



# New Horizons...

An Environmental Overview of BWI Airport



conservation

commitment

community





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# 1

## Introduction

Neighbors of Baltimore/Washington International (BWI) Airport, local interest groups and community representatives have often posed questions about the operations and development of BWI and their potential environmental effects. In the wake of BWI's unprecedented growth and accelerated construction projects, many neighbors have inquired about the effects of growth on water quality, groundwater supplies and forests.

The Maryland Aviation Administration (MAA) created this environmental overview for its neighbors and members of the aviation community who are interested in the airport, the environment, and the delicate balance that exists between the two. Through this document, MAA hopes to relay to the public its commitment to environmental stewardship, regulatory compliance and responsible resource management.

## WHERE WE BEGAN

From the 17th century to the middle of the 20th century, the property upon which BWI resides was composed of forests, farm fields and orchards. During the early 1940s, the Baltimore Aviation Commission selected the Friendship community area as the location for a new airport because of its proximity to the City of Baltimore, its slight elevation and general dome shape.

President Harry S. Truman formally opened Friendship International Airport in June 1950. The state-of-the-art airport consisted of three runways, associated taxiways, service buildings, a control tower, a terminal building and other aeronautical devices. Throughout the 1950s, Friendship International Airport was one of the most advanced airports in the United States.

The State of Maryland, through the Maryland Department of Transportation (MDOT), purchased Friendship International Airport from the City of Baltimore in 1972, and MAA assumed responsibility for airport operations. Friendship International Airport was renamed Baltimore/Washington International Airport in 1973 to reflect its role as a regional transportation center. In the early 1980s, MAA constructed a fourth runway (Runway 15L-33R) to provide separate facilities for general aviation aircraft and extended Concourse D of the main terminal.

BWI Airport has undergone dramatic growth since the late 1980s and the airport campus now includes fuel farms, parking garages, several parking lots, two air cargo complexes and new hangars. MAA opened Concourse E to accommodate international flights in 1997.

As the 21st century opened, BWI was the fastest growing airport in the nation, followed by nearby Washington-Dulles International Airport. To keep pace with this demand for air services, MAA began an accelerated \$1.8 billion facilities improvement program in 2000, which includes the expansion of Concourse A, additional surface parking areas, a new parking garage and remote tenant parking areas and rental car facilities. MAA expects to complete these projects by the end of 2005.



*MAA's Consolidated Rental Car Facility is one of many airport improvement projects that opened in late 2003.*

Today, BWI Airport property has grown to more than 3,200 acres and includes 13 headwater streams, wetlands, and hundreds of acres of forests, fields and open turf. Constructed resources include terminals, runways, taxiways and other aviation support facilities. Other features include the historic Benson-Hammond House and the BWI Trail that surrounds the airport.

## A CAPITAL LOCATION

Maryland plays an important role in transportation systems throughout the Eastern Seaboard. As a result of its proximity to the Chesapeake Bay and the Atlantic Ocean, the nation's capital and major distribution routes along the East Coast, Maryland's transportation infrastructure plays an important role in our region's economic vitality and quality of life.<sup>1</sup> Less than 10 miles south of the City of Baltimore, BWI Airport is a central element in this infrastructure.

BWI's location has been a vital factor in its recent growth and its ongoing development as an intermodal transportation center. Nearby railroad, light rail and regional bus services provide travelers with quick, easy, and economical links to major metropolitan centers including downtown Washington, Baltimore and Annapolis. Express buses can take passengers directly from the BWI terminal to the Washington Metro for as little as \$2.

More than 19 million passengers traveled through BWI in 2002, as competitive fares attracted passengers from surrounding states, such as Pennsylvania, Delaware, New Jersey, Virginia, and others. BWI is also a key element in our region's transportation system. BWI Airport provides air cargo operations, such as scheduled and charter freight, express and small package transport and mail service. In 2002, approximately 554 million pounds of airfreight passed through BWI.<sup>2</sup>



*Located near Baltimore, Annapolis, and Washington, D.C., BWI Airport plays an important role in regional transportation.*



*The growing Midfield Cargo Complex is the center of air cargo operations at BWI.*

## INCOME FOR MARYLAND

BWI's location and planning efforts have translated to economic benefits for Maryland by creating jobs and income. BWI activities generated more than \$5.7 billion in business revenue for Maryland during 2002, and the airport served as one of Maryland's leading economic engines by providing:

- > Approximately 20,500 direct, indirect or induced jobs;
- > More than \$860 million in income; and
- > More than \$150 million in state and local taxes.<sup>3</sup>

In 2001 Anne Arundel County led the state in the number of jobs created. State and county officials attributed a portion of this job growth to BWI Airport activities.<sup>4</sup>

## A RESPONSIBLE NEIGHBOR

MAA recognizes that daily operations at BWI can affect the surrounding community, and it has established various methods for working with its neighbors to resolve problems or address concerns.

Many of the neighborhoods near BWI have established neighborhood associations. MAA staff regularly attend neighborhood association meetings to answer questions posed by neighbors, inform them of upcoming activities and proposed development, and alert them of operational changes that might affect noise or flight patterns, such as changes in runway use or airport schedules.

In addition to individual neighborhood associations, MAA works with the BWI Neighbors Committee, which is composed of representatives from several adjacent communities. The committee meets quarterly to discuss airport-related issues, such as construction projects that could have temporary effects on nearby communities.

Working together, MAA and its neighbors can ensure that the world Marylanders leave their children is safe, secure and filled with opportunity.



*Hundreds of aircraft fly into and out of BWI Airport daily.*

## Endnotes

<sup>1</sup> Maryland Department of Transportation, Transportation Secretary's Office, November 5, 2002, "Secretary's Welcome." Website: [www.mdot.state.md.us/tso.html](http://www.mdot.state.md.us/tso.html).

<sup>2</sup> Maryland Aviation Administration, Office of Facilities Planning, September, 2003.

<sup>3</sup> Data pertaining to income and jobs were published in *The Regional and Local Economic Impacts of the Baltimore/ Washington International Airport and the State-wide General Aviation System*, 2002, prepared by Martin Associates, Lancaster, PA.

<sup>4</sup> *Hometown Annapolis*, "County Leads State in New Jobs," <http://www.hometownannapolis.com/cgi-bin/read/live/08-14-24/BUS>.





# 2

## A Delicate Balance: AVIATION AND THE ENVIRONMENT

### OUR MISSION:

MAA fosters the vitality of aviation statewide and promotes safe and efficient operations, economic viability and environmental stewardship.

Responsible for the operation of BWI and Martin State airports, MAA provides friendly, convenient facilities and customer services and develops enhanced domestic and international passenger and cargo opportunities through intermodalism and state-of-the-art technologies.

### OUR VISION:

The Maryland aviation system will be the “Easy Come, Easy Go” gateway to the world.

BWI is known by airlines, travelers and nearby residents as a convenient and efficient airport near our nation’s capital. But few know of the plans, strategies and processes in place to ensure that airport activities are carried out in a manner that provides for the safety of the traveling public and minimizes environmental impacts.

Safety, security and environmental stewardship are central to MAA’s mission. As MAA has learned, however, the regulations governing safety and the regulations governing the environment are not always complementary. For example, open water, forests and emergent wetlands help to enhance water quality, but they also attract birds and other wildlife that can pose hazards to aviation.

Section 2 describes MAA’s position as an agency within MDOT, its efforts to support aviation throughout Maryland and the challenge it faces to fulfill its mission.

## STATE TRANSPORTATION AGENCIES

BWI is owned by the State of Maryland and operated by MAA, one of six integrated transportation agencies that serve under MDOT. Other MDOT agencies include:

- > State Highway Administration (SHA),
- > Maryland Transit Administration (MTA),
- > Maryland Port Administration (MPA),
- > Maryland Transportation Authority (MdTA), and
- > Motor Vehicle Administration (MVA).

MAA benefits from its relationship with other state transportation agencies in two ways. First, the state's Transportation Trust Fund finances all of MDOT's capital and operating costs, and the state has the flexibility to direct adequate funding to priority transportation projects – regardless of mode – to meet Maryland's transportation needs. Second, MDOT's administrative structure helps MAA to further its goal of providing Maryland with an intermodal transportation system that easily integrates different modes, such as highway, rail and aviation.

## PASSENGER SAFETY AND THE ENVIRONMENT

Providing a safe environment for aviation is challenging. MAA must consider the safety of its passengers and employees as it responds to new security challenges in the 21st century and continues to respond to environmental conditions and operational challenges that have affected the aviation industry since it began a century ago.

Aviation and the natural environment are not always compatible. Airport operations can generate pollutants to threaten the environment if they are not managed properly, and environmental resources, such as trees and water, can attract waterfowl and flocking birds, which threaten aircraft and passengers.

Numerous federal, state and local laws and regulations protect environmental resources, such as water and wildlife, and many other regulations are in place to prevent pollution or habitat degradation. MAA must comply with all of these regulations – even when they seem to conflict with one another. For example, MAA must comply with Maryland's Forest Conservation Law to avoid and minimize the impact of its activities on forest resources, but trees can provide food and shelter for flocking birds.



*BWI airport is surrounded by many acres of forest and wetlands.*

The first bird strike fatality was recorded in 1912, when Cal Rodgers – the first man to fly across the United States – lost his life after a gull became jammed in the controls of his aircraft and caused him to lose control.<sup>1</sup> While aircraft have changed since that time, the hazards posed by wildlife have not changed. In 1995, a large aircraft departed from Elmendorf Air Force Base in Anchorage, Alaska, carrying 24 airmen. The aircraft struck a flock of geese shortly after takeoff, and all airmen were killed in the subsequent crash.

MAA works closely with various federal, state and local agencies to ensure regulatory compliance without compromising the safety of the traveling public. In addition, MAA works closely with the Federal Aviation Administration (FAA), which establishes safety and security standards for airports nationwide, and the U.S. Department of Agriculture's Wildlife Services staff, who serve as FAA's agents for addressing wildlife issues.

MAA also works with Anne Arundel County. MAA consults with three of the county's small area planning groups to ensure that proposed zoning and land use near the airport are compatible with aviation activities. In addition, MAA works closely with county Planning and Code Enforcement personnel to ensure that development projects near the airport do not introduce open water or landscaping that would serve as habitat for potentially hazardous wildlife.

By integrating its internal processes with federal, state, and local mandates, MAA can identify and manage its environmental resources to prevent the creation of potential conflicts or potentially dangerous conditions, while fulfilling environmental regulations.

## Endnotes

<sup>1</sup> *Wildlife Control Procedures Manual*, 2002, published by Transport Canada, Safety and Security, Aerodrome Safety Branch, Ottawa, Canada, page B.2.







# 3

## Resource Management

For the past 10 years, MAA has conducted voluntary inventories to identify and understand many of the natural systems and resources on its property. Although these resource inventories are not required by regulatory agencies, the results of the studies have helped MAA to plan its future development in a manner that is protective of the environment. By identifying its resources prior to development, MAA can create alternatives that avoid or minimize potential environmental impacts.

Section 3 identifies each environmental resource that is affected or potentially affected by operations at BWI, and it presents MAA's efforts to manage each resource to comply with or surpass environmental regulations and address safety concerns.

# AIR QUALITY

Air quality poses concern in the Baltimore metropolitan area, where ozone levels exceed national standards. Although automobile emissions are the primary source of air pollution throughout the Baltimore region, all activities that produce emissions affect regional air quality. Many aviation activities produce air emissions, but the three greatest emissions sources are aircraft, ground support equipment (e.g., tugs or belt loaders) and private automobiles. The airport's heating and cooling plant, machines and systems that use or store fuel also produce air emissions, but they produce far fewer emissions than either aircraft or ground vehicles.

Compared to other large airports, BWI's layout offers some air quality advantages. All aircraft produce emissions before take off as they taxi between terminal gates and runways and wait for permission to take off or land. The runway configuration at BWI accommodates relatively short taxi times for aircraft and accommodates quick take offs. The many other transportation facilities near BWI provide passengers with an alternative to driving to and from the airport (e.g., nearby Amtrak/MARC rail station, on-site light rail stop and bus access). In addition, MAA's relationship with other MDOT agencies and its increased emphasis on intermodal travel provide it with unique opportunities to reduce emissions.

## REGULATIONS

The Clean Air Act (CAA) and its amendments authorize the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS), which states are accountable for meeting. The CAA requires states to review proposed transportation projects and other projects to ensure that they do not jeopardize air quality, especially in non-attainment areas.<sup>1</sup>

EPA designates the Baltimore metropolitan region as a non-attainment area, because it produces ozone at levels exceeding the NAAQS. During the summer, the region fails to meet the federal health-based standard from ground level ozone pollution. In Maryland, the Maryland Department of the Environment (MDE) is responsible for statewide air quality planning. MDE has developed a State Implementation Plan (SIP) and control measures to bring Maryland's non-attainment areas into compliance by 2005.<sup>2</sup> MAA consults with MDE regarding all airport-related projects to ensure compliance with air quality regulations.

## PERMITS AND AUTHORIZATIONS

The federal government cannot fund or support any transportation activity unless it conforms to a state plan to achieve air quality.<sup>3</sup> MAA reviews each proposed project with MDE to determine the project's potential emissions and to ensure that it complies with the SIP. Any projects that do not comply with the SIP are not eligible for federal funding.

MAA also holds a permit from MDE's Air and Radiation Management Administration to operate the boilers within the BWI heating and cooling plant. The permit specifies that MAA must comply with all state requirements and regulations for small industrial-commercial-institutional steam generating units, provides limits for nitrogen oxide emissions and requires that only distillate fuel oil or natural gas be used as a power source. MAA has never violated its MDE air permit.

## PLANNING AND PROTECTION APPROACH

Since the mid-1970s, MAA has conducted periodic emissions inventories and air quality assessments to re-evaluate its compliance with CAA requirements. The purpose of the assessment is to:

- > Identify air emission sources at BWI;
- > Quantify emissions from these sources;
- > Estimate future emissions associated with BWI; and
- > Estimate future emissions in the vicinity of BWI.

MAA's air quality assessments help MAA, FAA, MDE and EPA measure, manage and minimize airport-related air quality impacts more efficiently. The assessments also serve as a tool for MAA to ensure that existing activity and future growth at BWI are consistent with MDE's goals to return the Baltimore region to an attainment area by 2005 and to help ensure that new airport projects meet federal requirements.

MAA's most recent air quality assessment was prepared in 2001 using the Emission Dispersion Modeling System (EDMS) to calculate the extent that aviation emissions contribute to regional air quality.<sup>4</sup> FAA and EPA identified the EDMS model as an improvement over other modeling approaches and have mandated its use for air quality planning at United States airports.

## RECENT ACCOMPLISHMENTS

MAA has worked hard to ensure that emissions from BWI Airport remain consistent with the SIP, and it has taken several voluntary steps to further reduce emissions at the airport especially those associated with traffic congestion and ground transportation vehicles. These strategies include:

- > A new focus on intermodal transportation;
- > Terminal roadway improvements and remote facility construction;
- > Installation of Smart Park technology; and
- > Alternative fuel use.

### **New Focus on Intermodal Transportation.**

An intermodal transportation system provides for the connection and integration of several types of transportation for traveling or shipping goods between an origin and a destination.

The need for intermodalism is great in Maryland, where automobile travel serves as the chief transportation mode for many residents. During the past few years BWI has developed into an intermodal transportation facility that provides Maryland's residents and businesses with many options and convenient connections. Near to downtown Baltimore and Washington, D.C., MAA has worked with other MDOT agencies to develop links to commuter rail, light rail, heavy rail, local and regional buses and to encourage enhancements to Maryland's highway network.



*Conveniently located near the International Terminal, the BWI Light Rail Station allows passengers to travel between the airport and locations throughout Baltimore.*

MAA continues to work with several agencies and communities to provide various alternatives for those traveling to and from the airport. In addition to providing inexpensive and easy access to and from the airport, the use of shared transportation facilities can help to reduce air emissions by reducing the number of personal vehicles on Maryland's roads.

In addition to these intermodal connections, MAA recently constructed the BWI Trail, which follows the airport perimeter and serves as an intermodal transportation facility by linking the surrounding communities and neighborhoods with the Linthicum Light Rail Station, the Baltimore and Annapolis Trail and the BWI Rail Station. The 12.5-mile trail includes road overpasses and wooden boardwalks for safety and allows walkers, joggers, roller bladers and cyclists to pass by the historic Benson-Hammond House, the Andover Equestrian Center and wetlands on the north side of Dorsey Road and east side of MD Route 170. Trail construction began in the early 1990s, and the last segment opened to the public in May 1999.

MAA is currently developing a conceptual design for a peplemover system to serve the terminal and new remote facilities at BWI. The new system will provide connections from the airport terminal to rental car facilities, the BWI Rail Station, light rail and parking garages. As new terminals and concourses are designed and constructed, MAA would extend its new peplemover system into the new areas.

**Roadway Improvements and Remote Facility Construction.** Traffic congestion causes increased air emissions. MAA began an ambitious roadway improvement project in 2000 to reduce congestion near the airport terminal.

To circulate traffic more efficiently near the airport terminal, MAA is constructing additional lanes in front of passenger arrival and departure areas. The roadway improvements will double the amount of available curbside area and make dropping off and picking up travelers quicker and easier.<sup>5</sup> MAA is also constructing pedestrian sky bridges to eliminate pedestrian travel on airport roadways.

To further reduce congestion near the airport, MAA is constructing additional parking facilities near the intersection of Ridge Road and Stoney Run Road, approximately 1 mile from the terminal. All rental car agencies have been relocated to a new facility in that area. MAA is providing passengers with regular shuttle service between the terminal and these facilities. By constructing the facilities just beyond the airport boundary, MAA hopes to further reduce congestion in the immediate airport vicinity.



*MAA has constructed additional remote parking facilities for tenants and employees. Shuttle buses are used to transport tenants and employees between the terminal and the remote facilities.*



**Smart Park Technology.** To reduce traffic congestion in its parking garages at BWI Airport, MAA began to install the “BWI Smart Park System” in 2001. The system includes ultrasonic sensors over each parking space to indicate availability.<sup>6</sup> Signs located at the end of each row display the number of available spaces. When the Smart Park System is installed, each parking space in BWI garages will be equipped with lights to indicate the locations and direction of available spaces. MAA hopes the new technology will allow drivers to find spaces more quickly and reduce congestion within the garages.

**Alternative Fuel Sources.** To reduce its fuel consumption, MAA has turned its attention to reducing emissions associated with both ground vehicles and aircraft.

MAA’s fleet of ground vehicles is extensive and consumes much fuel. To reduce the emissions associated with its vehicle fleet, MAA was a pioneer in encouraging the use of Compressed Natural Gas (CNG) vehicles. CNG vehicles offer air quality benefits, because they produce fewer emissions than gasoline-powered engines.

The BWI Airport terminal hosts various types of aircraft for different carriers. These aircraft must keep their engines running while parked at BWI gates in order to generate power for onboard lights, heating or air conditioning. MAA’s designs for new terminal facilities include gates with electrical power for aircraft. The electrical connections will provide parked aircraft sufficient power for lights and other passenger comforts and allow pilots to shut down aircraft engines and reduce fuel consumption.

## FUTURE ACTIVITIES AND CHALLENGES

As the demand for air travel grows, MAA will continue to face the challenges associated with terminal road congestion, and it will increase its efforts to encourage passengers to use transit or shared vehicles to travel to and from the airport.

Air quality regulations will pose ongoing challenges. MAA remains committed to minimizing the effects of airport activities on regional air quality through a variety of planning and management approaches. Chief among these approaches is a greater emphasis on intermodal transportation and more convenient connections with nearby communities.



*Although ground-support equipment is vital to airport operations, it also produces air emissions.*

# NOISE

Noise from airport operations is the environmental issue that evokes the most concern and greatest response from citizens living near BWI Airport. To address this concern, MAA maintains a continuous noise monitoring program and works hard to ensure ongoing dialogue with nearby citizens through:

- > A 24-hour hotline for noise-related questions and complaints. This hotline receives 20 to 50 calls per month, which exceeds calls from the public regarding any other environmental issue.
- > An ongoing Noise Abatement Plan (NAP) to reduce aviation noise impacts on surrounding communities. The NAP includes the development of an Airport Noise Zone (ANZ) to reduce or eliminate noise-impacted land use. MAA updates the NAP and ANZ simultaneously every five years.

MAA representatives work closely with nearby residents and attend quarterly meetings of the BWI Neighbors Committee, which consists of representatives from communities near the airport.

## BACKGROUND: NOISE AND VIBRATION

A person talking, a musical instrument and an airplane all produce sound. Noise is generally considered to be unwanted sound. A person's interpretation of a sound's source and meaning determines his or her initial reaction. If someone interprets a sound as undesirable noise, scientists can use measurements of the sound's intensity, frequency and duration as indicators of its potential annoyance or aversion. However, other factors also affect a person's reaction to noise. If a noise interrupts an activity (such as sleeping or conversation), causes an injury or damages possessions, its annoyance is greater. Other factors related to annoyance include a person's attitude toward the source of the noise, the individual's ability to control it and the level of the intruding noise above other more familiar sounds.<sup>7</sup>

Sound energy is produced by a source and transmitted through the air in waves. Sound pressure levels are called *decibels* and denoted as dB. Sound pressure levels are measured or estimated using a filter called the "A-Weighting Network," which reduces low and very high frequency sounds, much like a human ear does. Sound pressure levels are reported in terms of an A-weighted sound level and expressed in dBA. The A-weighted rating of noise sources corresponds to the human ear's reduced sensitivity to low-frequency sound and correlates well with human perceptions of the annoying aspects of noise, particularly from traffic noise sources. A sound of 1 dBA is the quietest sound perceived by the human ear, and an increase of 10 dB represents a doubling of volume. The loudest sound a person can hear without pain is approximately 120 dBA. If sound energy is transmitted through solid materials, it is referred to as vibration.<sup>8</sup>

MAA monitors noise using a day-night average of sound levels, known as DNL or Ldn, to characterize noise impacts. The DNL measure represents a receptor's cumulative noise exposure from all noise events over a full 24-hour period. Ten decibels are added to sound levels that occur during the 9-hour period from 10 p.m. to 7 a.m. to represent the more intense human response to noise during nighttime hours.

MAA uses noise contours to define which areas surrounding the airport are exposed to a particular noise level. MAA also uses DNL noise contours in the planning analysis that state and federal agencies require.

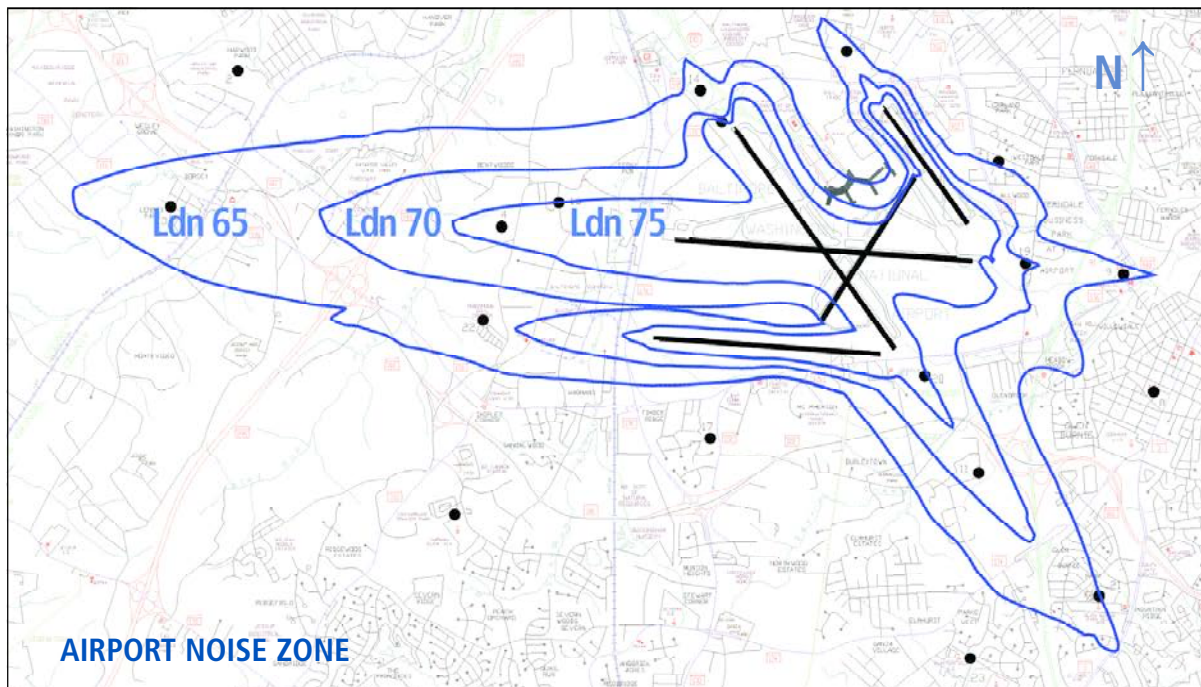
## REGULATIONS/PERMITS AND AUTHORIZATIONS

Both the State of Maryland and the FAA have established regulatory programs to minimize aircraft noise exposure.

**State Requirements.** The Maryland Environmental Noise Act of 1974 protects citizens from the impact of transportation-related noise. State legislation at Sections 5-805, 5-806, and 5-819 of the Transportation Article of the Annotated Code of Maryland requires airport operators to develop a NAP and an ANZ. MAA completed the initial NAP and ANZ for BWI Airport in 1976. MAA's most recent plan was published in 1998, and a new plan was initiated in 2003.

The ANZ is determined by developing composite noise contours encompassing the largest area of effect for the base year, five-year forecast, and ten-year forecast cases. The ANZ contours show areas where noise levels reach 65, 70, and 75 DNL (see above). MAA uses forecasts of aircraft types and operations, future airport improvements and other elements to develop the contours.

The State of Maryland encourages the development of noise-compatible types of land use, such as industrial or commercial use, within BWI Airport's ANZ, which is shown above. Noise levels below 65 DNL are considered compatible with residential land use. MAA has developed and implemented a variety of strategies to reduce and eliminate noise-impacted land use.



*MAA identifies the Airport Noise Zone based on flight path data and aircraft types to determine where noise levels are 65 DNL or greater (1998 ANZ). The figure above illustrates the 65, 70, and 75 Ldn noise contours surrounding BWI Airport.*

**TABLE 3-1: Federal Airport Noise Compatibility Standards**

LAND USE	AREA OF INCOMPATIBILITY
Residences (single and multifamily), mobile homes, dormitories, schools, hospitals, libraries, churches, rest homes, homes for the aged, nursing homes, auditoriums, concert halls.	65 DNL or Greater
Transient lodging, hotels, motels, sports arenas, outdoor spectator sports, playgrounds, neighborhood parks, noise-sensitive manufacturing.	70 DNL or Greater
Golf courses, riding stables, water recreation, cemeteries, office buildings, retail and wholesale establishments, movie theaters, restaurants, industry, manufacturing, utilities, livestock farming, animal breeding.	75 DNL or Greater
Agriculture (except livestock), mining, fishing, Aviation-related uses.	None

Source: Maryland Aviation Administration, November 1997, *Public Participation Handbook for the 1998 BWI Airport Noise Zone Update*, Appendix F, Baltimore, MD.

Key: DNL – Day-night average representing cumulative noise exposure from all noise events over a full 24-hour period.

**Federal Requirements.** Federal requirements focus on two areas:

- > Changing the noise emission characteristics of airplanes, and
- > Funding mitigation measures for noise-incompatible land use.

To reduce aircraft noise, the federal government adopted the “Aviation Noise Abatement Policy,” which required noise emission improvements for the aircraft fleet and mandated a phase-out of the operation of Stage 2 commercial jet aircraft by December 31, 1999.<sup>9</sup> This regulation led to the development of a commercial fleet of quieter aircraft. The overall number of residences impacted by noise from BWI was reduced significantly following the use of these quieter aircraft, and the BWI Noise Zone has been reduced by 400 acres since 1993.

To mitigate noise impacts, FAA administers a program described in the Federal Aviation Regulations (FAR) at Part 150, “Airport Noise Capability Planning.” Under these regulations, FAA will fund mitigation programs and approve noise abatement procedures for implementation if an airport has developed a noise compatibility program and has completed certain studies. MAA receives federal funding for noise mitigation, because the State of Maryland’s noise statutes, mitigation program, and local laws constitute a NAP and fulfill the federal compatibility requirement. (Federal Airport Noise Compatibility Standards are shown in Table 3-1.)



## PLANNING AND PROTECTION APPROACH

MAA's NAP includes numerous programs and strategies to reduce noise impacts and impacted land use areas:

### Continuous Noise Monitoring Program.

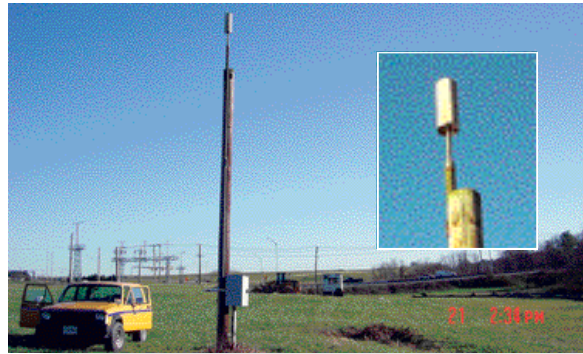
MAA has implemented a noise monitoring program that measures airport noise at 23 locations in nearby communities. MAA also owns and maintains several portable monitors to respond to community concerns as they arise. MAA uses this monitoring information in conjunction with computerized flight path information to monitor and evaluate the NAP to provide citizens with information about specific noise events.

**Aircraft noise abatement departure and arrival program.** MAA has identified procedures that pilots can use during take offs and landings at different runways. These voluntary procedures include maintaining specific altitudes at certain distances from the airport, and they identify certain turn locations to minimize noise effects on residential communities. MAA recently produced a poster illustrating the neighborhoods near BWI and its runway departure areas. MAA distributed the poster to the Chief Pilot for each major airline at BWI, so that it could be displayed in each pilot lounge. The poster reminds pilots of the importance of using noise abatement procedures.

**Preferential Runway Use and Continued Restricted Use of Runway 4-22.** MAA has directed pilots to use preferred runways for specific activities and operations. For example, from 11 p.m. to 5 a.m., weather permitting, pilots are requested to use Runway 10-28 for arrivals and departures. Similarly, Runway 4-22 is closed to multi-engine aircraft from 10 p.m. to 7 a.m. unless unusual weather conditions or emergencies exist.

### Controlling Ground-based Noise Sources.

MAA has restricted certain ground operations, such as reverse thrust powerback procedures and engine maintenance run-ups, to certain times and locations.



*MAA performs continuous noise monitoring using pole-mounted monitors at 23 locations in nearby communities.*

Since the inception of MAA's Noise Assistance Program in 1988, the State of Maryland has provided more than \$73 million to improve the quality of life for 1,029 residents by helping them to soundproof or sell their homes through the following programs:

**Voluntary Land Acquisition Program.** In 1985, MAA offered to purchase residential properties within the 75 DNL noise contour. In 1988, MAA expanded the offer to include residential properties that are exposed to cumulative noise levels of 70-75 DNL. As of September 2002, owners of 239 of the 335 eligible properties voluntarily sold their property to MAA.<sup>10</sup>

**Homeowners Assistance Program.** Since 1988, MAA has offered financial assistance to homeowners residing in communities that are exposed to noise levels between 70 and 75 DNL, but who are not eligible for the Voluntary Land Acquisition Program. As of September 2002, MAA provided assistance to 650 homeowners.

MAA can also assist eligible homeowners in making soundproofing improvements, such as adding insulation, acoustical windows, and air conditioning (which enables homeowners to keep windows closed), to reduce interior noise levels to 45 DNL.

**School Soundproofing Program.** Under this program MAA has provided \$9.3 million for soundproofing at four local schools: Corkran Middle School, Arthur Slade Regional School and Glen Burnie Park and Oakwood elementary schools.

**Board of Airport Zoning Appeals.** Maryland law prohibits development within the ANZ if the proposed land use is incompatible or if the proposed structure or construction equipment poses a hazard to aircraft. When incompatible development or land use is proposed, MAA notifies project sponsors, and they may petition the Board of Airport Zoning Appeals (BAZA) for a variance from the regulations. BAZA meets monthly to review variance requests

## RECENT ACCOMPLISHMENTS

MAA's commitment to managing noise at BWI Airport has resulted in benefits for its neighbors. In one case, MAA's commitment to thoroughly research a neighbor's noise complaint generated data that were ultimately used to refine FAA's technical approach for predicting noise at airports around the nation.

**Low-Frequency Takeoff Noise Study.** In 1990, MAA identified the ANZ for BWI using FAA's Integrated Noise Model (INM). The model results indicated that portions of the Allwood community, which is west of BWI, were outside of the ANZ. In response to ongoing community concerns, MAA measured noise in the Allwood community, and the measurements consistently showed noise levels that were higher than those predicted by the INM model.

To identify the reason for this discrepancy, MAA and FAA conducted a study that evaluated noise levels during the start of takeoffs. The study results showed that takeoff sound has considerable energy in lower frequencies, which adds to the perceived loudness and causes structures, such as homes, to vibrate. Because A-weighted noise levels de-emphasize the lower frequencies and C-weighted levels do not, the joint study was conducted to measure the C-weighted levels associated with noise at the start of takeoff as well as A-weighted levels. MAA and FAA reported their findings, and based on these findings, FAA revised its INM model to compute sound levels near airports more accurately.

Using the project results, MAA developed a sound insulation program to mitigate for low-frequency noise. To date, MAA's program is the only program to receive federal funding specifically for low-frequency noise insulation.

**A Smaller ANZ.** MAA notes that the continued replacement of older Stage 2 jet aircraft with quieter Stage 3 aircraft has reduced the size of the ANZ and the number of people affected by noise. The 1998 ANZ Update indicates that the size of the ANZ was reduced by 5 percent, from 7,500 acres in 1993 to 7,100 acres in 1998. This smaller ANZ translates to 850 (39 percent) fewer homes and 2,400 (41 percent) fewer people affected by airport-related noise.<sup>11</sup>

MAA proposed a new program in the 1998 ANZ Update to help local governments purchase residentially zoned land within the ANZ so that it can be converted to public use. Funding can be accessed from the federal government if a sponsoring local government agrees to provide matching funds. MAA helped Anne Arundel County purchase a tract known as the Van Metre property in 1999. The property will be used for parkland and open space, which is compatible land use within the ANZ.

## FUTURE ACTIVITIES AND CHALLENGES

MAA forecasts indicate that the demand for air travel at BWI will continue to increase, and MAA is poised to meet the challenges associated with the subsequent increase in airport activity. Some of the noise impacts associated with increased air traffic could be offset by technological improvements and quieter aircraft.

MAA is prepared to address the challenges posed by additional operations by:

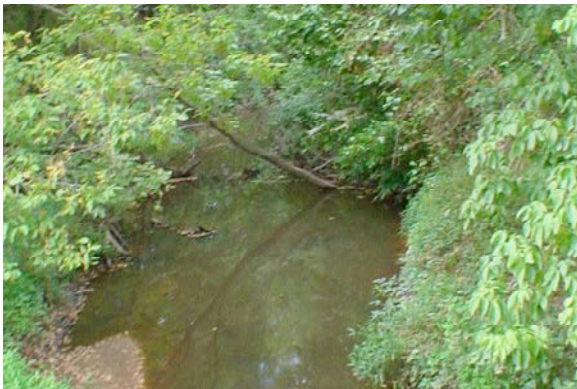
- > Beginning to revise NAP for BWI Airport in 2003;
- > Encouraging the use of nearby parcels for non-residential purposes or other uses that are compatible within the ANZ;
- > Continuing to support area residents through an ongoing dialogue, the 24-hour noise hotline, and programs including operational and soundproofing strategies; and
- > Working with local and county planning groups to encourage the development of compatible land uses within the ANZ.

# WATER RESOURCES

Water resources at BWI Airport include 13 streams, non-tidal wetlands and groundwater resources that form an important subsystem within the Chesapeake Bay Watershed. MAA recognizes the importance of water quality issues associated with BWI Airport within this larger context, and it is keenly aware that airport operations have the potential to affect wetlands and water quality. MAA works tirelessly to protect water resources through engineering and operational controls as well as continuous resource monitoring.

MAA has worked cooperatively with various agencies to promote water quality. Since 1989 MAA has participated in the Maryland Department of Natural Resources' Targeted Watershed Program for Sawmill Creek, which has allowed MAA to work with other state agencies to help improve the quality of Sawmill Creek and its watershed through improved stormwater management.

MAA has developed working relationships with other MDOT agencies to enhance water quality. MAA worked with SHA during the 1990s to create a wetland mitigation site as compensation for unavoidable impacts sustained by previous MAA and SHA development projects. Such interagency cooperation proved to be cost effective, environmentally advantageous and consistent with airport operation objectives.



*One of the many small headwater streams on BWI Airport property.*

## RESOURCE DESCRIPTION

BWI Airport property is generally higher in elevation than the surrounding area. Consequently, 12 of BWI Airport's 13 streams are small streams with low base flows that receive drainage from small contributing areas, form the headwaters of other creeks and contribute to larger off-site streams. MDE has designated all of the streams on BWI property as Class I streams, which means the streams must maintain the standards for water contact recreation and maintenance of aquatic life.

BWI property also includes many wetlands. Most wetlands are associated with streams, but several isolated nontidal wetland areas are associated with drainage ditches or low-lying areas.

Shallow groundwater provides some flow to BWI Airport's on-site streams and wetlands. Although the airport property serves as a groundwater recharge area, no potable wells exist on or near the property.<sup>12</sup> The deeper Patapsco groundwater aquifer that underlies BWI provides drinking water for Anne Arundel County, but this aquifer is not subject to nearby shallow aquifer influences.

Much of BWI Airport property is covered by impervious surfaces such as pavement or buildings. Stormwater that flows over these impervious surfaces can be introduced to pollutants associated with airport operations such as: fluids from surface vehicles (petroleum, antifreeze or other chemicals), deicing compounds from airplanes, particulates from vehicle emissions and foreign objects and debris (such as tires, equipment or trash). The quantity of water running over these paved surfaces can affect on-site streams and wetlands. To prevent these pollutants from entering surface water or wetlands, MAA developed a complex system of ditches, ponds and infiltration trenches in accordance with state regulations, and has a Foreign Object Debris (FOD) collection program.



Over the past 15 years, MAA has made great strides in sustaining and improving the quality of the water resources under its stewardship, but it continues to be challenged by two sources:

- > Continued airport growth, which increases the amount of impervious surface and runoff; and
- > Increasingly stringent and sometimes conflicting federal and state requirements. For example, MDE emphasizes the use of infiltration to control water quality, however, the presence of open water can attract waterfowl or other potentially hazardous wildlife.

MAA works hard to provide interagency coordination and explain the special concerns associated with aviation safety.

## REGULATIONS/PERMITS AND AUTHORIZATIONS

Since Congress passed the U.S. Rivers and Harbors Act in 1899 to regulate navigation, the federal government and the State of Maryland have passed legislation to preserve, protect and improve water quality. The programs associated with this legislation have broad scopes, and their regulations address a variety of issues, including the construction and operation of airport facilities. Table 3-2 briefly summarizes these programs.

The state also issues periodic initiatives to emphasize specific aspects of the quality of water resources. For example, the Chesapeake Bay Agreement, which is renegotiated periodically, includes specific wetland restoration, reforestation and other environmental goals. As a state agency, MAA is a key player in helping the state meet these objectives.

**TABLE 3-2: Applicable Water Quality Laws and Regulations**

### LAWS

#### Stormwater

**1972** Clean Water Act (also known as the Federal Water Pollution Control Act) created the federal program designed to protect and restore our nation's waters. The implementing regulations include permitting activities associated with the National Pollutant Discharge Elimination System (NPDES).

**1977** Clean Water Act Amendments strengthened control of toxic disposal into our nation's waters and allowed states to assume responsibility for certain federal programs.

**1984** Maryland Stormwater Management Regulations.

**1987** Clean Water Act Amendments expanded the NPDES permit program to include the regulation of stormwater from industrial activities, including airports.

**2000** Maryland Stormwater Regulations Revised.

#### Wetlands

**1990** Maryland Non-tidal Wetlands Protection Act.

**1987** Clean Water Act Amendments strengthened regulations to protect our nation's wetlands.

#### Forests

**1991** Maryland Forest Conservation Act.

### MAA PLANNING ACTIVITIES

- BWI Comprehensive Stormwater Plan
- NPDES Stormwater Permit
- Comprehensive Stormwater Management Plan Update

- BWI Wetland Inventory and Mitigation Plan
- Wetland Resource Map for BWI Airport
- Maintenance Map Wetland Areas at BWI Airport

- BWI Forest Stand Delineation
- BWI Reforestation Master Plan
- Forest Management Plan

## PLANNING AND PROTECTION APPROACH

When Friendship International Airport began operations, airport developers and operators considered streams and wetlands as potential conduits to carry stormwater and other liquid discharges away from airport property. Legislation was not in place to protect these resources, and developers could drain or fill them to accommodate facility development and operations.



*MAA's environmental staff frequently inspects the condition of on-site streams and wetlands.*

Congress passed the Clean Water Act in 1972, which focused national attention on water quality issues. Several regulations were created during the early 1980s to implement the Clean Water Act, including the regulations that govern discharges to wetlands and stormwater quality. MAA has responded to these new regulations by studying its resources and developing detailed management plans.

**Water Resource Inventories.** MAA knows that it must understand its natural resources in order to protect them, and it has conducted several natural resource inventories since 1993. MAA uses the results of these inventories to guide its development and prepare its resource management plans. The results of the stream studies served as the foundation of MAA's *Comprehensive Stormwater Management Plan for BWI Airport*, which promotes water quality through stream stability.

MAA performs wetland investigations periodically as part of its development process. Based on the results, MAA can adjust its plans to avoid wetland impacts.

**Stormwater Management Strategy.** MAA's *Comprehensive Stormwater Management Plan* is its greatest tool for ensuring water quality on a routine basis. The plan identifies each drainage area that exists on BWI Airport and the structures and operations that affect it. The plan includes the location of existing stormwater management facilities and the proposed locations for additional facilities to accommodate all of MAA's proposed development for a 10-year period as shown on MAA's *Airport Layout Plan for BWI Airport (ALP)*.

**Integrated Development.** MAA worked hard to create a *Comprehensive Stormwater Management Plan* that incorporated the results of many planning studies and to prevent potential conflicts or conditions that would be incompatible in an aviation environment. MAA consulted many resources when updating its stormwater management plan including:

- > Documentation of existing stream conditions,<sup>13</sup>
- > MDE stormwater management design guidance,<sup>14</sup>
- > Wetland resource map for BWI Airport,
- > FAA and USDA's wildlife management guidance,<sup>15</sup> and
- > MAA's Wildlife Hazard Assessment for BWI Airport.<sup>16</sup>



*MAA constructed this long, linear stormwater management trench through coordination with USDA Wildlife Services personnel. The trench was designed so that it would not be attractive to birds or waterfowl.*

MAA revised its plan in 2001 to reflect BWI's unprecedented growth and recent development activities, promote water quality and stream stability based on recent characterizations and respond to new, more stringent stormwater management regulations set forth by MDE. The new regulations placed greater emphasis on providing water quality management for stormwater and encouraged the use of created wetlands, open water ponds or infiltration trenches.

MAA understands the need for water quality controls, but faced potential conflicts because open water attracts waterfowl and other wildlife that could pose hazards to aircraft. Using previous environmental studies, MAA identified on-site wetlands and areas with saturated soils that would be unlikely to promote quick infiltration and hold water for prolonged periods. When identifying potential facility locations, MAA avoided these areas and selected areas with drier, sandier soils.

MAA consulted FAA guidance during plan preparation to identify appropriate holding times and structures that would not be likely to attract potentially hazardous wildlife, and it incorporated the guidance into its stormwater management designs. According to USDA, which serves as FAA's representative for wildlife issues, stormwater management ponds would be less likely to attract wildlife if they were constructed in a long, linear fashion and contained vegetation to mask the water.

MAA approached all three agencies (FAA, USDA and MDE) while developing stormwater management design plans for the Consolidated Rental Car Facility and held several meetings with the agencies to discuss safety and environmental concerns. As a result, MAA and its consultants were able to develop stormwater management plans that successfully incorporate wildlife management techniques and water quality controls (see photos). Based on this experience, MAA developed design standards for its design consultants to use in future development projects and included the design guidance in the *Comprehensive Stormwater Management Plan*.

Even the most carefully constructed stormwater management facility will be ineffective if it is not operated or maintained properly. MAA's Division of Environmental Planning consults with the Division of Environmental Compliance to develop maintenance procedures and Best Management Practices (BMPs), which ensure that stormwater management facilities will be monitored and maintained regularly.



*MAA's complex drainage system is designed to keep water off of and away from aircraft movement areas.*



**Operations and Maintenance.** Many operations and maintenance activities at BWI Airport affect water quality, including vehicle maintenance, fuel management, deicing fluid collection and hazardous materials management. MAA's Division of Environmental Compliance oversees MAA, airline and tenant activities, some of which potentially affect stormwater, surface water or groundwater quality. The division also collects water quality data to support MAA's National Pollutant Discharge Elimination System (NPDES) permit.



*Small streams near aviation facilities, such as runways and on-site roads, can be vulnerable to runoff containing fuel or other substances.*

**Fuel Management.** Aircraft operations at BWI Airport require the use of approximately 650,000 gallons of fuel per day. This fuel must be stored and transported according to stringent regulations to guard against potential releases. The main BWI Airport fuel farm consists of several large aboveground tanks that store jet fuel for airlines. A smaller fuel farm is located at the General Aviation Complex, and a third fuel farm is under construction at the Midfield Cargo Complex. The main fuel farm receives jet fuel through pipelines from a nearby transmission facility in Maryland, which is operated by a regional fuel provider. Trucks transport the fuel from the fuel farm to aircraft and ground support equipment, such as lavatory trucks, catering trucks and water trucks.

The chance of a spill exists whenever fuel is transported. For example, small releases can occur during the transfer of fuel from the tanks to trucks or from trucks to airplanes or ground support equipment. MAA's tenant directives provide detailed procedures that must be followed immediately in the event of even a small spill and they outline reporting requirements. Fuel farm owners and tenant fuel operators must report each release to MDE, which inspects spill areas to ensure that environmental degradation does not occur.

MAA's on-site Airport Rescue and Fire Fighting (ARFF) Station is staffed 24 hours a day, seven days a week and the staff includes First Responders, who are specially trained to evaluate fuel spills. The ARFF staff is available to all tenants and ensures that all fuel spills are cleaned up by the responsible party. If necessary, MDE can be called to help determine who is responsible for spills and assist with clean up.



**Deicing.** Even a light layer of frost can affect aircraft operations during critical maneuvers. To ensure safe aircraft operation during winter weather conditions, FAA requires air carriers to follow specific procedures for deicing planes. If weather conditions warrant and mechanical snow- or ice-removal methods are ineffective, deicing chemicals may be applied directly to runway surfaces. Deicing fluid can enter the environment as it drips from aircraft as they park, taxi and takeoff.

Airlines use commercial deicing mixtures composed of glycol, water and additives including anti-corrosives and surfactants. Glycol-based deicing fluid that enters surface water sources can present biologic oxygen demand, which reduces the amount of dissolved oxygen available to organisms. Other deicing fluid constituents can be toxic to aquatic life.

In 1993, MAA undertook studies of deicing procedures with MDE, the airlines and ground operators at BWI Airport. The results of the studies were used to develop facilities and BMPs that could be used to collect, transmit, store and dispose of aircraft deicing fluids used at BWI Airport. The goal of the plan was to reduce the amount of waste fluid runoff discharged to stormwater without compromising air passenger safety.

From 1994 to 2000, MAA constructed deicing pads for Runways 15R-33L, 15L-33R and 10-28, and underdrain systems beneath piers A, B and C to collect deicing fluid. Waste deicing fluid collected from the deicing pads and the underdrain systems is transported through a transmission line to two 600,000-gallon storage tanks. The stored fluid is either diverted to the sanitary sewer for treatment at the Patapsco Waste Water Treatment Plant or sent to another facility for treatment and disposal. The amount of fluid diverted to the Patapsco treatment plant per day is strictly regulated according to the conditions of MAA's sanitary permit from Baltimore County.

MAA records the amount of deicing fluid that is collected and discharged from BWI Airport by:

- > Keeping records of the amount of fluids applied and collected; and
- > Monitoring surface water quality daily to identify potential releases.

MAA requires each air carrier to report the total quantity of deicing fluid applied to its aircraft. MAA compares this amount to the amount collected for treatment at the deicing pads to determine the efficiency of the collection facilities.

MAA monitors the amount of deicing fluid that enters the surface water daily by measuring the amount of glycol present in the stormwater samples collected as discharge from selected outfalls. MAA's 1999 *Study of Total Deicing Fluid Recovery and the Glycol Mass Balance at BWI* concluded that the success of BWI Airport's glycol collection program results from the effectiveness of its collection and stormwater management systems. While collection removes much of the glycol before it has the opportunity to enter stormwater, the stormwater management system is designed to break down or biodegrade glycol before it reaches streams and groundwater.



*Water quality monitoring stations are located at stormwater management outfalls near runways and taxiways.*

MAA's stormwater management facilities, such as grass-lined trenches or retention/detention ponds, allow the stormwater/glycol mixture to infiltrate through the soil and water columns, where it breaks down into less harmful constituents. Over the past several years, MAA has been able to limit glycol discharges to less than 30 percent of the amount applied. According to an EPA study, this performance places BWI among those airports with "exemplary collection systems," which is the highest level of deicing fluid collection efficiency defined by EPA.<sup>17</sup>

**Hazardous Material.** MAA and its tenants use various hazardous materials that could harm water resources, and MAA takes care to ensure that these materials do not pose hazards to humans or the environment.

MAA's Division of Environmental Compliance has developed and implemented a variety of programs to ensure that hazardous materials are stored, transported and disposed of appropriately and to reduce the use of hazardous materials. These programs include:

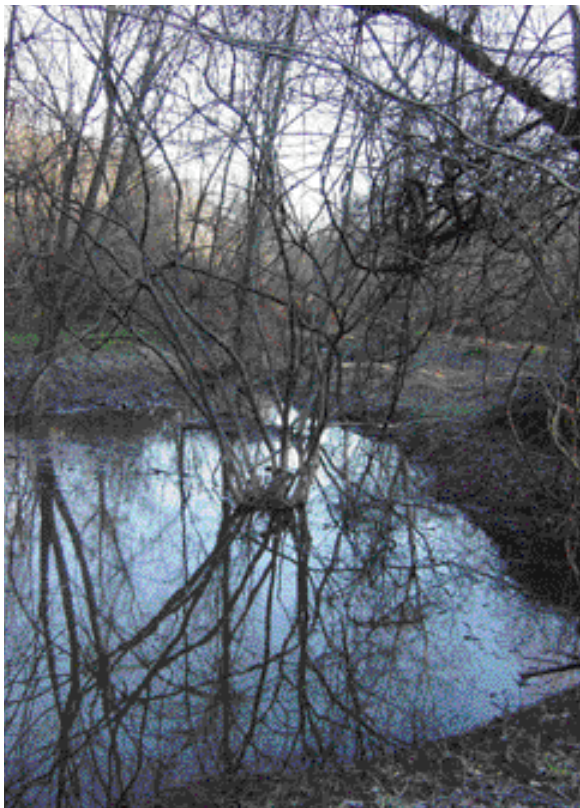
- > Standard operating procedures to ensure that MAA manages hazardous materials and wastes according to federal and state regulatory requirements.
- > A contingency plan that identifies safeguards and emergency procedures to prevent or recover from unexpected discharges of oil or other hazardous materials.
- > A *Stormwater Pollution Prevention Plan* to document the sources and types of discharge that could enter MAA's stormwater management system. To develop this plan, MAA conducted pollution prevention opportunity assessments that led to operational improvements to help minimize pollutant discharges to stormwater.

Before MAA acquires or purchases property, MAA's Real Estate Division researches the property's former uses to determine whether hazardous materials were ever used or deposited on the property. In addition, the Commercial Management Division, Office of Business Administration, includes language in its leases to advise tenants that they are responsible for the appropriate storage and disposal of hazardous material and waste.

## RECENT ACCOMPLISHMENTS

MAA's approach to water quality includes a variety of projects that contribute to cleaner water. These projects include:

- > Updating its *Comprehensive Stormwater Management Plan* to include recent and proposed development and to address regulatory changes;
- > Updating its NPDES permit and *Stormwater Pollution Prevention Plan* to include recent development; and
- > Constructing paved areas with underground drainage/collection systems to capture deicing fluids and prevent them from entering the stormwater management system.



*BWI Airport property contains numerous wetland systems, such as this wetland adjacent to Clark Branch.*

## FUTURE ACTIVITIES AND CHALLENGES

As BWI continues to grow, MAA must ensure that its development does not impact Maryland's valuable water resources. To do so, MAA performs the following:

- > Provides appropriate stormwater management planning strategies and facilities that are protective of MAA's on-site streams and aquatic habitats;
- > Incorporates resource management approaches that do not conflict with or compromise the safety of the traveling public;
- > Continues to monitor regulatory changes to ensure compliance;
- > Monitors the water resources on MAA property to ensure their ongoing protection; and
- > Facilitates conversation among various regulatory agencies to resolve potential conflicts and differing approaches to safety and environmental protection.

# FORESTS AND HABITATS

BWI Airport contains diverse landscapes ranging from forests and fields to open areas with turf. MAA must maintain these areas to maximize their environmental and aesthetic contributions while satisfying safety and security mandates.



*BWI Airport property includes turf areas adjacent to runways and taxiways, landscaped areas, and forests.*



*Trees and forests, like stormwater management facilities, can help to protect water quality. MAA maintains forests whenever possible to protect water quality.*

## RESOURCE DESCRIPTION

MAA's 3,200 acres at BWI include a variety of forest and habitat types.

**Forests.** MAA property at BWI includes more than 200 acres of forests that support wildlife. The age, density and species within these forested areas vary from dense stands of mature hardwoods and deciduous trees to young stands of Virginia pine and loblolly pine.

MAA's forests enhance water quality. The forest floor provides a soft area for groundwater infiltration, which improves water quality by filtering out particulates and other pollutants. The root systems of trees also absorb stormwater to prevent erosion. Forested areas adjacent to streams provide additional benefits by providing shade and moderating rapid changes in water temperature.

**Forested Wetlands.** BWI Airport contains approximately 90 acres of wetlands, including some forested wetlands. Forested wetlands are especially valuable because they enhance water quality. Wetlands hold water for prolonged periods and filter out many impurities before the water enters nearby streams or recharges groundwater supplies.

An extensive forested wetland associated with the Stony Run floodplain, just west of BWI Airport, was designated as Wetlands of Special State Concern. Although MAA does not own all of the property associated with this wetland system, it is conscious of the potential effects of the airport on this valuable system.



**Turf Areas.** BWI Airport maintains many turf or lawn areas next to runways, taxiways and aircraft operations areas. These areas provide pilots, ground staff and control tower personnel with unimpeded views of aircraft operations and open areas for use in an emergency situation, such as a runway overrun. MAA also maintains turf in other locations, such as the area adjacent to the airport fence, to provide security.

While trees and shrubs provide better filtering and absorb runoff and overland flow more effectively than turf, the turf offers benefits over pavement or other impervious surfaces by providing opportunities for infiltration.

**Landscaped Areas.** MAA provides landscaped areas with formal planting beds near the terminal and airport entrances. Some landscaped areas include trees, shrubs and berms that serve as a shield between the airport and nearby roads. These areas provide environmental and aesthetic benefits.

## REGULATIONS

Several federal and state regulations govern MAA's landscapes and their use. These regulations support two goals: protecting natural resources and ensuring the safety of the traveling public.

## PERMITS AND AUTHORIZATIONS

Maryland is the only state with a law regulating forests. As a state agency, MAA must not merely comply with the law – it must be exemplary in its compliance.

The Maryland General Assembly passed the Maryland Forest Conservation Act in 1991 to protect the state's forests and sensitive areas as well as water and air quality.<sup>18</sup> The purpose of the Forest Conservation Act is to reduce the rate of deforestation caused by development. The Act requires developers to conserve and sometimes replace the forests they disturb. While protecting trees appears to be the objective of the Act, its ultimate goal is to protect trees in an effort to maintain water quality. Although the Act is administered by the Maryland Department of Natural Resources (DNR), compliance with the Act is also a condition of stormwater management plan approval by MDE.



*Bright orange fencing and prominent signs are used to protect forests during construction activities.*



**Ensuring Safety.** FAA provides extensive regulations for safe airport operation.

- > Federal Aviation Regulations (FAR) Part 77. FAR Part 77, defines the dimensions and elevations of “imaginary surfaces” that are utilized by pilots during take off and landing of aircraft. Pilots rely on airspace above, and sometimes within, these surfaces to be free of obstructions such as lighting poles, buildings or trees.<sup>19</sup> Airport sponsors, such as MAA, must eliminate conflicts with these surfaces, including trees. FAA regulations also specify the areas near runways and taxiways that must be maintained as either pavement or turf.
- > FAA Advisory Circular 150/5200-33, Hazardous Wildlife Attractants on or near Airports. Forests, wetlands and other landscapes provide habitat for flocking birds and other wildlife that could pose strike hazards to aircraft. Wildlife strikes cause damage to aircraft and threaten the safety of the public. To reduce the possibility of wildlife strikes, FAA advises airport managers through design and maintenance procedures to reduce the likelihood of wildlife strikes. Maintenance procedures include frequent mowing of turf areas to prevent forming of seed heads and eliminate hiding places for rodents, providing efficient drainage systems and storing certain types of waste, such as food waste, in covered receptacles away from runways and taxiways. FAA regulations at FAR Part 139 require airport operators to create and maintain a wildlife hazard management plan to address the specific habitats and species present at their airports.
- > FAR Part 107, Aviation Security. FAA requires airport operators to install security fences along the airport perimeter, and it requires the operators to create a 10-foot clear zone of maintained turf or pavement on each side of the fence. This security zone provides a clear view for security cameras focused on the fence line, and it enables rapid and frequent visual inspection for security breaches, such as holes in or beneath the fence.



*MAA performs obstruction studies regularly to ensure that nearby forests do not grow into protected airspace.*

## PLANNING AND PROTECTION APPROACH

MAA's primary goal is to provide a safe environment for the traveling public and MAA must formulate its resource protection and management plans within this larger context of safety.

Most landowners protect their resources to provide habitat and foster wildlife, but MAA must manage its resources to minimize habitat and discourage wildlife near runways, taxiways and within protected airspace. However, MAA acknowledges that its forests and landscapes are critical to water quality protection. Finally, MAA must provide an environment that is attractive to passengers. As previously discussed, MAA's Office of Planning and Environmental Services has prepared numerous environmental resource inventories to develop strategies for achieving these seemingly contradictory goals.

MAA prepared a Forest Stand Delineation for all 3,200 acres associated with BWI Airport in 1995, and it revised the delineation in 2003.<sup>20</sup> MAA prepared this resource inventory so that it could manage the forest resources on BWI as a whole and determine the potential effects of proposed development. MAA worked closely with DNR to prepare a *Reforestation Master Plan*<sup>21</sup> defining how MAA would provide mitigation for forested areas affected by proposed development.

## OPERATION AND MAINTENANCE

One of MAA's primary forest management concerns is to keep FAR Part 77 surfaces free from obstructions, including trees, and to keep regulated areas, such as fencelines, runways and taxiways, free from visual barriers. If trees or other vegetation must be removed from a regulated area, such as a wetland, or if more than 40,000 square feet of clearing is required, MAA consults with DNR and MDE to obtain the appropriate permits and approvals. Safety must be addressed, but MAA must comply with appropriate environmental regulations at the same time. If reforestation is required, MAA will consult with resource management agencies to identify an appropriate location that is off the airport and outside of aircraft approach and departure surfaces (some of which extend 5 miles away), so that the reforestation area does not provide habitat to increase risks to the traveling public. MAA is committed to providing forest conservation reforestation, but it must cultivate these resources in a manner that is compatible with passenger safety.

**Landscaping.** MAA creates and maintains landscapes to provide an attractive airport for the public. MAA carefully selects trees and plants for their resistance to pests and disease, tolerance of site conditions, suitability (i.e., wildlife attractiveness), function and maintenance requirements. MAA works closely with landscape architects to ensure that they do not create an environment that is attractive to flocking birds or waterfowl. MAA reviews plans to make sure they do not incorporate fruits, nuts or berries that could serve as a food source. It also reviews plant configurations to ensure that they do not provide wildlife with opportunities for nesting and loafing.

MAA also consults with an on-site USDA Wildlife Services biologist, who serves as FAA's representative at BWI Airport. Working with USDA, MAA is able to identify types of plants or habitats that could pose threats to aircraft operations and replace them with less attractive species. USDA also works with MAA's Division of Environmental Planning personnel and Division of Maintenance personnel to identify appropriate grass heights and mowing schedules.



*MAA routinely inspects its reforestation areas, which include hundreds of acres of pine trees. Anne Arundel County has awarded MAA for its reforestation efforts.*

## FUTURE ACTIVITIES AND CHALLENGES

BWI Airport and Northern Anne Arundel County have grown dramatically throughout the 1990s, and development is expected to continue at an unprecedented pace for the next 10 years.

MAA has worked with MDE and DNR to fulfill its permit requirements and manage wildlife, but further coordination is necessary. MAA has begun to work with Anne Arundel County to discuss the potential wildlife hazards associated with landscaping and stormwater management within the aircraft approach and departure areas that extend from BWI Airport. MAA and the county have also developed guidelines for reducing these hazards, such as appropriate plant palettes.

Anne Arundel County, MDE, DNR and other agencies will continue to require MAA and all nearby developers to fulfill forest conservation requirements and provide mitigation, including reforestation. MAA must continue its dialogue with these agencies to ensure that proposed development and mitigation sites are developed in a manner that is consistent with operations at BWI.

# CULTURAL RESOURCES

Humans have occupied the land surrounding BWI Airport for over 10,000 years. Early hunters and gatherers took advantage of the area's creeks, wetlands and forests as sources of drinking water and a variety of plant and animal foods. Much of the evidence of these early people is covered by the soil that has built up over the centuries through erosion and deposition. This soil also created the fertile farmland that attracted the European settlers and farmers throughout the 18th and 19th centuries. Evidence of this earlier human activity, known as cultural resources, remains beneath the earth's surface.

To date, archeologists have identified more than 100 sites within 5 miles of BWI Airport. These fragile, irreplaceable sites could be destroyed easily by earth-moving activities or vandalism. MAA's commitment to environmental stewardship includes a commitment to preserving and protecting these resources.

## REGULATIONS/PERMITS AND AUTHORIZATIONS

The National Historic Preservation Act of 1966 (NHPA) serves as the basis of the nation's historic preservation program. Section 106 of this act requires federal agencies to "take into account" the effects of its undertakings on historic properties.<sup>22</sup> In addition, the Advisory Council on Historic Preservation (ACHP) developed regulations to implement this act. The ACHP was created to advise the President and Congress on historic preservation issues and to review federal actions that may affect significant historic and archeological resources. To comply with NHPA, MAA must identify potential impacts to the cultural resources under its stewardship whenever it considers the development of a new project and the project's potential environmental impacts.

As a state-owned property, MAA must consult with the Maryland Historical Trust (MHT) to determine how its actions may affect on-site archeological and historic resources that are listed or eligible for listing in the Maryland Register or the National Register of Historic Places (NRHP). MHT is the agency responsible for evaluating and inventorying historic and prehistoric sites, determining their value to Maryland's cultural heritage, and participating in decisions regarding the preservation of such resources. Each project that occurs on BWI Airport property must adhere to Article 83B, 5-601 to 5-630 of the Annotated Code of Maryland.

## PLANNING AND PROTECTION APPROACH

MAA recently prepared a *Historic Preservation Plan for Baltimore/Washington International Airport* (HPP), in coordination with FAA and MHT, in an effort to streamline compliance with federal and state preservation procedures.<sup>23</sup> Rather than continuing to comply with federal and state agencies on a case-by-case basis, the HPP allows FAA and MAA to make some basic decisions concerning how an action may affect historic property by:

- > Defining the area in which an action may affect a significant archeological or historical site (i.e., area of potential effect).
- > Determining whether the area of potential effect contains any recorded sites or requires further study.<sup>24</sup>

MAA prepared the HPP according to the guidance set forth by federal and state agencies. The two-part HPP contains:

- > An overview of the airport's history;
- > An inventory of all recorded archeological and historical resources within the airport;
- > A predictive model to indicate areas of MAA property and nearby properties that are likely to contain historic or cultural resources; and
- > Guidance for evaluating and mitigating potential impacts to MAA's cultural resources if encountered.

MAA consults the HPP for each project that it undertakes, and presents its conclusions to appropriate state agencies during the environmental review and permitting process. If the proposed project indicates a high potential for impacts, MAA works with project engineers early in the design phase to explore the possibility of changing or modifying the design to avoid or minimize the potential impact on cultural resources. If avoidance is not possible, MAA works closely with state representatives to determine the appropriate mitigation measures.

## RESOURCES

Through extensive research that has included reviews of historic maps, studies of early people, models that predict location of resources and on-site archeological testing, MAA has identified numerous on-site cultural resources. These resources fall into two categories: actual identified sites or zones of archeological sensitivity that have a high potential to contain resources. Sites of the highest value are either listed on or eligible for the NRHP.

**Prehistoric Sites.** Two prehistoric sites have been identified on MAA property, the Higgins site and the Harman site.

The Higgins site contains the tools and remains of fire-cracked rock hearths used by Paleoindian peoples approximately 8,000 to 10,000 years ago. The site was probably a small, short-term campsite where game was processed. The site also contains projectile points from the Middle (6,500 to 3,000 BC) or Late (3,000 to 1,000 BC) Archaic periods. Archeologists working for MDOT and MHT determined that the site is eligible for the NRHP.

The Harman site contains projectile points and ceramics from the Archaic and Woodland periods. MHT has recommended that portions of the Harman site be further evaluated to determine the site's eligibility for the NRHP.

**Historic Sites.** Many historic sites have been identified on MAA property, and MAA has worked with state and local preservation agencies to avoid and preserve these resources.



**Farming Community Resources.** Prior to airport construction, the land that comprises BWI Airport property contained farmsteads, which would have included houses made of log, frame, brick or stone; wells; gardens; and picker, tenant or slave housing. When the City of Baltimore began to develop Friendship International Airport in the 1940s, it purchased these farms.

**Cemeteries.** In addition to the farms, a i rport property was the site of a number of cemeteries, including the Friendship Church Cemetery, the Holy Trinity Church Cemetery, the St. Andrews Cemetery, and approximately 14 small, private cemeteries with an unknown number of graves. In 1946, a contract was let for the relocation of remains from small cemeteries and family burial grounds within the airport boundaries. Only two cemeteries are known to remain on airport property:

- > Friendship Cemetery is a small, active cemetery located just south of the Airport Rescue and Fire Fighting facility and west of the intersection of runways 15R-33L and 4-22. The cemetery was established in the early 19th century and is still used. MAA works closely with cemetery representatives to prevent disturbance to known gravesites, and it makes every effort to allow families to visit and maintain gravesites.
- > Joseph Cole Farmstead Cemetery is a small cemetery is located near Kitten Branch. Early records and indentations in the ground surface indicate that the remains may have been removed from this cemetery when the airport was constructed in the 1940s, but the markers are intact. MAA has preserved this cemetery, but it is not available to the public.



*Friendship Cemetery is a small, active cemetery on BWI property. MAA works closely with family members to preserve known gravesites.*

**Benson-Hammond House.** The Benson Hammond house was constructed in the 1830s, and it is the only historical resource on MAA property that is currently listed in the NRHP. MAA leases the house to the Ann Arrundell County Historical Society, Inc., which uses it as its headquarters. The historical society conducted archeological investigations of the site and found artifacts from the 18th, 19th and 20th centuries, in addition to prehistoric artifacts such as projectile points, flakes, pottery sherds, a stone pendant, stone blades and bowl fragments.



**B. Smith Site.** MAA discovered the remains of the Basil Smith farmstead in 2001, while performing archeological surveys for the new rental car facility. The site contained artifacts, such as a foundation, pottery and nails associated with 19th century occupation, and some artifacts that were reflective of 18th century occupation. MHT determined that the site was eligible for inclusion on the NRHP.

Impacts to the B. Smith site were unavoidable. MAA developed a Memorandum of Understanding with FAA and MHT to develop appropriate mitigation. Since that time, MAA has sent all artifacts to the Jefferson Patterson Museum for curation, and it has worked with MHT to prepare a website for public viewing. The website describes the artifacts, their historical context, and what MAA learned from its archeological investigations.

**High Probability Zones.** MAA's *Historic Preservation Plan for BWI Airport* indicates that the property contains several other areas that are likely to include either historic or prehistoric archeological sites. Some of the information used to determine this probability includes soils, terrain, proximity to water and the extent of previous disturbance from airport construction, plowing, etc. MAA uses this preliminary data to avoid and minimize impacts to these resources during project planning and to ensure that investigations are performed in a thorough and timely fashion if development is necessary.

## FUTURE ACTIVITIES AND CHALLENGES

MAA's greatest challenge for this culturally rich area is to encourage facility growth while avoiding potential impacts. However, MAA recognizes that avoidance may not always be possible; therefore, it must develop processes and schedules that provide for agency coordination, permitting, mitigation and preservation efforts.

# COMMUNITY AND RECREATIONAL RESOURCES

Airports offer unique recreational opportunities for air travelers and residents of surrounding communities by providing large open areas and spectacular views as aircraft take off and land. MAA has worked to link BWI Airport with several nearby recreational facilities. These facilities, located within and outside of the terminal, provide thousands of people with an attractive area for exercise and play while experiencing the thrill of aviation.



*The Thomas A. Dixon Aircraft Observation Area allows residents to experience the thrill of aviation up close.*



*MAA dedicated the observation area to Mr. Thomas A. Dixon, a BWI neighbor and community leader.*

## RESOURCES

Community and recreational resources at BWI Airport include:

- > An observation deck, large models, displays and a play area within the terminal that provide travelers with recreational opportunities.
- > The 12.5-mile BWI Trail is a paved hiker-biker trail that follows the airport perimeter and serves as an intermodal transportation facility that links the surrounding communities and neighborhoods with the Linthicum Light Rail Station, the Baltimore and Annapolis Trail, and the BWI Rail Station. The trail, which includes road overpasses for safety and wooden boardwalks, allows walkers, joggers, roller bladers and cyclists to pass by the historic Benson-Hammond House, the Andover Equestrian Center, and wetlands on the north side of Dorsey Road and the east side of MD Route 170. BWI Trail construction began in the early 1990s, and the last segment opened to the public in May 1999.
- > The Thomas A. Dixon, Jr. Aircraft Observation Area is a small park on the south edge of the airport at the southern end of Runway 15R-33L. Many BWI Trail users enjoy this area, which includes parking facilities, bike racks, restrooms, drinking water fountains, picnic tables, a tot lot and a shaded area with illustrations to help them identify the aircraft that fly overhead.<sup>25</sup> MAA named the area in tribute to Tom Dixon, a BWI neighbor and community leader who was instrumental in establishing the BWI Neighbors Committee.
- > Friendship Park, which MAA also leases to Anne Arundel County, is a small park that provides walking and biking trails and a small playground. The park is located on the south side of Dorsey Road, adjacent to the Thomas A. "Tom" Dixon Aircraft Observation Area.

## PERMITS AND AUTHORIZATIONS

The State of Maryland has controls in place to monitor and discourage incompatible land use near active runways. FAA's interest in land use is two-fold: FAA regulations at FAR Part 77, "Objects Affecting Navigable Airspace," prohibit land use that would create obstructions in flight paths. Furthermore, FAA guidance in FAR Part 150/1520-1, "Noise Control and Compatibility Planning for Airports," encourages the development of noise-compatible land use. This guidance considers recreational facilities to be more compatible with noisy environments than residential structures, and these recreational areas provide a transitional buffer for surrounding land use.



*Since 1999 the BWI Trail has linked nearby neighborhoods and provided residents with recreational opportunities.*

## PLANNING AND PROTECTION APPROACH

The open areas associated with Friendship Park comprise a portion of the drainage area that forms the headwaters of Sawmill Creek. By maintaining this area as open space, MAA helps to support water quality goals for the creek.

## RECENT ACCOMPLISHMENTS

MAA eagerly invites the public, especially area residents and airport employees, to use the BWI Trail. MAA publicized the trail in its annual report and provided signs to direct potential trail users. The trail is incorporated in local and state trail network maps. Local organizations can reserve the trail for charitable events by calling the Anne Arundel County Department of Parks and Recreation.

The public is also welcome to take a close-up look at BWI Airport's operations. BWI Airport's tour program for youth and adult groups focuses on airport operations and facilities, aviation careers, and BWI Airport's history and economic importance. Thousands of people have taken a closer look at BWI and its operations since the program was initiated.<sup>26</sup>

## FUTURE ACTIVITIES AND CHALLENGES

The BWI Trail is a valuable asset to the airport and surrounding communities. MAA will work to ensure that users of the BWI Trail will have uninterrupted access to this facility during upcoming airport development activities.



# ENERGY

BWI Airport produces and consumes a vast amount of energy to support airport operations and to accommodate the approximately 20 million people who pass through its gates annually. This energy use can be broken down into two categories:

- > Energy used to support the airport and facility operations (i.e., stationary consumers), and
- > Energy consumed to support transportation to, from, and within the airport using aircraft, ground support and surface vehicles (i.e., mobile consumers).

To support facility operations, MAA owns, maintains and operates an on-site utility generation plant. This facility utilizes natural gas to produce the electricity required to light, cool, heat and provide power to facility buildings. MAA carefully monitors the fuel consumed by the on-site facility, and it operates the facility in accordance with a permit from MDE's Air and Radiation Management Administration. MAA has never violated the conditions of this permit.



*BWI's fuel farm provides fuel to the hundreds of aircraft that travel to and from BWI daily.*

## REGULATIONS/PERMITS AND AUTHORIZATIONS

Energy use is of concern at both the federal and state levels. Under the 1990 Clean Air Act Amendments and the Energy Policy Act of 1992, Congress requires those who own and operate vehicle fleets to purchase alternative or clean-fuel vehicles. While the implementing regulations for each federal act vary, MDOT supports these requirements with a strong commitment to upgrading its vehicle fleet with clean-burning fuels.

## PLANNING AND APPROACH

The Office of Planning and Environmental Services provides the framework for managing energy use at BWI Airport in three important ways:

- > Preparing and implementing a *Utility Master Plan for BWI Airport* that describes existing utility services to BWI and prospective utility needs;
- > Developing travel options and alternatives for persons to travel to, from and within the airport through new facilities and intermodal systems; and
- > Using more energy-efficient systems and alternative-fuel vehicles to decrease energy consumption, reduce emissions and protect air quality. (For additional information refer to the Air Quality section.)

**Utility Master Plan.** The Office of Planning and Environmental Services prepared the *Utility Master Plan for BWI Airport* to identify the many systems and utilities needed to operate the airport. The plan provides baseline energy consumption data and describes existing services used to operate BWI under current conditions, such as: water and sanitary services, glycol collection, natural gas consumption, electrical power, heating and air conditioning systems, fuel use and communication networks.

MAA uses the plan to determine current usage levels and how proposed development would affect utility use and distribution systems. For example, MAA recently began to construct 15 additional airport gates. Prior to design development, MAA performed utility analysis to determine the additional resources that would be required to operate the additional gates. MAA determined that it would have to expand its central utility plant to accommodate the additional gates and included the necessary utility plant upgrades as part of the overall project development.

### **Additional Travel Options and Facilities.**

Vehicles that travel shorter distances or for shorter periods of time use less fuel and produce fewer emissions. The Office of Planning and Environmental Services considers this fact whenever new projects are introduced and developed.

MAA understands that a substantial amount of energy is expended to carry passengers to, from and between various airport locations. MAA hopes to reduce energy consumption associated with these activities by providing passengers with other options for getting to and from the airport using mass transit or shared rides, and future plans include the use of a peoplemover system and moving sidewalks to further reduce dependence on ground-support vehicles.

**Using Energy-Efficient Facilities and Alternative-Fuel Vehicles.** MAA's Division of Maintenance is responsible for managing energy use at BWI Airport. This division has a program to monitor fixed facility energy consumption and balance the power load demand daily. Whenever possible, the division strives to replace facilities with new, more energy efficient systems and increase the use of alternative fuels.

### **RECENT ACCOMPLISHMENTS**

MAA is promoting efficient energy use in the terminal area by replacing the lighting with more energy efficient fixtures. Switching from T-12 fluorescent lights to T-8 lights with electronic ballasts will reduce the electricity required to illuminate the airport by 30 percent. MAA routinely includes energy efficient lighting in its new construction projects.

Another program to reduce energy consumption has focused on BWI Airport's heating, ventilation and cooling (HVAC) systems. Various HVAC systems have been installed and upgraded as the airport expanded during the last decade. These new systems provide for a five to ten percent reduction in fuel use.

To reduce air emissions, MAA's Division of Maintenance uses many alternative fuel or bi-fuel vehicles. Some of the vehicles use only compressed natural gas (CNG), while others use a combination of natural gas and fossil fuels. The approximately 20-vehicle fleet includes carrier vans, pick-up trucks and flat-bed trucks that are used daily.<sup>27</sup> MAA's facilities also include an on-site quick-fill CNG fueling station.

### **FUTURE ACTIVITIES AND CHALLENGES**

Reduced energy use makes sense from both a business and an environmental perspective. Both the aviation industry and MAA will continue to look for ways to increase energy efficiency. The aviation industry will continue to redesign aircraft to achieve greater fuel economy to avoid increased ticket prices and maintain competition. Similarly, MAA will continue to look for ways to increase energy efficiency and minimize operating expenses throughout the airport. These savings will help to secure BWI Airport's competitive position within the marketplace by allowing it to attract and retain tenants such as airlines and support services.

MAA is also sensitive to the environmental effects of energy consumption. As demand for transportation at BWI Airport grows, the demand for fuel to operate transportation vehicles will increase. MAA will continue to look for ways to improve transportation to, from and among its facilities. It will continue to look toward intermodal options to provide alternatives to the use of personal automobiles that travel to and from the airport in an effort to prevent congestion on and near terminal roadways and to reduce air emissions in the Baltimore region.



# SOLID WASTE, LIQUID WASTE AND RECYCLING

The tenants, staff and patrons of BWI Airport produce a waste stream that includes refuse from restaurants, offices, a hotel, a fire department, aircraft support services and operations, construction and maintenance activities. Many of the materials in this waste stream, such as paper, cardboard, aluminum, plastic and glass, can be separated for reuse or recycling. MAA leads a program to encourage recycling, minimize waste and dispose of solids in an environmentally safe manner.



*MAA recyclable solid waste, such as tires, paper, and metal. Materials are stored in covered containers so that they do not attract birds or other wildlife.*

## REGULATIONS/PERMITS AND AUTHORIZATIONS

**Solid Waste.** Maryland's Recycling Act provides the State of Maryland with the authority to set state and county recycling goals for various wastes through an Office of Recycling. The focus of the legislation is solid waste, including metals, paper, tires, batteries and white goods (i.e., old appliances, such as refrigerators). State facilities set a goal of recycling 20 to 25 percent of their solid waste streams. As a state facility, activities at BWI Airport are subject to these goals.

FAA's advisory circular, *Hazardous Wildlife Attractants on or near Airports*, provides guidelines for the storage and transfer of waste. The guidelines include suggestions for covering waste during storage and transfer so it does not attract gulls, pigeons, crows, and other flocking birds that can pose wildlife hazards.

**Liquid Waste.** Liquid wastes from BWI Airport are limited to the discharge of sanitary wastes and collected deicing fluids. These liquids are discharged through the airport's sanitary sewer system to the Patapsco Wastewater Treatment Plant according to a permit from Baltimore County or sent to an off-site facility for treatment and disposal.

## PLANNING AND PROTECTION APPROACH

The Office of Planning and Environmental Services considers the potential for reuse of buildings, pavement, and materials with each construction project it reviews. For example, MAA considered selling or transferring the wood from the trees it clears rather than simply hauling it to a landfill. While not every construction project results in a recycling or reuse opportunity, MAA is careful to consider recycling or reuse in every large project it undertakes.

MAA is conducting a study to improve its management of collected deicing fluid, and it is investigating the potential for recycling deicing fluid. (Deicing fluid is currently collected and discharged according to a permit with the local wastewater treatment plant.)

## RECENT ACCOMPLISHMENTS

MAA's Office of Operations, which maintains a recycling program in the terminal area for paper, cardboard, aluminum cans, and plastic and glass bottles, provides specific containers to collect these items from tenants and patrons. MAA's records indicate that BWI Airport is approaching the state-mandated goal of recycling 20 percent of its waste stream, but it has not yet achieved this goal.

**Operation and Maintenance.** The Office of Operations has provided tenants with information about pollution prevention and vehicle maintenance that includes guidelines on storing and handling recyclable liquids such as fuel oil, brake fluid and others. MAA and its tenants store these materials on site until they are picked up by a commercial recycling contractor and disposed of at an appropriate facility. The Tenant Directives MAA issues with its leasing agreements also address these issues.

## FUTURE ACTIVITIES AND CHALLENGES

As landfill capacity throughout the Eastern Seaboard becomes further constrained, all large-quantity waste generators will face greater challenges in finding locations that accept solid waste as well as higher disposal costs. As MAA grows, it will generate even larger amounts of solid waste. To address this challenge, MAA will strive to recycle an even larger portion of its solid waste stream and surpass state goals.

## Endnotes

- <sup>1</sup> Maryland Department of the Environment (MDE) website: [www.mde.state.md.us/Air/air\\_quality/index.asp](http://www.mde.state.md.us/Air/air_quality/index.asp).
- <sup>2</sup> MDE, July 5, 2001, *Reasonably Available Control Measure (RACM) Analysis for the Baltimore Region*, prepared for EPA.
- <sup>3</sup> An EPA rule describing the criteria and procedures for determining conformity is found at 40 CFR Part 51. (EPA, Office of Air and Radiation and Mobile Sources, 1999, <http://www.epa.gov/oms/transp/traqkey.htm>).
- <sup>4</sup> KM CHNG Environmental, Inc., 2001, *Air Quality Assessment for Baltimore/Washington International Airport*, Burlington, MA.
- <sup>5</sup> MDOT, 2002, "A Blueprint for the Future," brochure describing construction activities at BWI Airport, Baltimore, MD.
- <sup>6</sup> MDOT, 2002, "A Blueprint for the Future," Baltimore, MD.
- <sup>7</sup> Maryland Aviation Administration (MAA), November 1997, *Public Participation Handbook for the 1998 BWI Airport Noise Zone Update*, Baltimore, MD, p. 13.
- <sup>8</sup> Federal Aviation Administration (FAA), Potomac Consolidated Tracon, "Straight Talk on Aircraft Noise" (undated brochure), Washington, DC.
- <sup>9</sup> FAA, Aviation Noise Abatement Policy, available at: <http://aee.hq.faa.gov/Noise/Part1.html>.
- <sup>10</sup> Rullman, Walter, October 31, 2002, conversation regarding homeowner assistance programs and their funding, MAA, Division of Real Estate, Baltimore, MD.
- <sup>11</sup> MAA, November 1997, *Public Participation Handbook for the 1998 BWI Airport Noise Zone Update*, Division of Noise Abatement and Land Use Compatibility Planning, Baltimore, MD.
- <sup>12</sup> Mark Williams, 2002, MAA, Division of Environmental Compliance, Baltimore, MD.
- <sup>13</sup> MAA, January 2000, *Documentation of Existing Stream Conditions*, Baltimore, MD.
- <sup>14</sup> MDE, Water Management Administration, 2000 *Maryland Stormwater Design Manual, Volumes 1 and 2*, Baltimore, MD.
- <sup>15</sup> FAA, Office of Airport Safety and Standards, and United States Department of Agriculture (USDA), Wildlife Services, January 2000, *Wildlife Hazard Management at Airports*, Washington, DC.
- <sup>16</sup> USDA, Wildlife Services, 2001, *Wildlife Hazard Assessment for BWI Airport*, Annapolis, MD.
- <sup>17</sup> United States Environmental Protection Agency (EPA), Office of Water, August 2000, *Preliminary Data Summary, Deicing Operations*, EPA-821-R-00-016.
- <sup>18</sup> The legal provisions for the Forest Conservation Act are provided in the Annotated Code of Maryland (Natural Resources Article, Title 5, Subtitle 15) and the Code of Maryland Regulations (COMAR, Title 8, Subtitle 19, Forest Conservation).
- <sup>19</sup> FAA, FAR Part 77, Objects Affecting Navigable Airspace, Subpart A, Sections 77.1 to 77.29, Washington, DC. Also available at: [www.faa.gov/AVR/AFS/FARS/far77.txt](http://www.faa.gov/AVR/AFS/FARS/far77.txt).
- <sup>20</sup> Straughan Environmental Services, Inc., 2003, *Forest Stand Delineation for BWI Airport, Maryland*.
- <sup>21</sup> Greiner, Inc., 1998, *Reforestation Master Plan for Baltimore/Washington International Airport*, Timonium, MD.
- <sup>22</sup> National Historic Preservation Act of 1966, as amended, 36 CFR 800, the Advisory Council on Historic Preservation's publication Preparing Agreement Documents (1989) and Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (1983).
- <sup>23</sup> Greiner, Inc., 1995, *Historic Preservation Plan for Baltimore/Washington International Airport*, Timonium, MD, Part 2, p. 2.
- <sup>24</sup> Greiner, Inc., 1995, *Historic Preservation Plan for Baltimore/Washington International Airport*, Part 1, Timonium MD, p. 5.
- <sup>25</sup> BWI Airport, Office of Public Affairs, 1998, *It's a Whole New World*, Baltimore, MD.
- <sup>26</sup> BWI Airport, Office of Public Affairs, 1998, *It's a Whole New World*, Baltimore, MD, p. 15.
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# 4

## A Team Approach

MAA's Office of Planning and Environmental Services is responsible for developing and implementing both long-term and short-term plans for improving facilities at BWI, and for ensuring that proposed development is performed to preserve Maryland's valuable resources.

MAA's Office of Planning and Environmental Services includes five divisions who work to accomplish this goal:

- > Division of Airport Planning;
- > Division of Terminal Planning and Intermodal Development;
- > Division of Environmental Planning;
- > Division of Environmental Compliance; and
- > Division of Aviation Noise and Land Use Compatibility Planning.

Section 4 describes how this integrated team works to develop and operate new facilities to meet the ever-changing demands of the dynamic air travel industry.



## HELPING BWI GROW

The Office of Planning and Environmental Services focuses on both long-term and short-term plans and development within the context of BWI Airport growth. The five divisions within the Office of Planning and Environmental Services work as a team to answer many questions for each new development project – from preliminary concept to operation. Some of these questions are:

- > What new facilities are necessary, and why are they necessary?
- > How large should the new facilities be?
- > Where should the facilities be constructed?
- > How long will the proposed facilities be needed?
- > How will the facilities operate once they are constructed, and who will be responsible for them?

The Office of Planning and Environmental Services also works with FAA to identify immediate and forthcoming changes in demand or safety requirements.

**Determining Facility Needs.** The Division of Airport Planning uses data from passenger forecasts, economic forecasts, tenants and MAA staff to evaluate proposed projects or identify whether new facilities are necessary to meet the needs of the traveling public. If an airline expresses the desire for additional gates or baggage claim facilities, the Division of Airport Planning refers to historical passenger data and forecasts. Using the forecasts, the division identifies whether new gates or baggage facilities are necessary, the number required and whether the new facilities will meet short-term and long-term needs. If the forecasts indicate that the additional gates are unnecessary or required for only a short period, the Division of Airport Planning works to develop alternative solutions to meet the tenant's needs.

**Identifying Facility Locations.** When MAA identifies the need for facilities, the various divisions within the Office of Planning and Environmental Services translate the need into a feasible project and identify potential locations that can be illustrated on the Airport Layout Plan. If a new facility must be constructed at the terminal or provide links to other transportation facilities, the Division of Terminal Planning and Intermodal Development would review the project and identify appropriate locations. If a proposed project requires terminal expansion or construction, the Division of the Environmental Planning would consult its previously prepared environmental resource inventories to recommend locations that would minimize environmental impacts. If the proposed project would lead to increased noise or a change in zoning, the Division of Aviation Noise Abatement and Land Use Compatibility Planning would review the proposed project locations to determine the potential effects on residential areas and nearby land use.

**Obtaining Permits and Approvals.** The Division of Environmental Planning is responsible for identifying the various permits and approvals that will be required by federal, state and local agencies prior to construction. The group performs extensive agency coordination with FAA, EPA, the U.S. Army Corps of Engineers, MHT, MDE, DNR, Anne Arundel County, and others as necessary. As previously discussed, one of MAA's greatest challenges is to reconcile conflicting regulatory requirements. For example, DNR requires forest preservation whenever possible, while FAA encourages the elimination of trees on airport property.

**Engineering and Design.** The Division of Airport Planning and Division of Environmental Planning staff review plans early in the design process to determine whether a proposed project can pose risks to the traveling public. For example, the Division of Airport Planning reviews all designs to ensure that neither the proposed facility nor the construction equipment (cranes, etc.) would affect protected air space. The Division of Environmental Planning reviews stormwater management plans for each proposed project to ensure that the project would not create open water to attract waterfowl near the airport.

During a recent construction project, MAA environmental staff noted that proposed seed mixes included in the design plans included millet and other grains which often attract waterfowl and flocking birds. The staff proposed an alternate seed mixture that does not attract wildlife and presented it to the Division of Engineering as a new design standard. Now all MAA engineers and consultants incorporate this safer seed mix in new airport design plans.

**Facility Operation.** After a new facility is designed and constructed, the Division of Environmental Compliance is responsible for its daily operation, even if it is constructed for tenant use. Some activities for which the Division of Environmental Compliance is responsible include:

- > Maintaining stormwater management facilities;
- > Ensuring that MAA's NPDES stormwater discharge permit requirements are achieved;
- > Capturing and measuring deicing fluid;
- > Developing a Stormwater Pollution Prevention Plan and training MAA employees and tenants to reduce pollution; and
- > Monitoring tenant operations to ensure that stormwater pollution is minimized.

Close coordination between the Division of Environmental Compliance and Division of Environmental Planning is crucial for meeting MAA's environmental protection goals. The environmental resource inventories prepared by the environmental planning staff are useful to compliance personnel when updating complex permits, such as the NPDES permit and air quality permit. MAA's Environmental Planning Division recently prepared stormwater facility maintenance manuals as part of its *Comprehensive Stormwater Management Plan*. The manuals provide detailed instructions for maintaining new and existing stormwater management facilities at BWI. The Division of Environmental Compliance uses these manuals to plan inspection schedules and perform maintenance when managing the airport's stormwater management system.

## PLANNING AND PROTECTION APPROACH

Federal, state and local agencies regulate many activities and materials associated with airport operations, such as the disposal of deicing fluids and the waste associated with rental car and vehicle maintenance. Some of the agencies involved in regulating the transportation, use, storage and disposal of these materials include the U.S. Department of Transportation, EPA, FAA, MDOT and MDE.

The Division of Environmental Compliance is responsible for ensuring that BWI Airport personnel, tenants and air carriers comply with many of these regulations. One method of ensuring compliance with these regulations is through MAA's tenant directive program, which addresses regulatory requirements through leases. The program has been successful, because it allows MAA to revise its requirements when regulations or operations change without renegotiating tenant leases. To date, MAA has issued tenant directives to address items such as:

- > trash disposal,
- > aircraft and vehicle washing,
- > fueling,

- > deicing,
- > fuel/oil and hazardous material spill procedures,
- > drum/container markings, storage, disposal procedures,
- > storage tank use, and
- > energy conservation.

MAA's Division of Environmental Compliance inspects tenant-operated airport facilities monthly to ensure compliance with tenant directives.

#### **RECENT ACCOMPLISHMENT: WILDLIFE HAZARD MANAGEMENT GROUP**

Environmental protection and passenger safety measures must occur throughout BWI – not only on the airport or during the preparation of facility designs. The Office of Planning and Environmental Services works with other offices and divisions throughout MAA to promote and ensure environmental compliance and safe airport operations, and it has developed several interdepartmental strategies to meet environmental goals.

The Division of Environmental Planning spearheaded the effort to establish a Wildlife Hazard Management Working Group in 2000, and it initiated a wildlife hazard assessment for BWI. The working group meets monthly and is composed of representatives from diverse MAA offices, such as:

- > USDA, Wildlife Services,
- > Maryland Transportation Police,
- > Division of Maintenance,
- > Airport Operations Center,
- > Airport Security Center, and
- > Division of Environmental Planning.

The Wildlife Hazard Management Working Group meets monthly to discuss issues that arise during daily operations and to identify potential solutions. Because diverse members of the MAA community participate in the working group, the group is able to consider each issue from a variety of perspectives. The ongoing efforts of the committee are crucial to ensure the safety of the traveling public. The participation of the diverse membership ensures that messages regarding wildlife hazards are disseminated to other members of the airport community in an effort to increase awareness of wildlife issues.

#### **BEYOND BWI BOUNDARIES**

MAA's Office of Planning and Environmental Services has looked beyond BWI's boundaries and encouraged community participation to further reduce wildlife hazards. Since 2002, the Division of Environmental Planning has worked closely with Anne Arundel County to discuss development within the Airport Zone, which is defined by the Code of Maryland Regulations as the area within 4 miles of BWI Airport. MAA has worked with the county to help eliminate the creation of large stormwater management ponds, wetlands, or inappropriate vegetation associated with proposed development within the Airport Zone. To streamline the county and MAA review processes, MAA provided county planners with guidelines and stormwater management strategies that fulfill water quality regulations and meet FAA wildlife management criteria. The county distributes these guidelines to developers working within the Airport Zone.



# 5

## Soaring into the Future

MAA will confront many new environmental issues as regulations change, the air travel industry evolves, and as BWI Airport continues to undergo unprecedented expansion and further intermodal development. MAA and its staff will work hard to ensure that daily operations remain safe, environmentally responsible, and address the needs of the traveling public.

MAA is poised to meet its ongoing environmental challenges by continuing to employ some of the same strategies that have proven successful, and by employing new strategies. Section 5 presents MAA's approach to meeting the future head on.



## RESOURCE MANAGEMENT

MAA's strategy of inventorying its many environmental resources has proven successful. Through these studies, MAA has been able to negotiate with many regulatory agencies and convey the special issues and concerns associated with an aviation environment. MAA will continue to manage its resources by maintaining an ongoing dialogue with federal, state and local agencies.

**Update Resource Inventories.** MAA studied its environmental resources throughout the 1990s in an attempt to understand the complex environment it manages. As a result of these studies, it has been able to undertake an accelerated airport development program which avoids environmental impacts to the greatest extent possible and complies with all appropriate environmental regulations.

To ensure continued success, MAA will maintain its resource inventories continuously. Ongoing inventories include:

- > Forest stand delineations and conservation plans,
- > Wetland inventories and permits,
- > Stream condition studies,
- > Air quality assessments, and
- > BWI's *Noise Abatement Plan*.

MAA performs routine environmental studies and monitoring to update these resource inventories.

## Develop and Update Resource

**Management Plans.** Based on its many resource inventories, MAA has been able to develop resource management plans to determine the effects of proposed development on its environmental resources. Ongoing master plans that MAA will continue to update include the following: *Reforestation Master Plan, Comprehensive Stormwater Management Plan, Stormwater Pollution Prevention Plan and Utility Master Plan*.

In addition, MAA will continue to update its *Airport Layout Plan*, which provides a conceptual look at airport development for a 20-year period.

**Agency Coordination.** MAA understands that diverse talents, skills and knowledge are required to ensure that BWI continues to operate safely and in a manner that is protective of its valuable environmental resources. MAA will encourage ongoing coordination with several groups and agencies including:

- > Local small area planning groups and local communities to encourage compatible land use within the Airport Zone;
- > County and state agencies to review stormwater management facilities and mitigation designs in an effort to avoid wildlife hazards within the Airport Zone;
- > Local developers to communicate additional considerations associated with development within the Airport Zone; and
- > Federal and state agencies to seek out mitigation opportunities, banking opportunities, and locations for protective easements that do not conflict with aviation safety.

## LOOKING AHEAD

BWI's future is promising – its location near the nation's capital, within the northeast corridor, and its popularity with economical air carriers make growth inevitable.

**Expanded Facilities.** Facility expansion has been ongoing at MAA since 2000, when it opened additional parking facilities for the peak travel season. Improvements will continue as MAA remains committed to customer service and being the capital region's "Easy Come, Easy Go" airport.

Recently constructed facilities and facilities that are underway include:

- > A second parking garage employing the BWI Smart Park system,
- > A consolidated rental car facility on New Ridge Road,
- > Additional tenant and employee parking facilities on Ridge Road,
- > Pier A/B expansion,
- > Airside improvements (taxiways and taxi lanes),
- > Roadway improvements and pedestrian walkways, and
- > Additional safety and security facilities.

MAA hopes that these improvements will help to provide environmental benefits by reducing congestion in the terminal area.

**Intermodal Transportation.** MAA will continue to focus on intermodalism for the next several years. Intermodalism allows people and goods to travel from origin to destination using more than one form of transportation.

MAA's proximity to so many regional transportation systems provides it with an opportunity to be a leader in intermodalism nationwide. Plans to provide quicker, easier connections between these other forms of transportation are underway, and MAA is considering the development of a regional intermodal transportation center that will provide passengers with easy, wait-free connections among various modes. MAA is currently exploring various methods to fully integrate all modes of transportation that serve BWI Airport.



*MAA is poised to meet the challenges of the dynamic aviation industry and address the needs of the traveling public.*

## SUMMARY

As MAA's opportunities for growth continue, so will its efforts to refine its operations and processes by incorporating environmental protection measures, meeting or surpassing regulatory goals, and seeking out the results of scientific studies and technological advances as they occur. MAA will continue to work with its sister agencies within MDOT to support its efforts for expansion and intermodalism, and it will depend on its more than 500 employees to keep BWI operating smoothly and safely. By counting on these resources, MAA will fulfill its mission by addressing the needs of Maryland's traveling public one passenger at a time.







MARYLAND DEPARTMENT OF TRANSPORTATION  
Maryland Aviation Administration