan.

Automobile Modeling Parameters

As stated previously, Washtenaw County is designated as being in attainment with the NAAQS for carbon monoxide. The primary NAAQS for CO are 35 parts per million (ppm) for the maximum one-hour concentration, and nine ppm for the maximum eight-hour concentration. To be in attainment with the NAAQS, these concentrations may not be exceeded more than once annually at a given site. In order to determine whether the proposed project will be in attainment with the NAAQS, a micro-scale air quality analysis was conducted. Through this analysis, maximum one-hour CO concentrations for the Existing Condition (2008) and the No Build Condition and Proposed Alternative in the design year (2030) were estimated.

The calculation of CO concentrations was performed through the use of two computer models. The first model, MOBILE6.2.03, developed by the Environmental Protection Agency (EPA), provided the means for calculating vehicular emission factors for the range of expected vehicle types. The second model CAL3QHC, which is also known as the California Line Source Dispersion Model is used to calculate CO concentrations at receptor sites. The EPA has improved upon this program in order to allow analysis of air quality conditions at road intersections, where highest concentrations of pollutants are typically found.

The emission factors determined through MOBILE6.2, in addition to receptor locations, peak hourly traffic volumes, meteorological conditions and roadway geometry constituted the input data for CAL3QHC. The aforementioned parameters were conservatively selected in order to represent a worst-case scenario for each of the conditions. Background CO concentrations were obtained from the MDEQ's 2006 Air Quality Report. Since there is not a single monitoring site near the project site, the average of the highest recorded value for all nine sites was used for the background concentrations. The resulting one-hour background concentration used in the model was 3.0 ppm.

Locations along the various road corridors were selected for analysis of air quality conditions. Locations were chosen based upon existing traffic volumes and future projections, nearby proximity of sensitive receptors, and representative location within the overall project vicinity. Layout plans, air photos, and site observations were used to determine the locations of sensitive receptors near the studied intersections. The sensitive receptors included residential properties and open spaces (see Figure X).

Traffic volumes were obtained from the SEMCOG website and the Washtenaw Area Transportation Study (WATS) website for the existing condition. WATS also determined the increase in the traffic volumes for the future conditions. According to their models, State Street and Lohr Road will experience a cumulative increase in traffic volume of 3.3% for the future condition. Similarly, Ellsworth Road will experience a cumulative increase in traffic volume of 3.7% for the future condition.

A persistence factor is the ratio between the 8-hour and 1-hour CO concentration and is used to estimate the 8-hour CO concentration based on the 1-hour CO concentration. Three seasons of monitoring data were obtained from the MDEQ's Air Quality Reports and are tabulated in Table 2. The persistence factor for each station and each year was calculated by dividing the 8-hour CO concentration by the 1-hour CO concentration. The average of all of the persistence factors was calculated to be 0.70, which compares well with tabulated values for urban locations. Therefore, the 8-hour CO concentrations were determined by multiplying the persistence factor of 0.70 by the 1-hour CO concentrations as calculated by CAL3QHC.

Table 2: Persistence Factor

Station	One-Hour CO Concentration (ppm)			Eight-Hour Concentration (ppm)			Persistence Factor		
	2004	2005	2006	2004	2005	2006	2004	2005	2006
Otisville	1.1	--	--	0.6	--	--	0.55	--	--
Grand Rapids	3.0	2.8	2.7	2.2	2.0	2.0	0.73	0.71	0.74
Warren	3.3	4.8	3.5	2.1	2.5	3.0	0.64	0.52	0.86
Oak Park	4.1	3.7	3.1	2.4	2.2	2.6	0.59	0.59	0.84
Seney	--	0.8	--	--	0.7	--	--	0.88	--
Allen Park	3.6	2.5	3.9	3.1	1.8	3.2	0.86	0.72	0.82
Detroit-Linwood	4.1	3.7	3.7	2.6	2.6	2.8	0.63	0.70	0.76
Livonia	1.4	2.1	2.9	1.2	1.7	1.3	0.86	0.81	0.45
Detroit-Newberry	--	2.9	--	--	1.8	--	--	0.62	--
Detroit-W. Lafayette	--	2.8	1.5	--	1.8	1.0	--	0.64	0.67
Yearly Average	2.9	2.9	3.0	2.0	1.9	2.3	0.69	0.69	0.73
Category Average	3.0			2.1			0.70		

Automobile Modeling Results

Existing Condition

CAL3QHC was used with the existing road centerlines and traffic volumes to determine one-hour CO levels. The maximum one-hour CO concentration is 5.2 ppm and the average concentration is 3.6 ppm. No receptors exceed the NAAQS one-hour standard of 35 ppm. The persistence factor calculated previously was used to determine the eight-hour CO concentrations from the one-hour concentrations. The resulting maximum eight-hour concentration is 3.6 ppm and the average concentration is 2.5 ppm. No receptors exceed the NAAQS eight hour standard of 9 ppm.

No-Build Condition

The increased traffic volumes (as determined by WATS) were adjusted in the CAL3QHC model to the 2030 values to determine the future CO concentrations. With the increased traffic, the model shows that there will be no significant increase in the CO concentrations. The maximum one-hour concentration remains at 5.2 ppm, and the maximum eight-hour concentration remains at 3.6 ppm. No receptors exceed the NAAQS one-hour or eight-hour standards. The average one-hour CO

concentration is 3.6 ppm, the average eight-hour CO concentration is 2.5 ppm, both of which are identical to the averages for the Existing Condition. Twenty seven receptors experience an increase in one-hour and eight-hour concentrations with a maximum one-hour increase of 0.3 ppm and a maximum eight-hour increase of 0.2 ppm.

Consequences of the Preferred Alternative

There will be no revisions to the existing roadway system as a result of the Preferred Alternative. Consequently, the air model results for the Preferred Alternative will be identical to those for the No-Build Condition. Since the No-Build Condition analysis shows that no sites will exceed the one-hour or eight-hour NAAQS standard, the Preferred Alternative also will have no sites exceeding the NAAQS standard.

During construction, appropriate mitigation measures, such as covering and spraying stock piles with water, should be utilized to minimize potential short term negative impacts which may be experienced locally due to fugitive dust, construction vehicle exhaust, or other fumes related to construction materials and equipment.

Affected Environment

Climate Change/Greenhouse Gases

Of growing concern is the impact of proposed projects on climate change. Greenhouse gases are those that trap heat in the earth's atmosphere. Both naturally occurring and anthropogenic (man-made) greenhouse gases include water vapor (H_2O), carbon dioxide (CO_2),[1] methane (CH_4), nitrous oxide (N_2O), and ozone (O_3).[2]

Research has shown that there is a direct link between fuel combustion and greenhouse gas emissions. Therefore, sources that require fuel or power at an airport are the primary sources that would generate greenhouse gases. Aircraft are probably the most often cited air pollutant source, but they produce the same types of emissions as cars. Aircraft jet engines, like many other vehicle engines, produce carbon dioxide (CO_2), water vapor (H_2O), nitrogen oxides (NO*x*), carbon monoxide (CO), oxides of sulfur (SO*x*), unburned or partially combusted hydrocarbons (also known as volatile organic compounds (VOCs)), particulates, and other trace compounds.

According to most international reviews, aviation emissions comprise a small but potentially important percentage of anthropogenic (human-made) greenhouse gases and other emissions that contribute to global warming. The Intergovernmental Panel on Climate Change (IPCC) estimates that global aircraft emissions account for about 3.5 percent of the total quantity of greenhouse gas from human activities.[3] In terms of U.S. contribution, the U.S. General Accounting Office (GAO) reports that aviation accounts "for about 3 percent of total U.S. greenhouse gas emissions from human sources" compared with other industrial sources, including the remainder of the transportation sector (23 percent) and industry (41 percent).[4]

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[1] All greenhouse gas inventories measure carbon dioxide emissions, but beyond carbon dioxide different inventories include different greenhouse gases (GHGs).

[2] Several classes of halogenated substances that contain fluorine, chlorine, or bromine are also greenhouse gases, but they are, for the most part, solely a product of industrial activities. For example, chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) are halocarbons that contain chlorine, while halocarbons that contain bromine are referred to as bromofluorocarbons (i.e., halons) or sulfur (sulfur hexafluoride: SF_6).

[3] IPCC Report as referenced in U.S. General Accounting Office (GAO) *Environment: Aviation's Effects on the Global Atmosphere Are Potentially Significant and Expected to Grow*; GAO/RCED-00-57, February 2000, p. 4.

[4] Ibid, p. 14; GAO cites available EPA data from 1997.

The scientific community is developing areas of further study to enable them to more precisely estimate aviation's effects on the global atmosphere. The FAA is currently leading or participating in several efforts intended to clarify the role that commercial aviation plays in greenhouse gases and climate change. The most comprehensive and multi-year program geared towards quantifying climate change effects of aviation is the Aviation Climate Change Research Initiative (ACCRI) funded by FAA and NASA. ACCRI will reduce key scientific uncertainties in quantifying aviation-related climate impacts and provide timely scientific input to inform policy-making decisions. FAA also funds Project 12 of the Partnership for AiR Transportation Noise & Emissions Reduction (PARTNER) Center of Excellence research initiative to quantify the effects of aircraft exhaust and contrails on global and U.S. climate and atmospheric composition. Finally, the Transportation Research Board's (TRB) Airport Cooperative Research Program (ACRP) project 02-06 is preparing a guidebook on preparing airport greenhouse gas emission inventories. The results of this effort are expected to be out in late 2008.

Environmental Consequences

Based on FAA data, operations activity at the Ann Arbor Municipal Airport represents less than 0.1 percent of U.S. aviation activity. Therefore, assuming that greenhouse gases occur in proportion to the level of activity, greenhouse gas emissions associated with existing and future aviation activity at the Ann Arbor Municipal Airport would be expected to represent less than 0.1 percent of U.S.-based greenhouse gases. Therefore, we would not expect the emissions of greenhouse gases from this project to be significant.

Cumulative Effects

Because aviation activity at the Ann Arbor Municipal Airport represents such as small amount of U.S. and global emissions, and the related uncertainties involving the assessment of such emissions regionally and globally, the incremental contribution of this proposed action cannot be adequately assessed given the current state of the science and assessment

Appendix D. Agency Coordination

JENNIFER M. GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES
LANSING

REBECCA A. HUMPHRIES
DIRECTOR

May 12, 2009

Ms. Amy Eckland
JJR, LLC
110 Miller Avenue
Ann Arbor, MI 48104

RE: **Proposed Environmental Assessment for Ann Arbor Municipal Airport**

Dear Ms Eckland:

The location of the proposed project was checked against known localities for rare species and unique natural features, which are recorded in a statewide database. This continuously updated database is a comprehensive source of information on Michigan's endangered, threatened and special concern species, exemplary natural communities and other unique natural features. Records in the database indicate that a qualified observer has documented the presence of special natural features at a site. The absence of records may mean that a site has not been surveyed. The only way to obtain a definitive statement on the presence of rare species is to have a competent biologist perform a field survey.

Under Act 451 of 1994, the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection, "a person shall not take, possess, transport, ...fish, plants, and wildlife indigenous to the state and determined to be endangered or threatened," unless first receiving an Endangered Species Permit from the Department of Natural Resources, Wildlife Division. *Responsibility to protect endangered and threatened species is not limited to the list below. Other species may be present that have not been recorded in the database.*

The presence of threatened or endangered species does not preclude activities or development, but may require alterations in the project plan. Special concern species are not protected under endangered species legislation, but recommendations regarding their protection may be provided. Protection of special concern species will help prevent them from declining to the point of being listed as threatened or endangered in the future.

The following is a summary of the results for the project in Washtenaw County, sections 16, 17, T3S R6E.

The following list includes unique features that are known to occur on or near the site(s) and may be impacted by the project.

common name	status	scientific name
Henslow's sparrow	**state endangered**	***Ammodramus henslowii***
Grasshopper sparrow	**special concern**	***Ammodramus savannarum***

The **Henslow's sparrow** has been known to occur in the area. Henslow's sparrow require grasslands to breed. Today, this means grassy fields, pastures, hayfields and meadows with

scattered shrubs. They are often found in damp/moist low-lying locations. Henslow's arrive in Michigan in early April and are on their breeding ground by late to early May. Two broods are common during the breeding season, which means nesting can last into August. Fall migration begins in late September to mid-October.

The **grasshopper sparrow** has been known to occur in the area. Grasshopper sparrow's can be found in native prairies, cultivated fields, old fields, hayfields, pastures and open savanna. The nest is generally well concealed on the ground by overhanging vegetation. Spring arrival occurs in April and May and by mid-May grasshopper sparrow's are on their breeding ground. Two broods are a possible during the breeding season, which means nesting can last into August. Fall migration is complete by late October.

In summary, the project site may include suitable habitat for the above listed species. Potential impacts might include direct destruction of species and disturbance of critical habitat.

Thank you for your advance coordination in addressing the protection of Michigan's natural resource heritage. If you have further questions, please call me at 517-373-1263 or e-mail at SargentL@michigan.gov .

Sincerely,

Lori G. Sargent
Endangered Species Specialist
Wildlife Division

United States Department of the Interior

FISH AND WILDLIFE SERVICE
East Lansing Field Office (ES)
2651 Coolidge Road, Suite 101
East Lansing, Michigan 48823-6316

IN REPLY REFER TO:

June 3, 2009

Ms. Molly Lamrouex, Environmental Specialist
Aeronautics and Freight Services
Michigan Department of Transportation
2700 E. Airport Service Drive
Lansing, Michigan 48906

Re: Early Coordination for Proposed Improvements at Ann Arbor Municipal Airport, Washtenaw County, Michigan

Dear Ms. Lamrouex:

We are responding to your May 4, 2009, request for early coordination regarding the subject project. We submit these comments in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act), and the National Environmental Policy Act (NEPA).

Wetlands

For information on the location of wetlands, please visit the National Wetland Inventory (NWI) wetland map website (National Map Viewer) at *http://nmviewogc.cr.usgs.gov/viewer.htm*. Pursuant to state law and the federal Clean Water Act, the State of Michigan regulates certain activities in wetlands. Development that would impact wetlands may require a permit for which this office may have review authority. In the review of these permit applications, we may concur (with or without stipulations) or object to permit issuance depending upon whether the proposed work may impact public trust fish and wildlife resources.

Migratory Birds

Under the Migratory Bird Treaty Act of 1918, as amended, it is unlawful to take, capture, kill, or possess migratory birds, their nests, eggs, and young. For proposed projects that may contain habitat suitable for nesting by migratory bird species, including song birds and/or raptors, we recommend you schedule construction activities or remove potential habitat or nesting structures before the initiation of spring nesting or after the breeding season has ended to avoid take of migratory birds, eggs, young, and/or active nests. Generally, we recommend that any habitat disturbance occur before April 15 or after August 1 to minimize potential impacts to migratory birds, but please be aware that some species may initiate nesting before April 15.

Scanned 6-8-09

Endangered Species

For endangered and threatened species list requests and section 7 consultations with the U.S. Fish and Wildlife Service, please refer to our endangered species and technical assistance website, located at *http://www.fws.gov/midwest/endangered/section7/index.htm*. In some cases, you may be able to conclude the endangered species review process without contacting this office.

We appreciate the opportunity to provide comments at this early stage of project planning. Please direct any questions to Barbara Hosler of this office at 517/351-6326 or the above address.

Sincerely,

Barbara Hosler

for Craig A. Czarnecki
Field Supervisor

JENNIFER M. GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF AGRICULTURE
LANSING

DON KOIVISTO
DIRECTOR

April 7, 2009

Ms. Amy Eckland
JJR, LLC
110 Miller Avenue
Ann Arbor, MI 48104

Dear Ms. Eckland:

RE: Ann Arbor Municipal Airport – JJR Project No. 50178.000

Our office has reviewed your request dated March 30, 2009 regarding the above-referenced project and finds that there are no Farmland Development Rights Agreements on any property within the project boundaries.

Therefore, we conclude that there will be no project impacts on land enrolled in this program.

Thank you for the opportunity to review this project.

Sincerely,

Jarrod Thelen, Resource Analyst
Farmland & Open Space Preservation
Environmental Stewardship Division
517-373-3328

JT:lls

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

June 2, 2009

Ms. Molly Lamrouex, Environmental Liaison
Michigan Department of Transportation
Aeronautics and Freight Services
2700 Port Lansing Road
Lansing, Michigan 48906

Dear Ms. Lamrouex:

SUBJECT: Michigan Department of Environmental Quality (MDEQ) File Number 09-81-5002
Early Coordination – Ann Arbor Municipal Airport, Washtenaw County, Michigan

The MDEQ, Land and Water Management Division (LWMD) has completed review of your May 4, 2009, request for early coordination comments for the Ann Arbor Municipal Airport located in Section 17, T3S, R6E, of Washtenaw County, Michigan. Your letter indicates that you are in the process of preparing an Environmental Assessment (EA) for the proposed project, which includes determining the feasibility of shifting and extending the primary runway and parallel taxiway 950 feet to the southwest. Based on the general information provided, we have the following comments.

1) All natural resource features, including lakes, streams, and wetlands, should be identified as part of your investigation. Any alternatives that are developed need to evaluate the potential impact on these and other resources. Steps should be taken to identify feasible and prudent alternatives to avoid and/or minimize any potential impacts to the natural resources.

2) There appears to be a drain/stream located at the southwest corner of the airport property. Any impacts to this drain/stream would require a permit under Part 301, Inland Lakes and Streams, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). Under Part 301, we recommend that new structures fully span the bankfull channel when feasible. Our preference is for streams or drains to be relocated instead of enclosed where the impacts can not be avoided.

3) The drainage area of the small drain is less than 2 square miles; therefore, a permit would not be required under the State's Floodplain Regulatory Authority found in Part 31, Water Resources Protection, of the NREPA.

4) It is not clear if any wetlands would be impacted by the proposed project. Available maps do appear to indicate the presence of hydric soils near the airport. If there are wetlands impacts, they should be field verified, and their types, functions, and values properly described. Impacts to wetlands will require a permit under Part 303, Wetlands Protection, of the NREPA. Mitigation will be required for any unavoidable impacts to wetlands. We do not regulate the clearing of vegetation but would require a permit under Part 303, Wetlands Protection, of the NREPA for any grading, filling, draining, or

grubbing where stumps are removed. Cut vegetation should be removed from any wetland areas. Additional information on wetlands and the mitigation requirements can be found at www.michigan.gov/deqwetlands.

5) A special interest search of our databases indicates that there is a potential State Threatened plant and Endangered animal in section 17, T3S, R6E. If these species are within your project area, you will be required to coordinate the potential impacts with Ms. Lori Sargent, Michigan Department of Natural Resources, at 517-373-9418.

6) Our database search also indicates potential Part 201 sites located in section 17, T3S, R6E. Please contact Mr. Mitch Adelman at 517-780-7690 of the Remediation and Redevelopment Division in the LWMD's Jackson District Office for further information.

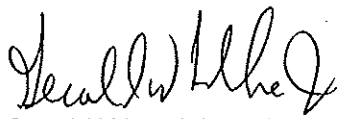
7) A National Pollution Discharge Elimination System (NPDES) permit will be required for storm water discharges associated with construction activities in accordance with Rule 2190 promulgated in accordance with Part 31, Water Resources Protection, of the NREPA.

8) A permit will be required under Part 91, Soil Erosion and Sedimentation Control, of the NREPA. Part 91 permits are generally issued by the county or, in some instances, the local municipality. If the earth change involves two or more Part 91 permitting entities, the MDEQ issues the Part 91 permit.

As the project planning becomes better defined, we may have additional comments.

Thank you for the opportunity to review and provide comments. If you have any questions or need to schedule a field review, please contact Mr. Alex Sanchez at 517-335-3473, or you may contact me.

Sincerely,



Gerald W. Fulcher, Jr., P.E., Chief
Transportation and Flood Hazard Unit
Land and Water Management Division
517-335-3172

cc: Ms. Sherry Kamke, USEPA
Mr. Craig Czarnecki, USFWS
Mr. John Konik, USACE
Mr. Brad Davidson, FAA
Ms. Lori Sargent, MDNR
Mr. Mitch Adelman, MDEQ
Ms Mary Vanderlaan, MDEQ
Mr. Alex Sanchez, MDEQ

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

July 22, 2009

Michigan Department of Transportation
Attn: Ms. Molly Lamrouex
2700 Port Lansing Rd.
Lansing, MI 48909

Dear Ms. Lamrouex:

SUBJECT: Express Wetland Identification Report
Wetland Identification File Number: 09-81-0001-WA

The Department of Environmental Quality (DEQ) conducted a Level 2 Express Wetland Identification Review of 5 acres of an approximately 300-acre property (Property Tax Identification Number Ann Arbor Municipal Airport) located in Town 03S, Range 06E, Section 17, Pittsfield Township, Washtenaw County on July 21, 2009. The wetland review was conducted in accordance with Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA); and Rule 4 (1), Wetland Identification and Assessment (R 281.924) of the Administrative Rules for Part 303. This is a report of our findings in response to your Wetland Identification Application.

Based on our site review, which included a review of the dominant vegetation, hydrology, and soils, as well as an in-office review of pertinent information, the DEQ finds that the 5-acre review area does not contain wetland regulated by the state. The wetland within the review area is not regulated by the state since it is not within 500 feet of an inland lake or stream or within 1,000 feet of the Great Lakes or their connecting waters. The DEQ lacks jurisdiction under Part 303 for activities occurring within the Wetland Identification Review area.

Please be aware that this Wetland Identification Report does not constitute a determination of the presence of wetland that may be regulated under local ordinances or federal law. The U.S. Army Corps of Engineers (USACE) retains regulatory authority over certain wetlands pursuant to Section 404 of the Clean Water Act (CWA), and specifically those wetlands associated with navigable waters of the state. Navigable waters are generally the Great Lakes, their connecting waters, and portions of river systems and lakes connected to these waters. In other areas of the State, the DEQ is responsible for identification of wetland boundaries for purposes of compliance with the CWA under an agreement with the U.S. Environmental Protection Agency.

Your Wetland Identification Review area does not appear to be within those areas regulated by the USACE. However, should you desire more information, please contact the USACE at 313-226-2218.

This Wetland Identification Report is limited to findings pursuant to Part 303 and does not constitute a determination of jurisdiction under other DEQ administered programs. Any land use activities undertaken within the review area may be subject to regulation pursuant to the NREPA under the following parts.

Floodplain Regulatory Authority found in Part 31, Water Resources Protection
Part 91, Soil Erosion and Sedimentation Control
Part 301, Inland Lakes and Streams

The findings contained in this report do not convey, provide, or otherwise imply approval of any governing act, ordinance, or regulation, nor does it waive the obligation to acquire any applicable state, county, local, or federal approvals. This Wetland Identification Report is not a permit for any activity that requires a permit from the DEQ.

The findings contained in this report are binding on the DEQ until July 21, 2012, a period of three years from the date of this Wetland Identification Report. Please contact me if you have any questions regarding this report.

Sincerely,

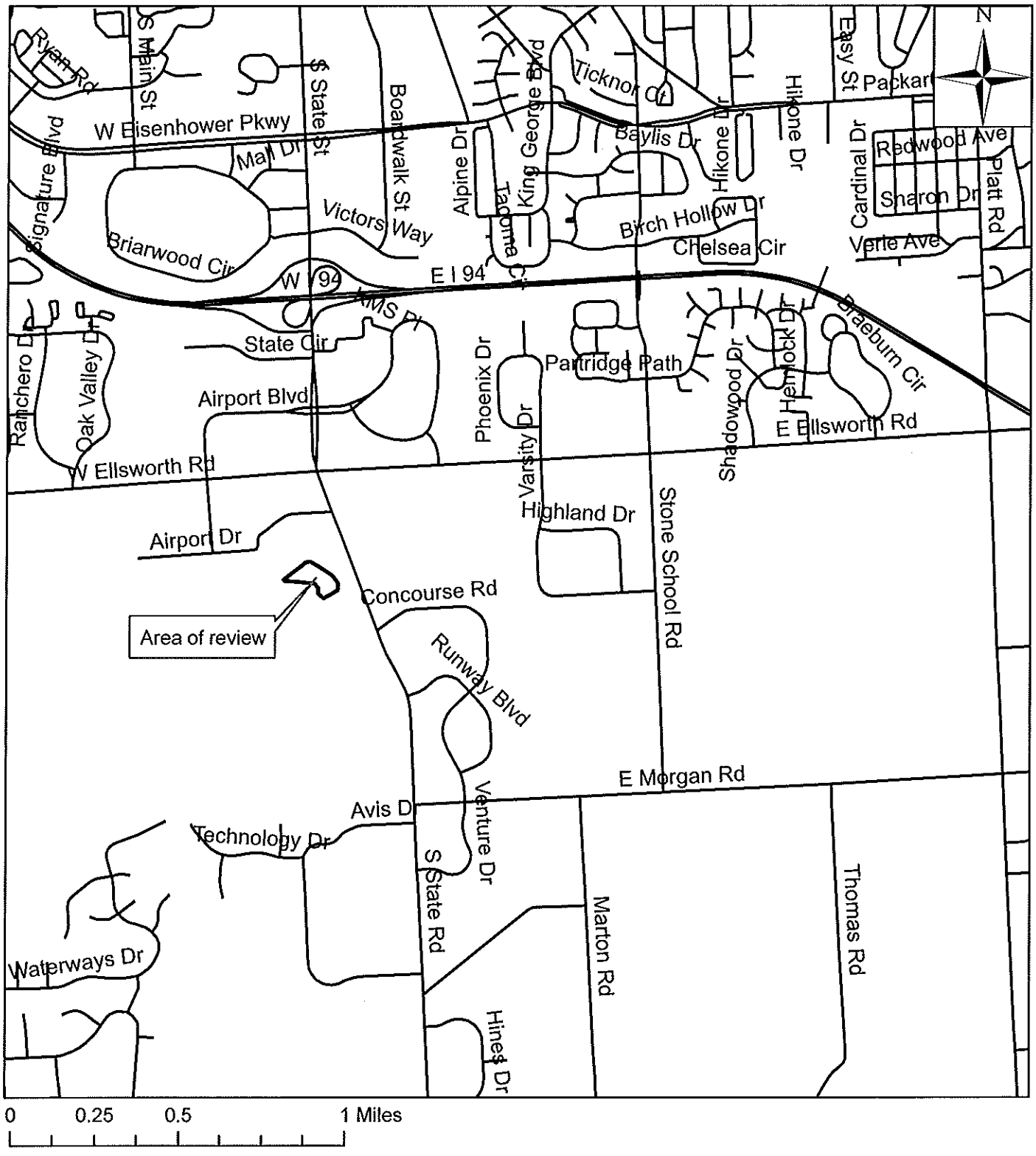
Peg Bostwick for

Todd Losee
Wetland Identification Program Coordinator
Land and Water Management Division
517-335-3457

Enclosures

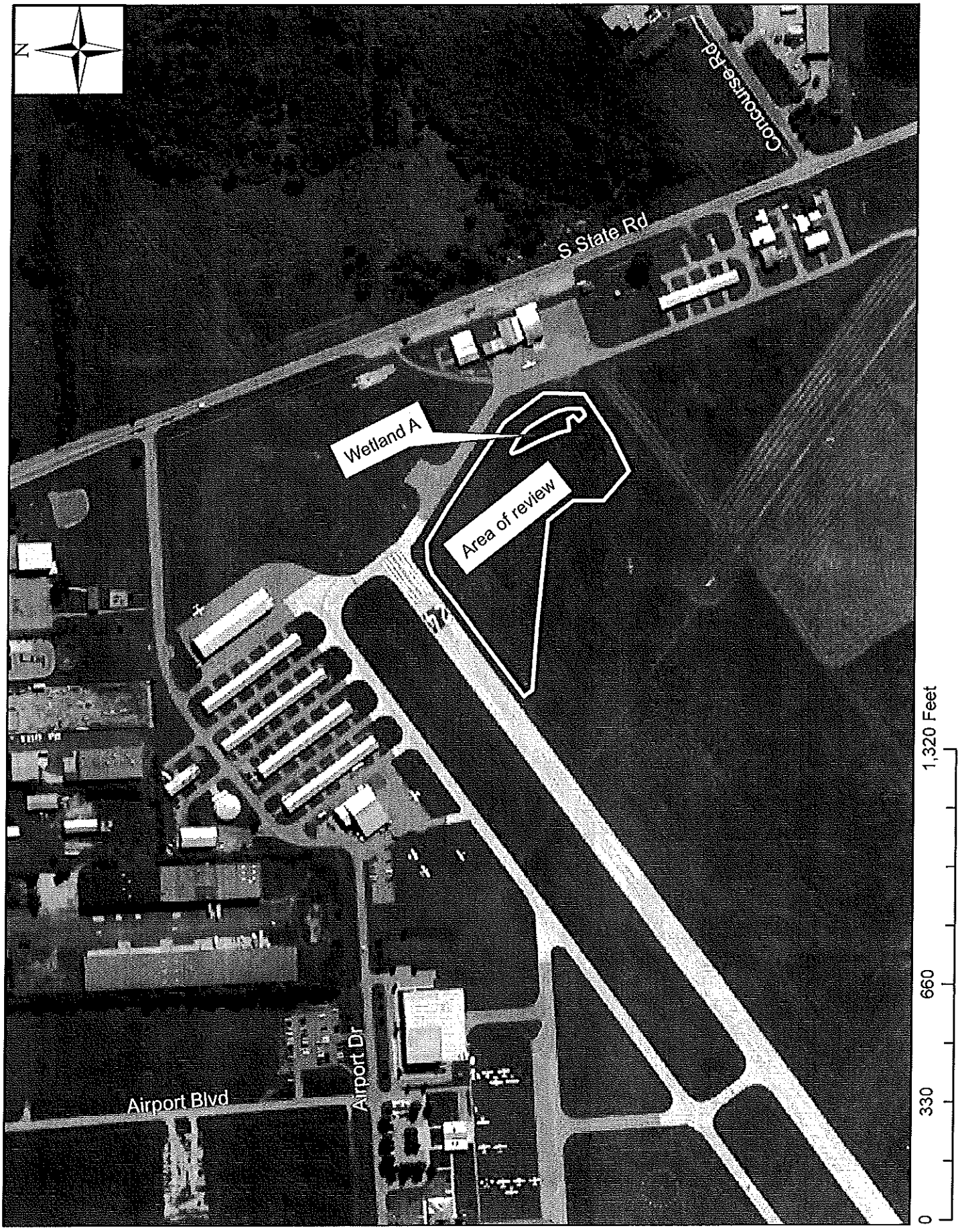
cc: Washtenaw County CEA
Washtenaw County Health Department
Pittsfield Township Clerk
Mr. Matt Kulhanek, City of Ann Arbor
Mr. Justin Pung, DEQ
Mr. Todd Losee, DEQ

Michigan Dept. of Transportation
09-81-0001-WA



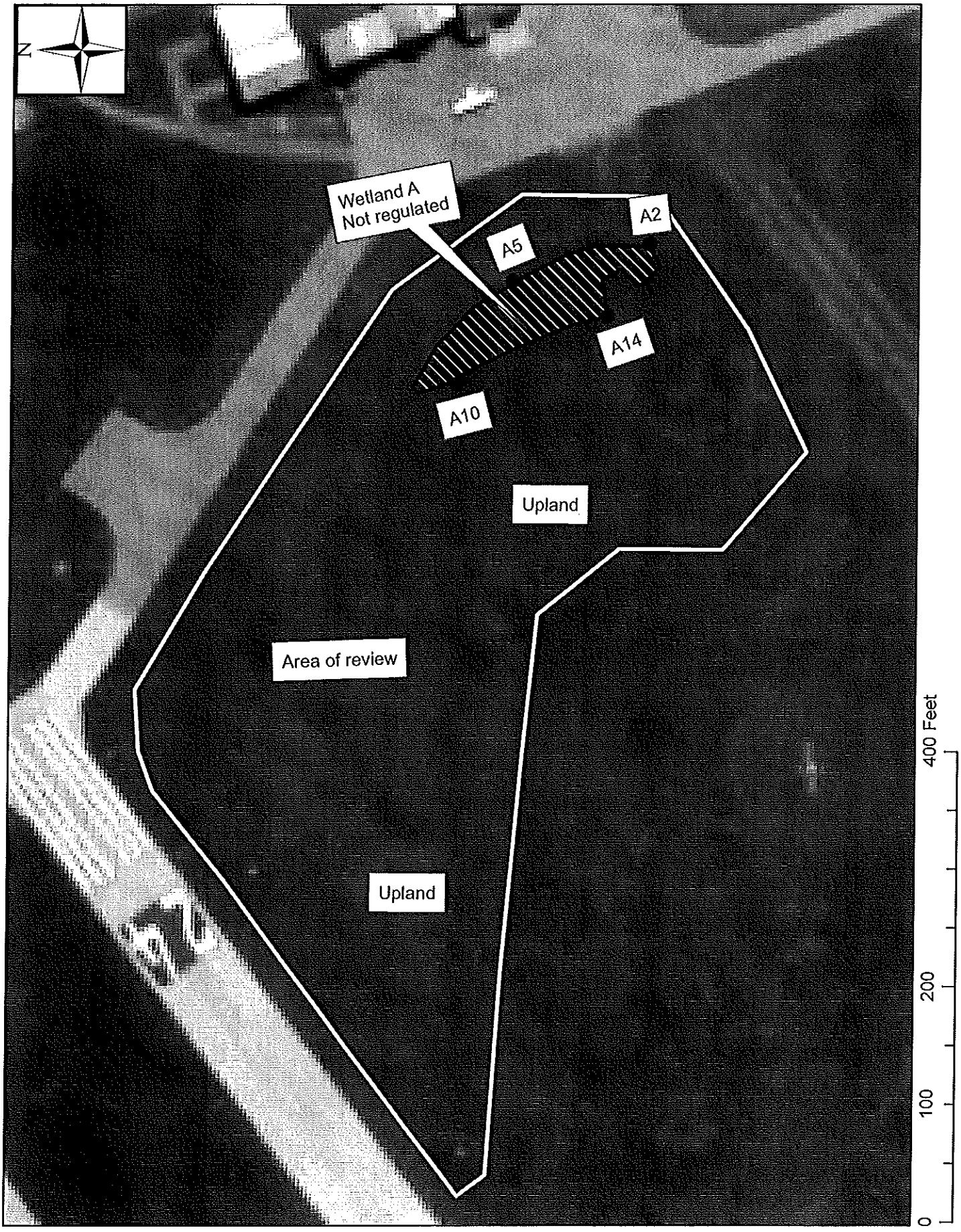
Site location map

Michigan Dept. of Transportation
09-81-0001-WA



Area of review in relation to the Ann Arbor Airport

Michigan Dept. of Transportation
09-81-0001-WA



Wetland A, the only wetland within the area of review, is not regulated.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MAY 2 0 2009

REPLY TO THE ATTENTION OF:
E-19J

Ms. Molly Lamrouex
Michigan Department of Transportation
Bureau of Aeronautics and Freight Services
2700 Port Lansing Road
Lansing, MI 48906

Re: Request for Early Coordination Review of Proposed Improvements for the Ann Arbor Municipal Airport, Washtenaw County, Michigan

Dear Ms. Lamrouex:

The NEPA Implementation Section has received you May 4, 2009 letter requesting information for the Ann Arbor Municipal Airport, Washtenaw County, Michigan. Under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act; U.S. EPA reviews and comments on major federal actions and other actions with environmental impacts when resources permit.

We understand the project will likely include a shift and extension of the primary runway and the parallel taxiway 950 feet to the southwest. Based on the information that you provided to us it is likely that the project will impact wetlands and forested areas.

As with any project, it is important to avoid impacts to wetlands and other natural resources. EPA and other resource agencies will assume that there are other alternatives that reduce environmental impacts, especially if the project is likely to adversely impact high quality wetlands and other natural resources. Therefore, we encourage you to thoroughly explain the project's purpose and need and rigorously explore alternatives that either do not affect or otherwise minimizes impacts to sensitive resources such as wetlands, floodplains, and streams.

Please provide us with information about this project as it progresses. Please contact Ms. Sherry Kamke at 312-353-5794 if you have any questions.

Sincerely,

Kenneth A. Westlake, Supervisor
NEPA Implementation
Office of Enforcement and Compliance Assurance

United States Department of Agriculture

NRCS

Helping People Help the Land
Natural Resources Conservation Service
7203 Jackson Road
Ann Arbor, MI 48103-9506
T (734) 761-6722 x3 F (734) 662-1686 www.mi.nrcs.usda.gov

September 3, 2009

Amy Eckland- Associate, JJR
110 Miller Avenue
Ann Arbor, MI 48104

RE: Ann Arbor Municipal Airport

Dear Eckland,

The Farmland Conversion Impact Rating form (AD-1006) for the proposed Ann Arbor Municipal Airport runway expansion is attached. The portions of the form to be filled out by NRCS are completed.

Some prime and farmland of local importance would be impacted by this project. If the project proceeds, I would urge you to utilize NRCS standards and specifications for conservation practices, as listed in the NRCS Electronic Field Office Technical Guide. This may be found at www.mi.nrcs.usda.gov.

Please don't hesitate contacting me if you have any questions.

Steve Olds
District Conservationist
USDA NRCS
Washtenaw and Wayne Counties

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*		Date Of Land Evaluation Request 9/1/09	
Name Of Project Ann Arbor Municipal Airport		Federal Agency Involved Federal Aviation Administration	
Proposed Land Use Airport		County And State Washtenaw County, Michigan	
PART II *(To be completed by NRCS)*		Date Request Received By NRCS 9/1/09	
Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).*	Yes ☑ No ☐	Acres Irrigated 4181	Average Farm Size 179
Major Crop(s) corn, soybeans, wheat	Farmable Land In Govt. Jurisdiction Acres: %	Amount Of Farmland As Defined in FPPA Acres: 163,000	% 35
Name Of Land Evaluation System Used LESA	Name Of Local Site Assessment System NA	Date Land Evaluation Returned By NRCS 9/3/09	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	18.0			
B. Total Acres To Be Converted Indirectly	0.0			
C. Total Acres In Site	18.0	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	8.7			
B. Total Acres Statewide And Local Important Farmland	9.3			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	0.01			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	34.0			
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	84.2	0	0	0

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use	15	0			
2. Perimeter In Nonurban Use	10	0			
3. Percent Of Site Being Farmed	20	1			
4. Protection Provided By State And Local Government	20	20			
5. Distance From Urban Builtup Area	15	0			
6. Distance To Urban Support Services	15	0			
7. Size Of Present Farm Unit Compared To Average	10	10			
8. Creation Of Nonfarmable Farmland	10	0			
9. Availability Of Farm Support Services	5	5			
10. On-Farm Investments	20	5			
11. Effects Of Conversion On Farm Support Services	10	0			
12. Compatibility With Existing Agricultural Use	10	0			
TOTAL SITE ASSESSMENT POINTS	160	41	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	84.2	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	41	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	125	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

(See Instructions on reverse side)

This form was electronically produced by National Production Services Staff

Form AD-1006 (10-83)


Grading limits
Grading limits
Ann Arbor Municipal Airport
Airport Dr
Airport Dr
Airport Blvd
W Ellsworth Rd
W Ellsworth Rd
S State Rd
S State Rd
S State Rd
S State Rd
Lohr Rd
Lohr Rd
Lohr Rd
Lohr Rd
Bridle Pass Dr
Glen Dr
Regents Park Ct
Waterways Dr
Technology Dr
Data Ct
Fairfield Ct
Avis Dr
Avis Dr

JENNIFER GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF HISTORY, ARTS AND LIBRARIES
LANSING

MARK HOFFMAN
ACTING DIRECTOR

October 20, 2009

BRAD DAVIDSON
FEDERAL AVIATION ADMINISTRATION
DETROIT AIRPORTS DISTRICT OFFICE
11677 SOUTH WAYNE ROAD SUITE 107
ROMULUS MI 48174

RE: ER-5410 Ann Arbor Municipal Airport – Runway Extension, Section 17, T3S, R6E, Pittsfield Township, Washtenaw County (FAA)

Dear Mr. Davidson:

Under the authority of Section 106 of the National Historic Preservation Act of 1966, as amended, we have reviewed the above-cited undertaking at the location noted above. Based on the information provided for our review, it is the opinion of the State Historic Preservation Officer (SHPO) that no historic properties are affected within the area of potential effects of this undertaking.

The views of the public are essential to informed decision making in the Section 106 process. Federal Agency Officials or their delegated authorities must plan to involve the public in a manner that reflects the nature and complexity of the undertaking, its effects on historic properties and other provisions per 36 CFR § 800.2(d). We remind you that Federal Agency Officials or their delegated authorities are required to consult with the appropriate Indian tribe and/or Tribal Historic Preservation Officer (THPO) when the undertaking may occur on or affect any historic properties on tribal lands. In all cases, whether the project occurs on tribal lands or not, Federal Agency Officials or their delegated authorities are also required to make a reasonable and good faith effort to identify any Indian tribes or Native Hawaiian organizations that might attach religious and cultural significance to historic properties in the area of potential effects and invite them to be consulting parties per 36 CFR § 800.2(c-f).

This letter evidences the FAA's compliance with 36 CFR § 800.4 "Identification of historic properties", and the fulfillment of the FAA's responsibility to notify the SHPO, as a consulting party in the Section 106 process, under 36 CFR § 800.4(d)(1) "No historic properties affected".

The State Historic Preservation Office is not the office of record for this undertaking. You are therefore asked to maintain a copy of this letter with your environmental review record for this undertaking. If the scope of work changes in any way, or if artifacts or bones are discovered, please notify this office immediately.

If you have any questions, please contact Brian Grennell, Environmental Review Specialist, at (517) 335-2721 or by email at ER@michigan.gov. **Please reference our project number in all communication with this office regarding this undertaking.** Thank you for this opportunity to review and comment, and for your cooperation.

Sincerely,

Martha MacFarlane Faes
Environmental Review Coordinator

for Brian D. Conway
State Historic Preservation Officer

MMF: JRH: BGG: kam

Copy: Kent Taylor, CCRG

From: "Esther Helms" <EHelms@sagchip.org>
To: LamrouexM@michigan.gov
Date: 5/19/2009 9:38:42AM
Subject: Section 17 Washtenaw County, Early Coordination Review of Proposed Improvements, Ann Arbor Municipal Airport, Washtenaw County, MI

May 19, 2009

Molly Lamrouex

Environmental Liaison

MDOT-Aeronautics and Freight Services

RE: Section 17 Washtenaw County, Early Coordination Review of Proposed Improvements, Ann Arbor Municipal Airport, Washtenaw County, MI

Dear Ms. Lamrouex;

This letter is in response to the above referenced project.

At this time we do not have any information concerning the presence of any Indian Traditional Cultural Properties, Sacred Sites or other Significant Properties to the projected project area(s). This is not to say that such a site may not exist, just that this office does not have any available information of the area(s) at this time.

This office would be willing to assist if in the future or during the construction there is an inadvertent discovery of Native American human remains or burial objects. Feel free to call my office if you have any questions or requests at 989-775-4730.

We thank you for including this Tribe in your plans.

Sincerely,

William Johnson /elh

Curator

Ziibiwing Center of Anishinabe Culture & Lifeways

Saginaw Chippewa Indian Tribe of Michigan

Little Traverse Bay Bands of Odawa Indians
Archives, Records and Cultural Preservation Department
7500 Odawa Circle, Harbor Springs, Michigan 49740
(231) 242-1450 phone (231) 242-1455 fax

May 7, 2009

Ms. Molly Lamrouex
MDOT
Bureau of Aeronautics and Freight Services
Airports Division
2700 Port Lansing Rd.
Lansing, MI 48906-2160

Re: Proposed Improvement Ann Arbor Municipal Airport, Washtenaw County, MI

Dear Ms. Lamrouex:

At this time, we do not have any information concerning the presence of any Indian Traditional Cultural Properties, Sacred Sites, or Other Significant Properties in the designated area of the proposed construction site in Ann Arbor, MI. This is not to say that such site does not exist, just this office does not have any available information indicating that a site is present using our current documentation of the area. If contact could be made with the closest tribe, that being the Huron Band of Potawatomi Indians, they could possibly provide more information.

However, this office would be more then willing to assist, if in the future or during construction, there is an inadvertent discovery of Native American human remains or burial objects. I have enclosed a Site Reference Form that our office uses in the event of a discovery in order to speed the process. Please contact me if you have any further question or requests. I can be reached at (231)242-1453.

We thank you for including our tribe in your plans.

Miigwetch (thank you)

Winnay Wemigwase

Winnay Wemigwase
Director
Archives/Records and Cultural Preservation
Little Traverse Bay Band of Odawa Indians

Site Reference Form

Date of Discovery:_____ Today's Date:_____

Owner/Site Representative:_____
Street Address: _____
City: _____State:_____Zip:_____
Location: _____
Phone:_____Fax:_____

Site Information:
Street Address:_____
City:_____State:_____Zip:_____

Location and Circumstance of Discovery: Time of Discovery:_____am/pm

_____
_____
_____
_____

Contacts Made:
Law Enforcement Department:_____
Investigating Officer:_____
Phone:_____Fax:_____
Date of police report:_____Time on report:_____am/pm

Other contacts (w/phone #):

_____
_____

Native American Burial (please circle) yes_____ no_____
Confirmed by:_____ Phone:_____Fax:_____
Release Status:_____

Little Traverse Bay Bands of Odawa Indians Tribal NAGPRA Contacts:

Eric Hemenway
Research & Repatriation Assistant
(231) 242-1527ph/ ehemenway@ltbbodawa-nsn.gov

Winnay Wemigwase
Director, Archives/Records &Cultural Preservation
(231) 242-1453ph/ wwemigwase@ltbbodawa-nsn.gov

7500 Odawa Circle, Harbor Springs, Michigan 49740

Appendix E. Field Observation Report

(June 2009)

Ann Arbor Airport, Ann Arbor, MI	6-10-09	6-19-09
SITE LOCATION	DATE	ISSUE DATE
Ann Arbor Airport Runway Expansion	50178.000	
PROJECT NAME	PROJECT NUMBER	
Carol Schulte	None	
ISSUED BY	SIGNATURE	

PARTICIPANTS	COMPANY
Carol Schulte	JJR
Tom Lee	Ann Arbor Airport

The Ann Arbor Airport was visited to investigate presence of wetlands, wildlife habitat, threatened or endangered species, and general plant communities within the limits of grading of proposed expansion areas. The site is located south of Ellsworth Road, west of State Street in Ann Arbor, MI, Washtenaw County. Tom Lee of the Airport accompanied Carol to unlock gates and allow access to the site. Pictures were taken of the site and are available for reference. Figure 1 is attached that shows airport layout as well as pertinent areas referenced in this report.

The weather during the site visit was mostly cloudy and in the high 60's.

Most of the soil south of the runway consists of Palms muck, a hydric soil. These areas contain either unmown grassy meadows or are being farmed in corn. South of the cropped area is a large forested wetland complex that was not investigated at this time. The area northwest of the runway consists of Fox and Matherton sandy loam soils and is very rocky. This area is also being farmed in corn by the same farmer.

The first area reviewed was at the east end of Runway 24 where the runway is proposed to shift southwest approximately 150'. Tom stated that generally the airport mows approximately 100' from the runway, but in this area it may be less than that because of a pledge to the local Audobon Society to keep some areas unmown for nesting meadow birds. This area was a mix of mostly wetland species and scattered upland species, including: plots of reed canary grass (*Phalaris arundinacea*), half a dozen (+/-) sedge (*Carex granularis*) plants, a few swamp milkweed (*Asclepias incarnata*), dandelion (*Taraxicum officinale*), sowthistle species (*Sonchus* sp.), buckthorn (*Rhamnus cathartica*), curly dock (*Rumex crispus*), and either goldenrod or aster species (*Solidago* or *Aster* sp.).

A County drain runs north-south on the west side of the property, then makes a turn at the end of the runway to run toward the east. The ditch is open except at the end of the runway, where it runs underground in an L-shaped culvert. The sides of the ditch on the west side are steep are approximately 6' +/- deep, but the ditch was dry in this area with only small areas of standing water on the south side. The south side ditch does not appear to have been maintained and the ditch itself is almost undefined in some areas. The standing water was tinted blue, although it was not determined what caused the tinting. The sides of the ditches contained upland weedy herbaceous species such as sweet clover (*Melilotus officinalis*), smooth brome (*Bromus inermis*), giant ragweed (*Ambrosia trifida*), Virginia creeper (*Parthenocissus quinquefolia*), lamb's quarters (*Chenopodium album*), riverbank grape (*Vitis riparia*), dame's rocket (*Hesperis matronalis*), teasel (*Dipsacus fullonum*), cow parsnip (*Heracleum maximum*), yellow goatsbeard (*Tragopogon pratensis*), yarrow (*Achillea*

millifolium), a few reed canary grass, wheat or rye (*Triticum* or *Secale* spp), and mixed upland and wetland trees such as American elm (*Ulmus americana*), box elder (*Acer negundo*), staghorn sumac (*Rhus typhina*), Russian olive (*Eleagnus angustifolia*),buckthorn (*Rhamnus catharticus*) cottonwood (*Populus deltoides*), bur oak (*Quercus macrocarpa*), and American linden (*Tilia americana*).

The area at the end of the runway where proposed expansion will occur was investigated. This area is kept mowed and the dominant plants in this area consisted of old field weeds and grassy species, with disturbed areas of bare dirt. Plants include rough-fruited cinquefoil (*Potentilla recta*), Canada thistle (*Circium arvense*), and an unidentified grass.

Near the weather station northwest of the end of the existing runway is a gravel borrow pit, excavated, according to Tom, for a foundation for the north hangars. While this area is artificially low and the dominant tree is a large multi-trunked willow (Salix sp.), the area is not considered a wetland. The ground plain is covered with mostly burdock (*Arctium minus*) with a few dame's rocket garlic mustard (*Alliaria petiolata*), along with buckthorn, box elder, smooth brome, and one poison hemlock plant (*Conium maculatum*). Concrete rubble and other wood debris has been dumped in the low area. In an adjacent area that is higher in elevation than the borrow pit and could be a leftover spoil pile, the area is dominated by poison hemlock and stinging nettle (*Urtica dioica*), a dead ash (*Fraxinus pennsylvanica*), and several black walnuts (*Juglens nigra*).

Several examples of wildlife were observed during the short field visit; there was evidence of rodent tunneling (field mice or voles) in last year's duff at the take-off zone for Runway 24 (see Photo 2). Pheasants (*Phasianus colchicus*) were heard calling just west of the site and later in the southern portion of the site. Robins (*Turdus migratorius*), goldfinch (*Carduelis tistis*), purple martins (*Progyne subis*), and killdeer (*Charadrius viciferus*) were observed, and a mating pair of redtail hawks (*Buteo jamaicensis*) were seen flying out of the bur oak near the end of the runway. Tom stated that a pack of coyote (*Canis latrans*) have been observed on the airport property as well as wild turkeys (*Meleagris gallopavo*).

There are no regulated wetlands on the site. Although the roughly 1000 square foot area near the runway take-off zone is dominated by wetland plants and contains hydric soils, the MDEQ would likely decline jurisdiction because it is further than 500 feet from an inland lake, river, or stream, is less than 5 acres in size, and there is no surface connection with other wetlands in the area.

No threatened or endangered species or special wildlife habitat were found at the proposed impact sites.

Our summarization of this Field Observation Report is transcribed as above. Please notify the writer within five (5) business days of this transcription of any disagreement, as the foregoing becomes part of the project record and is the basis upon which we will proceed.

Photo 1. Plots of reed canary grass near east end of Runway 24. 6-10-09.

Photo 2. Evidence of rodent tunneling near east end of Runway 24. 6-10-09.

Photo 3. Drainage ditch on west end of project site where ditch goes into culvert. 6-10-09.

Photos 4 and 5. Drainage ditch on south end of project where it emerges from culvert. 6-10-09.

Photo 6. Gravel borrow pit near weather station. 6-10-09.

P:/50178/000/Admin/Proj Mgmt/field reports/Field Report 6-10-09.docx

CC:

Appendix F. Audubon Society Bird Species Observed List

Breeding Bird Survey - Airport Fields
Maximum Breeding Status by Year

City of Ann Arbor, Natural Area Preservation

	Common Name	Status	2006	2007	2008
	Mallard	1	0	0	1
	Great Blue Heron	1	0	0	1
	Upland Sandpiper	1	1	1	0
	Killdeer	2	2	2	2
	Ring-necked Pheasant	2	0	0	2
	Rock Pigeon	2	2	0	0
	Mourning Dove	2	2	2	2
	Red-tailed Hawk	1	0	0	1
	American Kestrel	2	1	0	2
	N. Flicker	1	0	1	1
	Eastern Kingbird	1	0	0	1
	Willow Flycatcher	2	0	0	2
	Horned Lark	2	2	2	0
	Blue Jay	1	0	0	1
	American Crow	1	0	0	1
	European Starling	3	0	0	3
	Bobolink	3	0	3	3
	Brown-headed Cowbird	2	0	0	2
	Red-winged Blackbird	3	3	0	3
	Eastern Meadowlark	3	3	3	3
	American Goldfinch	2	0	2	2
	Savannah Sparrow	3	3	3	2
SC	Grasshopper Sparrow	2	0	0	2
T	Henslows Sparrow	2	0	2	0
	Song Sparrow	2	2	0	2
	N. Cardinal	2	2	0	0
	Rose-breasted Grosbeak	2	1	0	2
	Indigo Bunting	2	0	0	2

		Status	2006	2007	2008
	Cliff Swallow	1	0	1	0
	Barn Swallow	2	0	2	2
	Tree Swallow	1	0	0	1
	Red-eyed Vireo	1	0	0	1
	Warbling Vireo	1	0	0	1
	Yellow Warbler	2	2	0	2
	Common Yellowthroat	2	0	1	2
	Gray Catbird	2	0	0	2
	Wood Thrush	1	0	1	0
	American Robin	2	2	2	2

Total Number of Species	**38**	14	15	31

SC = special concern T = threatened E = endangered **Status:** 1 = observed only 2 = probable breeding 3 = confirmed breeding

Appendix G. Citizens Advisory Council Member List

Citizens Advisory Committee

Ann Arbor Municipal Airport Environmental Assessment

Name	Representing
Matt Kulhanek, Manager	Ann Arbor Municipal Airport
Mark Perry	AA Airport Advisory Committee
Kristine Martin	5th Ward Resident
Ray Hunter	4th Ward Resident
Jack Moghadam	3rd Ward Resident
Tony Derezinski	2nd Ward Resident
Jad Donaldson	Pilot-Avfuel
Ray Stocking	Washtenaw Audubon Society
David Schrader	FAA Safety Team
Shlomo Castell	Stonebridge Community Association
Jan Godek, Supervisor	Lodi Township
Barb Fuller, Deputy Supervisor	Pittsfield Township
Kristin Judge	Washtenaw County Commissioner, 7th District

Appendix H. Public Notices

CITY OF ANN ARBOR, MICHIGAN
100 North Fifth Ave. P.O. Box 8647
Ann Arbor, Michigan 48104-8647
www.a2gov.org

PRESS RELEASE

For Immediate Release

CONTACT: Matt Kulhanek,
Fleet and Facility Manager, (734)794-6312,
mjkulhanek@a2gov.org, or
Amy Eckland, JJR, (734) 669-2687,
amy.eckland@jjr-us.com

ANN ARBOR AIRPORT LAUNCHES ENVIRONMENTAL ASSESSMENT PLANNING EFFORT

ANN ARBOR, Mich., April 20, 2009 — The City of Ann Arbor is initiating the preparation of an Environmental Assessment (EA) to determine the potential impacts of lengthening the primary runway at the Ann Arbor Airport at 801 Airport Drive from 3,500' to 4,300' and a shift of the runway 150' to the southwest. The assessment results will determine potential impacts to noise levels, air quality, water quality, wetlands, floodplains, plant and wildlife, light emissions, historical and cultural resources, social, and socioeconomic factors. No runway changes will be approved until this environmental clearance process is completed.

A 12 member volunteer Citizen Advisory Council (CAC) will kick-off a series of meetings in early May as part of the assessment team. The CAC members will serve as representatives for area residents, pilots, and local municipalities. The CAC will assist with the review and discussion of the airport studies. Interested members of the public also may follow the status of the airport study via online newsletter updates, press releases, meeting notices, and by attending the public hearing. To help address questions related to the process and the potential runway improvement, two Frequently Asked Questions (FAQ) handouts have been posted on the city's airport web page. The condensed FAQ version is geared more toward non-aviation individuals. The technical FAQ version is longer and contains more detail including the specific references to various aviation regulations and practices. To sign up for periodic updates on this project, visit the airport page on the city's Web site, www.a2gov.org: select "Airport" from the "Government" drop-down menu, and then click the red envelope to subscribe.

The EA is expected to take approximately eight months to complete. The scope of the EA is defined by state and federal regulations and, upon completion, must be approved by the Michigan Department of Transportation – Bureau of Aeronautics (MDOT-Aero) and the Federal Aviation Administration. A public hearing on the findings of the EA is required by law. Public comments received will be made part of the final EA document.

CITY OF ANN ARBOR, MICHIGAN
100 North Fifth Ave. P.O. Box 8647
Ann Arbor, Michigan 48104-8647
www.a2gov.org

The overall project consists of completing an EA documenting the potential impacts related to an 800' runway safety extension and a shift of the runway 150' to the southwest. These modifications were depicted on the Airport Layout Plan approved by city council in September 2008. The full scope of the EA will be completed by two consulting firms, JJR and URS Corporation Great Lakes. JJR, through their Ann Arbor office, will be the lead consulting firm for the EA, including the public involvement and coordination. URS Corporation, the airport's design engineer, will be preparing preliminary engineering on the runway extension and completing other technical tasks in support of the EA and JJR.

Ann Arbor has 114,000 residents, spans 27.7 square miles, and was named the No. 1 Healthiest Hometown in the U.S. by AARP The Magazine *in 2008. Other notable recognitions include: No. 27 of the top 100 U.S. cities to live in by* CNN/Money Magazine *in 2008, as well as the fourth smartest city in the U.S. by* Forbes Magazine. *The city's mission statement reads: The city of Ann Arbor is committed to providing excellent municipal services that enhance the quality of life for all through the intelligent use of resources while valuing an open environment that fosters, fair, sensitive and respectful treatment of all employees and the community we serve.*

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car owners relative to identification marks on railroad equipment. FRA, railroads, and the public refer to the stenciling to identify freight cars.

Annual Estimated Burden Hours: 18,750 hours.

Title: Rear-End Marking Devices.

OMB Control Number: 2130–0523.

Type of Request: Extension of a currently approved collection.

Affected Public: Railroads.

Abstract: The collection of information is set forth under 49 CFR Part 221 which requires railroads to furnish a detailed description of the type of marking device to be used for the trailing end of rear cars in order to ensure rear cars meet minimum standards for visibility and display. Railroads are required to furnish a certification that the device has been tested in accordance with current ''Guidelines For Testing of Rear End Marking Devices.'' Additionally, railroads are required to furnish detailed test records which include the testing organizations, description of tests, number of samples tested, and the test results in order to demonstrate compliance with the performance standard.

Annual Estimated Burden Hours: 89 hours.

Title: Locomotive Certification (Noise Compliance Regulations).

OMB Control Number: 2130–0527.

Type of Request: Extension of a currently approved collection.

Affected Public: Railroads.

Abstract: Part 210 of title 49 of the United States Code of Federal Regulations (CFR) pertains to FRA's noise enforcement procedures which encompass rail yard noise source standards published by the Environmental Protection Agency (EPA). EPA has the authority to set these standards under the Noise Control Act of 1972. The information collected by FRA under Part 210 is necessary to ensure compliance with EPA noise standards for new locomotives.

Annual Estimated Burden Hours: 2,767 hours.

ADDRESSES: Send comments regarding these information collections to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 Seventeenth Street, NW., Washington, DC, 20503, *Attention:* FRA Desk Officer. Alternatively, comments may be sent via e-mail to the Office of Information and Regulatory Affairs (OIRA), Office of Management and Budget, at the following address: *oira_submissions@omb.eop.gov.*

Comments are invited on the following: Whether the proposed collections of information are necessary for the proper performance of the functions of the Department, including whether the information will have practical utility; the accuracy of the Department's estimates of the burden of the proposed information collections; ways to enhance the quality, utility, and clarity of the information to be collected; and ways to minimize the burden of the collections of information on respondents, including the use of automated collection techniques or other forms of information technology.

A comment to OMB is best assured of having its full effect if OMB receives it within 30 days of publication of this notice in the **Federal Register**.

Authority: 44 U.S.C. 3501–3520.

Issued in Washington, DC, on June 11, 2009.

Donna M. Alwine,

Acting Director, Office of Financial Management, Federal Railroad Administration.

[FR Doc. E9–14254 Filed 6–16–09; 8:45 am]

BILLING CODE 4910–06–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

FAA Notice of Intent to Prepare an Environmental Assessment; Ann Arbor Municipal Airport, Ann Arbor, MI

AGENCY: The Federal Aviation Administration, Department of Transportation.

ACTION: Notice of Intent to prepare an Environmental Assessment (EA) and conduct Citizen Advisory Meetings.

SUMMARY: The FAA has delegated selected responsibilities for compliance with the National Environmental Policy Act to the MDOT as part of the State Block Grant Program authorized under Title 49 U.S.C., Section 47128. This notice is to advise the public pursuant to the National Environmental Policy Act of 1969, as amended, (NEPA) 42 U.S.C. 4332(2)(c) that MDOT intends to prepare an EA for the proposed extension of runway 6/24 at the Ann Arbor Municipal Airport. While not required for an EA, the FAA and MDOT are issuing this Notice of Intent to facilitate public involvement. This EA will assess the potential environmental impacts resulting from the proposed extension of runway 6/24 from 3,500 feet to 4,300 feet. All reasonable alternatives will be considered including a no action alternative.

FOR FURTHER INFORMATION CONTACT: Ms. Molly Lamrouex, Environmental Specialist, Bureau of Aeronautics and Freight Services, MDOT, 2700 Port Lansing Road, Lansing, Michigan (517) 335–9866.

SUPPLEMENTARY INFORMATION: The EA will include analysis which will be used to evaluate the potential environmental impacts in the study area. During scoping, and upon publication of a draft EA and a final EA, MDOT will be coordinating with federal, state and local agencies, as well as the public, to obtain comments and suggestions regarding the EA for the proposed project. The EA will assess potential impacts and reasonable alternatives including a no action alternative pursuant to NEPA; FAA Order 1050.1E, Policies and Procedures for Considering Environmental Impacts; FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions; and the President's Council on Environmental Quality (CEQ) Regulations implementing the provisions of NEPA, and other appropriate Agency guidance.

Public Input Process: During development of the draft EA, a series of meetings to provide for public input will be held to identify potentially significant issues or impacts related to the proposed action that should be analyzed in the EA. For more information regarding the meetings for public input contact Molly Lamrouex, MDOT Bureau of Aeronautics and Freight Services, (517) 335–9866.

Issued in Romulus, Michigan, June 4, 2009.

Matthew J. Thys,

Manager, Detroit Airports District Office, Great Lakes Region.

[FR Doc. E9–14167 Filed 6–16–09; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

Petition for Exemption From the Vehicle Theft Prevention Standard; Nissan

AGENCY: National Highway Traffic Safety Administration (NHTSA) Department of Transportation (DOT).

ACTION: Grant of petition for exemption.

SUMMARY: This document grants in full the Nissan North America, Inc.'s (Nissan) petition for an exemption of the Murano vehicle line in accordance with 49 CFR Part 543, *Exemption from the Theft Prevention Standard.* This petition is granted because the agency has determined that the antitheft device to be placed on the line as standard equipment is likely to be as effective in

ANN ARBOR

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www.jjr-us.com