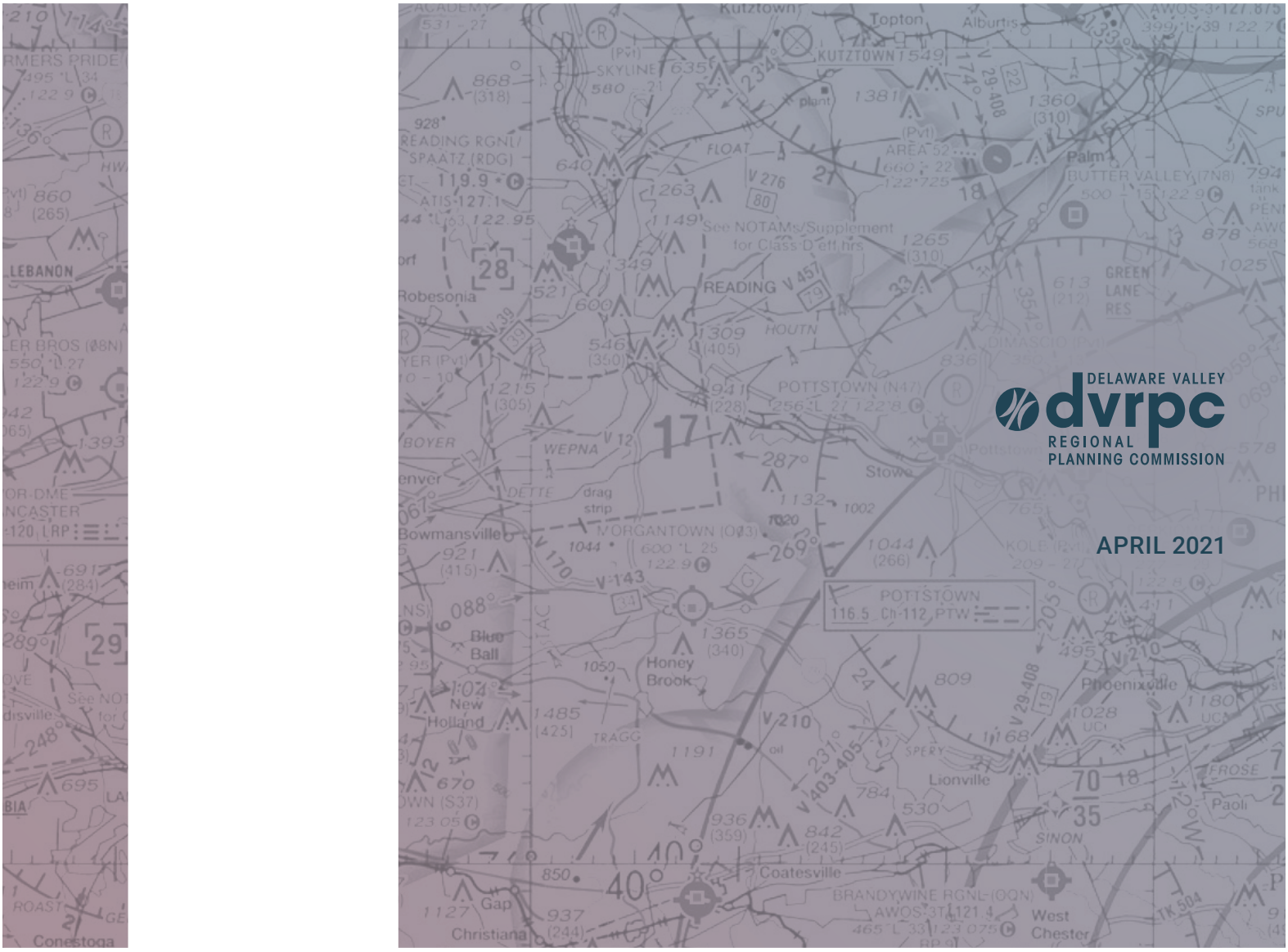


APRIL 2021

AIRCRAFT OPERATIONS COUNTING PROGRAM METHODOLOGY

The Delaware Valley Regional Planning Commission (DVRPC) is the federally designated Metropolitan Planning Organization for a diverse nine-county region in two states: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington,Camden, Gloucester, and Mercer in New Jersey. The DVRPC Regional Aviation System Plan Region includes three additional counties: Salem in New Jersey, New Castle in Delaware, and Cecil in Maryland.

DVRPC's vision for the Greater Philadelphia region is a prosperous, innovative, equitable, resilient, and sustainable region that increases mobility choices by investing in a safe and modern transportation system; that protects and preserves our natural resources while creating healthy communities; and that fosters greater opportunities for all.

DVRPC's mission is to achieve this vision by convening the widest array of partners to inform and facilitate data-driven decision making. We are engaged across the region and strive to be leaders and innovators, exploring new ideas and creating best practices.

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

TITLE VI COMPLIANCE DVRPC fully complies with Title VI of the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987, Executive Order 12898 on Environmental Justice, and related nondiscrimination mandates in all programs and activities. DVRPC's website, www.dvrpc.org, may be translated into multiple languages. Publications and other public documents can usually be made available in alternative languages and formats, if requested. DVRPC's public meetings are always held in ADA-accessible facilities, and held in transit-accessible locations whenever possible. Translation, interpretation, or other auxiliary services can be provided to individuals who submit a request at least seven days prior to a public meeting. Translation and interpretation services for DVRPC's projects, products, and planning processes are available, generally free of charge, by calling (215) 592-1800. All requests will be accommodated to the greatest extent possible. Any person who believes they have been aggrieved by an unlawful discriminatory practice by DVRPC under Title VI has a right to file a formal complaint. Any such complaint must be in writing and filed with DVRPC's Title VI Compliance Manager and/or the appropriate state or federal agency within 180 days of the alleged discriminatory occurrence. For more information on DVRPC's Title VI program or to obtain a Title VI Complaint Form, please visit: www.dvrpc.org/GetInvolved/TitleVI, call (215) 592-1800, or email public_affairs@dvrpc.org.

DVRPC is funded through a variety of funding sources including federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), the Pennsylvania and New Jersey departments of transportation, as well as by DVRPC's state and local member governments. The authors, however, are solely responsible for the findings and conclusions herein, which may not represent the official views or policies of the funding agencies.

Acknowledgments:
This report is funded by the U.S. Department of Transportation, Federal Aviation Administration, Harrisburg Airports District Office (HARADO), under Award Number 3-42-0125-019-2018.

Aircraft Operations Counting Background

The Delaware Valley Regional Planning Commission (DVRPC) has conducted aircraft operations counts at the non-towered airports in the 12-county, four-state Delaware Valley Regional Airport System Plan (RASP) area since 1986. Aircraft operations counts and annual estimates of activity are essential for planning and programming of airport improvements. Reliable operations data at airport facilities provides a basis for service provision and future activity forecasting. While towered airports generally have access to this information through air traffic controllers, the general aviation and reliever airports, which make up the majority of facilities in the region, rely primarily on estimates for their traffic data.

DVRPC's aircraft operations counting program has sought to improve these data estimates and provide more reliable annual operations data for airports in the region. This cyclical program focuses on the counting of non-towered National Plan of Integrated Airport Systems (NPIAS) airports and is made possible by funding through the Federal Aviation Administration (FAA). Given administrative costs, resource availability, and funding, the cycle groups NPIAS airports into a three-year program. The resulting aviation operations data created from these annual counting cycles provides facility-level details on based aircraft; estimated average daily, seasonal, and annual fixed-wing operations; and helicopter activity estimates.

In 2019, DVRPC determined it was critical to modernize the existing counting equipment and supporting methodology to improve the quality and utility of regional aircraft operations counts. DVRPC acquired new acoustical counting equipment and developed an updated counting methodology. This report documents the updated aircraft counting methodology implemented by DVRPC for the ongoing aircraft operations counting program for the year 2019 and forward.

Historic DVRPC Counting Methodology

Prior to 2019, DVRPC's aircraft operations counting program utilized a reliable methodology for conducting counts to produce daily, seasonal, and annual estimates of operations at non-towered airports. This methodology was developed and refined over the more than 30 years of operations counting conducted using acoustical counting equipment. The original methodology and

estimation model were documented in detail in "Estimation of Aircraft Operations at Nontowered Airports in the Delaware Valley Region," published in the *Transportation Research Record* of 1988. In the period of over 30 years that followed this methodology's publication, DVRPC diverged only slightly from the original methods, mostly relating to advancements in technology or in response to changes in collection equipment capabilities.

This operations counting methodology was built around the collection of fixed-wing takeoff counts from eight sample weeks of data with two weeks in each season. The acoustical counting equipment used for this data collection was a Larson Davis Laboratory (LDL) 820 Sound Level Meter. After retrieval, the data collected by the LDL 820 was downloaded in the Aircraft Counting Software (ACS) and checked manually for event-related errors. In addition to the fixed-wing takeoff counts, surveys and interviews with airport operators were conducted to compile annual estimates of helicopter operations. The resulting helicopter counts and outputs of the validated ACS data were input into a model that estimated the average daily operations by season and provided total estimated annual operations (takeoffs and landings). The final report compiled by DVRPC included summaries of the seasonal and annual operations, along with a weekly summary of daily operations by hour for the sample data collected.

This methodology worked reliably for decades, providing a sound foundation for operations activity reporting for the region. However, several factors led to the decision by DVRPC to pursue a new technology and supporting methodology for the aircraft operations counting program. These factors included:

- more frequent instances of equipment failure;
- the increasing cost of maintaining outdated equipment; and
- recognition that the eight-week samples could be replaced with a larger sample collection with newer technology solutions.

This document provides an overview of the updated methodology utilized for the aircraft operations counting program at DVRPC. This report outlines the process for data collection, data storage and reporting, and future improvements.

Data Collection

The aircraft operations counting program methodology was rethought from collection to reporting with a focus on improved data utility and reliability. The foundation of the improvements to the program was the investment in a new technology stack for the collection of fixed-wing operations data. DVRPC also sought additional data sources and analysis that could provide information on the nature of flight operations and composition of fleets servicing individual airports.

Fixed-Wing Activity

The core of the aviation counting program has long been the collection of fixed-wing takeoff data, utilizing acoustic counting devices deployed at the airport of interest. The improved methodology utilizes a similar approach with new technology and modified deployment processes.

Acoustic Counting Equipment

DVRPC utilizes the Wilderness Systems and Technologies' Aircraft Detection System (ADS) 4000 Phoenix. This device monitors acoustic signals and classifies them by amplitude, duration, and other features. The manufacturer of the system reports an accuracy of greater than 90 percent in the collection of takeoff events. The system consists of a microprocessor and associated electronics packaged in a cylindrical plastic enclosure. This enclosure is concealed in a weather shield and attached to a battery, charge regulator, and solar panel assembly. The low power consumption of the unit, along with its durable housing, and solar array, allow for long duration deployment of the device. This allows DVRPC to conduct a count cycle that can collect activity data for 11 months of the year, leaving several weeks each year to conduct maintenance and relocation to the next cycle facilities.

Deployment

The ADS 4000 equipment is deployed during the winter season of the count cycle, with a target deployment date in mid- to late-January. Like many acoustic aircraft counters, the ADS 4000 is positioned near the runway of the airport in a location that is near the rotation point for most traffic utilizing the facility. For most applications, the device is deployed near a runway light, in a

FIGURE 1: TYPICAL DEPLOYMENT OF ADS 4000

manner that does not obstruct the visibility of the light but eases maintenance issues for facility staff.

Figure 1 shows a typical deployment of the ADS 4000 with attached solar array mounted with a southern exposure to maximize power generation. The primary counting device is deployed on the ground, stabilized by stakes to prevent displacement, perpendicular to the runway.

Monitoring and Collection

During the deployment of the ADS 4000, DVRPC performs regular data downloads and equipment checks to ensure the quality of the collected operations counts. For many facilities, the airport facility staff includes inspection of the counting device into their regular maintenance routines and alerts DVRPC of any noticeable malfunctions or equipment displacement.

On regularly scheduled inspections by DVRPC staff, the equipment is carefully checked for damage and a snapshot of the operations counts is archived into DVRPC's Data Collection Platform (DCP) application. These counts are reviewed for any issues and checked against other count cycles for any major deviations that may indicate issues with the data collection. At the end of the counting cycle the full operations counts are loaded into the DCP application, and the equipment is collected for inspection and redeployment.

Post-Processing

Upon final collection of the equipment from the airport, the complete data file is uploaded to the DCP. This comma-separated text file output from the ADS contains rows of data for each recorded takeoff event. Each row comprises five data fields: date and time, loudness, duration (in seconds), and two additional analysis parameters. Table 1 shows a sample of the ADS output.

TABLE 1: ADS DATA OUTPUT

DATETIME	LOUDNESS	DURATION	AP1	AP2
04/10/2019 9:36:30	1839	15	25	4
04/10/2019 9:46:38	2245	7	23	2
04/10/2019 9:56:02	2937	14	32	4

This data file is consumed by a Python script that extracts the raw data from the counting devices and writes records to the DVRPC Aviation Database, flagging each event as valid or requiring additional review. The data cleaning process conducted in this step eliminates records classified by the ADS system as takeoffs but that do not meet standards developed by DVRPC for valid operations. The primary factor in this evaluation is the temporal separation of individual reported takeoff events.

Estimation of Operations

The collection of observed takeoff data remains a sampling of the annual fixed-wing takeoffs. The goal for coverage of sample days observed is 11 months for each facility. The timing of deployment schedules with host facilities and equipment maintenance can cause variation in the final sample size. This sample serves as the basis for establishing both the average daily operations by season and the full estimated annual operations.

TABLE 2: AVIATION SEASON DEFINITIONS

SEASON	MONTHS	DAYS
Winter	January–March	90
Spring	April–June	91
Summer	July–September	92
Fall	October–December	92

Due to seasonal variability in operations, the DVRPC aircraft operations counting program segregates observed data into four distinct seasonal bins for calculating average daily takeoffs. The seasons are defined in Table 2. In the final reports and deliverables from the program, the percentage of observed days is provided to document the sample size that informs the seasonal average daily activity.

The observed sample data includes only takeoff events. Estimated average daily operations, estimated seasonal operations, and estimated annual operations are calculated from the observed takeoffs. The calculations for these are as follows:

This methodology achieves 40–100 percent sample of days from each season to estimate operations. This is an improvement over the 15 percent sample utilized in the previous methodology.

estimated average daily operations = (observed average daily takeoffs) x 2

estimated seasonal operations (SO) = (estimated average daily operations) x (days in season)

annual estimated operations = $winter_{SO} + spring_{SO} + summer_{SO} + fall_{SO}$

Helicopter Activity

The collection of helicopter activity counts at airports is complicated by the operation patterns of these aircraft. The ADS 4000 device utilized for the collection of fixed-wing aircraft is positioned and calibrated for capturing aircraft takeoffs on the runway. Airport operation patterns dictate the approach and takeoff of helicopters, and in many cases they do not overlap with the range of the ADS. In order to capture an annual estimate of helicopter operations DVRPC utilizes a survey of the airport stakeholders.

This survey methodology is the same that has been utilized by DVRPC for the aircraft counting program prior to 2019. DVRPC works with the fixed-base operator (FBO) and airport owner to document the type and nature of helicopter activity at the airfield.

Facility Data

The airport facility inventory data is updated and reviewed during the aircraft counting cycle to ensure that improvements and based aircraft counts are current. This data is primarily sourced from FAA Form 5010, Airport Master Record database. Additional facility data is collected through interviews with the airport sponsors. The critical data points for this information and their sources are documented in Table 3.

TABLE 3: FACILTY DATA SOURCE

DATA	SOURCE
Runway(s)	FAA 5010
Services	FAA 5010, Airport Interviews
Employers	National Establishment Time Series, Airport Interviews
Based Aircraft	FAA 5010, Basedaircraft.com, Airport Interviews
Hangars (capacity/occupied)	Airport Interviews
Tie Downs (capacity/occupied)	Airport Interviews
Projects/Investments	Airport Interviews, Regional Aviation Committee Project Reports

DVRPC aviation planning staff also conducts a review of key facility improvements and operational changes since the previous counting cycle. This information is compiled from interviews with the airport sponsors, FBO staff, project status reports, and review of current aerials. The focus of this review is to document improvements that could have explanatory value for changes in the activity at the airport. The results of these critical airport updates are documented in narrative form in the DVRPC Aviation Database in the counting cycle record.

Weather Data

Aircraft operations are influenced by several factors, weather being one of the most critical to general aviation activity. Leveraging the updated DVRPC Aviation Database, weather data for every day of the aircraft counting cycle is downloaded and archived. This data is compiled from METeorological Aerodrome Reports (METARs). METAR is a format of reporting observational weather data that is used by aircraft pilots and meteorologists. The METAR data is sourced from permanent weather stations or airports with data collection capabilities. The frequency of METARs varies by station, but for regional facilities updates occur in intervals of less than 60 minutes.

METARs include coded data providing information on temperature, dew point, wind direction and speed, visibility, barometric pressure, precipitation, cloud cover and heights, and other special weather notes when applicable. This data is processed and translated into a data table in the DVRPC Aviation Database for future processing. The following is a sample METAR for Wings Field (LOM) on November 1, 2019, issued 1:35PM:

datetime		station	time group	report modifier	wind	variable wind dir
201911010135	METAR	KLOM	010135Z	AUTO	17012G22KT	150V210

visibility + sky condition	temp/ dew pt	alti-meter	remarks
10SM OVC018	22/19	A2956	RMK AO2

Source: DVRPC

This data is intended to provide additional information to explain the variation in daily operations at airports. DVRPC is working on an analysis of this weather data against observed aircraft observations to understand the impact of various weather conditions on aircraft operations. Currently DVRPC uses two methods to classify weather on a given day.

Traditional Method

The traditional weather classification that DVRPC generates for each day is a conversion of the raw observation data into the predominant aviation flight category for the observation day. The classification of these categories is available in Table 4. This provides a baseline explanatory variable for operations on the observation day.

TABLE 4: FLIGHT RULE CLASSIFICATION CRITERIA

FLIGHT RULE	FLIGHT RULE NAME	CLOUD CEILING		VISIBILITY
LIFR	Limited Instrument Flight Rules	< 500 feet	or	< 1 mile
IFR	Instrument Flight Rules	500–1,000 feet	or	1–3 miles
MVFR	Modified Visual Flight Rules	1,000–3,000 feet	or	3–5 miles
VFR	Visual Flight Rules	> 3,000 feet	and	> 5 miles

ATMAP Method

DVRPC also classifies weather conditions based on the ATM Airport Performance (ATMAP) weather algorithm, which was developed to quantify weather conditions at European airports.[1] This algorithm utilizes the observed weather phenomena and calculates a severity code for various defined weather classes. A coefficient is assigned for each classification. The algorithm allows for the classification of days as "good weather" and "bad weather" days based on the resulting summary of coefficients assigned for each weather class. Under the standards developed in this methodology model, any day with a summary coefficient ≥1.5 is considered a bad weather day. However, this is calibrated to large, towered airports in Europe. DVRPC is analyzing the data to better understand how the various weather classes impact operations at regional general aviation facilities.

At the time of publication of this methodology, the sample of data available from the two airports counted in the 2019 counting cycle is not sufficient to adequately inform this analysis. This analysis will be advanced in future aircraft operations counting cycles.

[1] EUROCONTROL, *Algorithm to Describe Weather Conditions at European Airports; Technical Report* (Brussels: Eurocontrol, 2011).

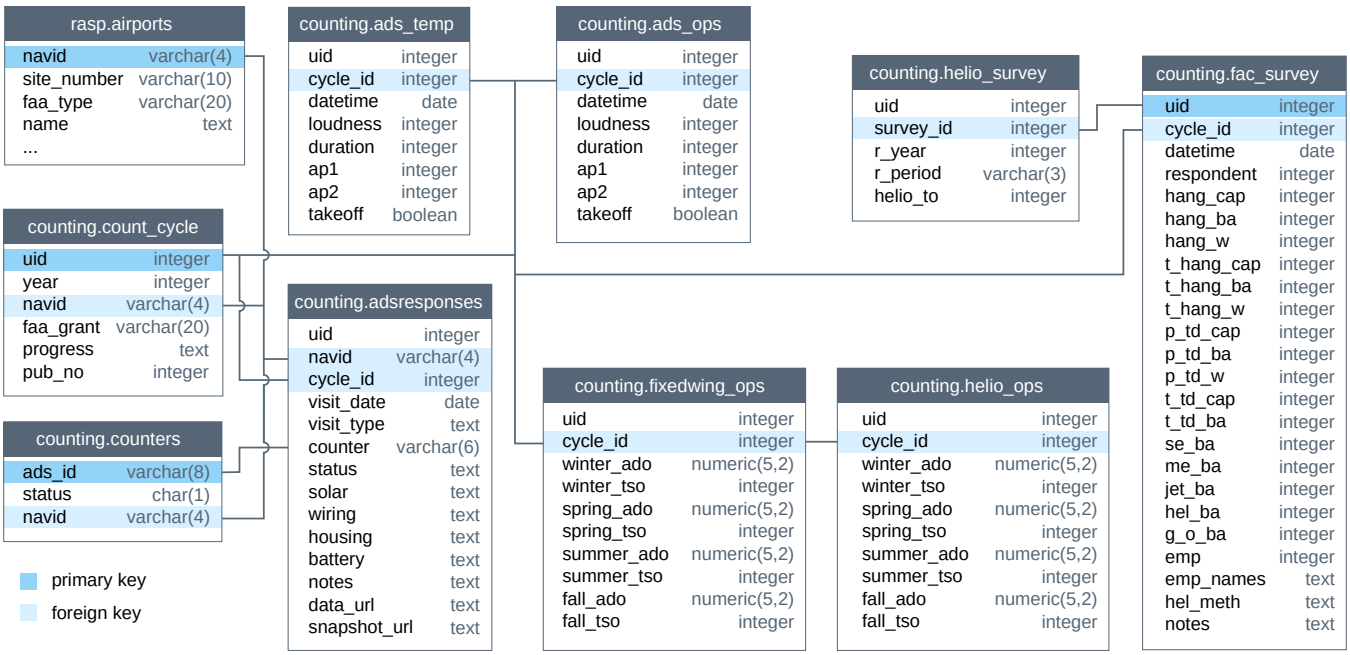
Data Storage and Reporting

The DVRPC Aviation Program has also enhanced the storage of aircraft operations counting data to improve the utility of the data and options for reporting. Leveraging the data systems enhanced in the Regional Aviation Data Initiative, new aircraft operations data tables have been developed to store raw and processed operations data. These enhancements make it possible to generate reports, produce regional summaries, analyze trends, and conduct detailed analysis of operation patterns more easily.

Data Storage

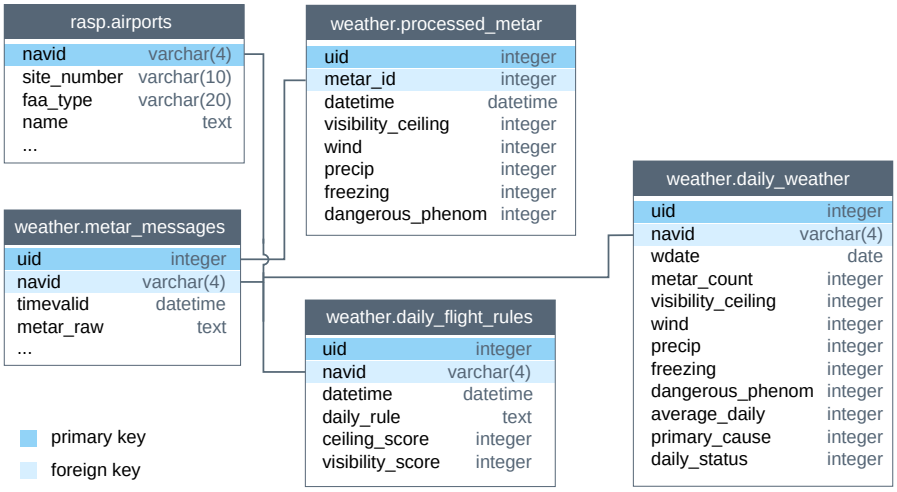
The various data collected as part of the aircraft operations counting program is stored in dedicated data tables of the DVRPC Regional Aviation Database. This database is built on PostgreSQL, and the cleaning, processing, and import of data is completed using Python scripts. Figures 2 and 3 provide an overview of the associated tables from the Regional Aviation Database.

FIGURE 2: "DVRPC-AVIATION" DATA TABLES FOR COUNTING PROGRAM



Source: DVRPC

FIGURE 3: "DVRPC-AVIATION" DATA TABLES FOR WEATHER DATA



Source: DVRPC

These data tables serve as the primary source for the development of the final summary reports, the Aviation Data Portal, and for regional analysis and tracking. The accessibility of this data allows for more robust analysis by facility and over time will serve as a critical resource for regional aviation system planning.

Communication and Reporting

Access to the aviation data collected and compiled by DVRPC is a critical consideration across the aviation planning program. Historically, only printed reports have been made available for the counting program. This allowed for only limited access to the counting results and in a limited structure of summary tables by year and season. The updated data system provides opportunities to enhance the reporting on each individual airport in a standard report format, as well as serve as the foundation of an online aviation microsite for more in-depth data exploration.

Counting Summary Report

The primary deliverable of the historic aircraft counting program was a printed report summarizing the counting cycle operations. This report compiled totals for all the airports observed in each cycle and published hourly counts for the observation days.

In the updated program, the counting summary reports are published by airport for each cycle. This allows for the inclusion of additional trends and patterns. It also provides departments of transportation, the FAA, and the airports dedicated documents for individual facilities. Example pages from the report are shown in Figure 4.

Each published report includes:

- Airport Facility Summary;
- Estimated Operations Summary and Trends by Aircraft Type;
- Seasonal Operations;
- Based Aircraft;
- Observed Daily Fixed-Wing Takeoffs; and
- Fixed-Wing Operations Patterns by Day of Week and Time of Day.

In addition to the individual facility-level activity summary reports, the updated program also includes count cycle summary reports. These reports compile the regional NPIAS airport activity from the three-year cycle into a summary document to provide an update on the trends of activity at these critical regional aviation facilities.

The cycle summary report includes:

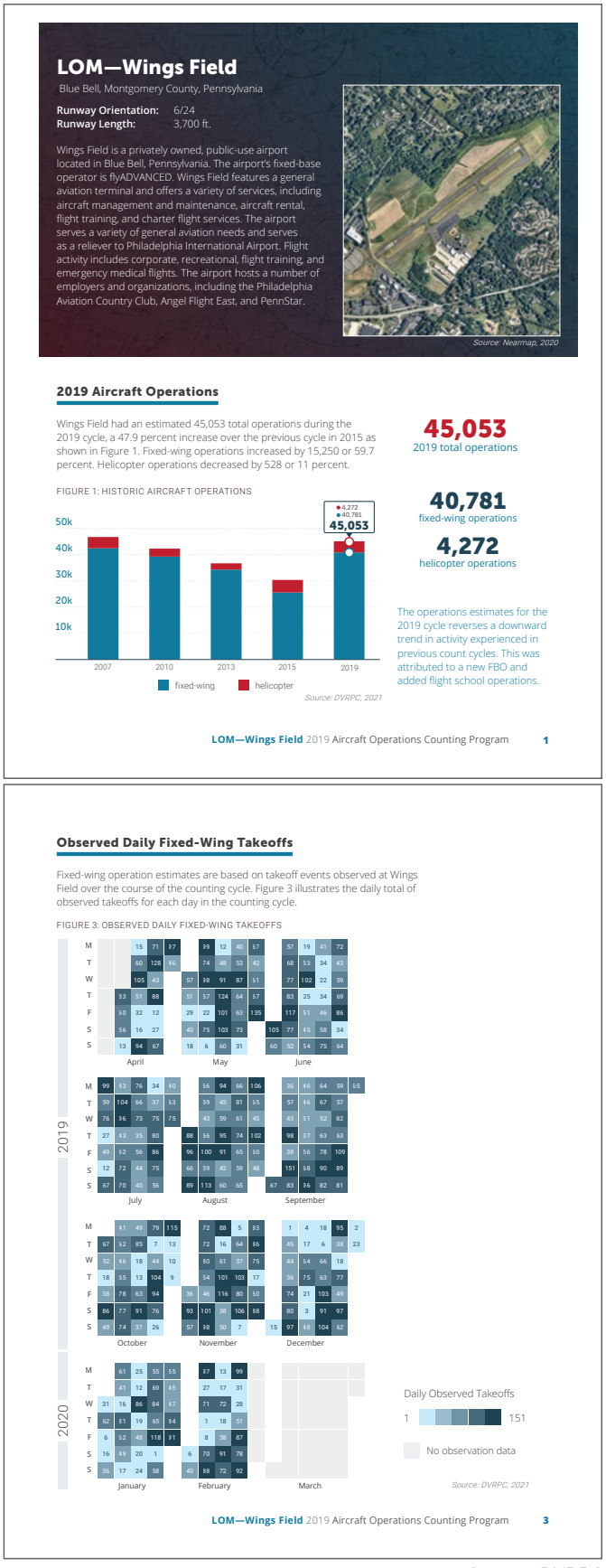
- Regional Operation Summary and Trends;
- Operation Trends by Aircraft Type; and
- Regional Based Aircraft Summary.

Aviation Data Portal

The Regional Aviation Data Initiative included the development of a new online platform to access aviation data, the Aviation Data Portal. This microsite is intended to improve the access to all types of aviation data that can help inform regional and system planning, educate decision makers and the public about aviation, and elevate the priorities for aviation in the region. The tool is in final development with an expected launch in spring 2021.

The aircraft operations counting program data is leveraged to provide details in two of the components. The tool includes a regional summary component that visualizes the historic regional and facility-level operations and based aircraft. This component utilizes the facility-level operations and based aircraft grouped by counting cycle to explain the trends in regional general aviation activity.

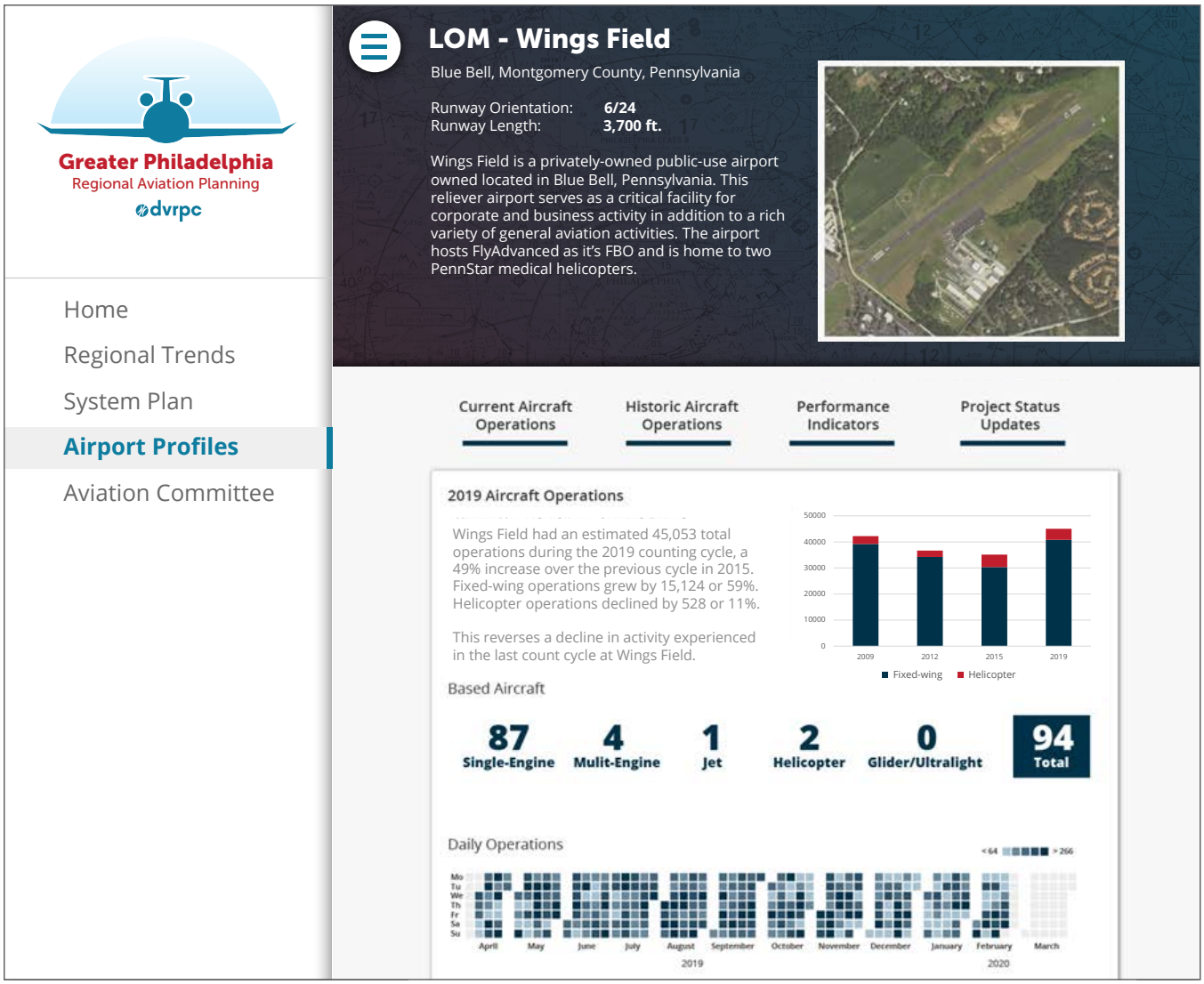
FIGURE 4: COUNTING REPORT SAMPLE PAGES



Source: DVRPC

In addition to the regional summary component, the Aviation Data Portal provides detailed access to each of the RASP airports. These profile pages provide access to the aircraft operations data for each cycle conducted with supporting graphics and narrative. The data provided in the Aviation Data Portal includes everything that is in the printed summary reports plus detailed information on the fixed-wing observations and weather details for each observation day. Figure 5 shows a screenshot of the site in development. In addition to the aircraft operations counting program data, the profile pages will provide additional inventory data, project status reports, investment history, and key performance measures to be established in the RASP Phase II project.

FIGURE 5: DVRPC AVIATION DATA PORTAL (BETA VERSION) SCREENSHOT



Source: DVRPC

Future Program Research

The advancement in data systems maintained by the DVRPC Aviation Program, along with new data sources, provide opportunities for future research in support of the aircraft operations counting and regional aviation system planning. Several gaps remain in the current program:

- takeoff sample validation;
- impacts of weather on operations; and
- nature of operations.

These areas, expanded upon below, will remain a focus of the aircraft operations counting program and will be incorporated into the methodology as they are refined.

Takeoff Sample Validation

The new aircraft operations equipment provides a new form of collection that is capable of a longer duration deployment and requires less post-processing due to the ADS 4000's built-in software. In order to confirm the vendor estimate of 90 percent accuracy of recorded takeoff events, DVPRC has identified the need to collect visual counts for comparison and validation. Through the first cycle of counts with the ADS 4000 equipment, several validation counts have been collected; however, a much larger sample is desired for a more robust statistical comparison. These validation counts will be conducted over future cycles using video and manual event counting. These validation counts include all takeoff, taxi, and landing events at the airfield during the observation session. Additional notation is made about the aircraft type and engine type. These notes are intended to help in any future diagnosis of miscounts found through the validation process and to assist in future data cleaning processes.

Impact of Weather on Operations

This report outlined the current process of downloading and classifying weather conditions at airports as a part of the aircraft operations counting program. This robust data currently helps to provide a qualitative understanding of the weather of any given observation day; however, the desire is to leverage this data to

better understand impacts of various weather conditions on daily aircraft operations at individual facilities. This will help to contextualize annual operations estimates for airports and to articulate the impacts that bad weather days have on different types of airports with varying levels of navigation aids and approaches. The collection of additional operations data and corresponding weather condition data will be leveraged to create a sufficient sample size to analyze these factors.

Nature of Operations

The DVRPC Aviation Program has identified Automatic Dependent Surveillance–Broadcast (ADS-B) data in other reports, as a potential source for valuable analysis of aircraft operations regionally. The use of ADS-B data could further enhance the reporting on aircraft operations at individual airports.

ADS-B is a technology that is shifting aircraft traffic control and separation from ground-based radar to satellite-derived positions. Aircraft with ADS-B Out equipment broadcast their Wide Area Augmented System-enhanced Global Positioning System (GPS) location. This is then consumed by Air Traffic Control (ATC) and other ADS-B receivers positioned on the ground or in other aircraft. Aircraft with ADS-B In equipment can display this data for better situational awareness. There is a federal requirement for ADS-B Out equipage for aircraft operating in certain airspace by January 1, 2020.

This data can be acquired in several ways. Multiple global data sources exist from paid services, such as FlightRadar24 and ADS-B Exchange; as well as research data providers, such as OpenSky Network. In addition to these data providers, data can be collected utilizing a locally deployed ADS-B receiver. This type of device is capable of capturing activity within a 200-nautical-mile diameter area. In both scenarios, acquisition from a data provider or local collection, the collected data will require powerful computing capabilities and data storage capacity. Table 5 shows the available data fields provided through ADS-B records.

TABLE 5: ADS-B DATA FIELDS

FIELD	DESCRIPTION
time	Date/time of data point (unix timestamp)
icao24	24-bit transponder ID (fixed during registration period of aircraft)
lat	Last known latitude of aircraft
lon	Last known longitude of aircraft
velocity	Speed over ground of aircraft (meters/second)
heading	Direction of movement
vertrate	Vertical speed of aircraft (meters/second)
callsign	Callsign being broadcast by aircraft
onground	Flag of surface or airborne position
alert	Special indicators for ATC
squawk	4-digit octal number used for emergencies
baroaltitude	Altitude measured by barometer
geoaltitude	Altitude measured using GPS sensor
lastposupdate	Date/time of last position update (unix timestamp)
lastcontact	Date/time of last contact with aircraft (unix timestamp)

Source: OpenSky Network, 2020

DVRPC has accessed historic data for the region through OpenSky Network and is exploring methodology to classify operations based on this trajectory data. Refinement of this methodology will present an opportunity for DVRPC to:

- identify the type of aircraft associated with individual operations;
- differentiate between different types of operations;
- identify the ultimate origin/destination of aircraft operations; and
- illustrate the patterns of general aviation activity regionally.

This data is a robust and large dataset that requires significant processing. DVRPC is continuing to explore the use of this data and the methodology for processing it to enhance the information available about operations at general aviation airports and the regional aviation system.

Aircraft Operations Counting Program Methodology

PUBLICATION NUMBER: TM19018

PUBLISHED: April 2021

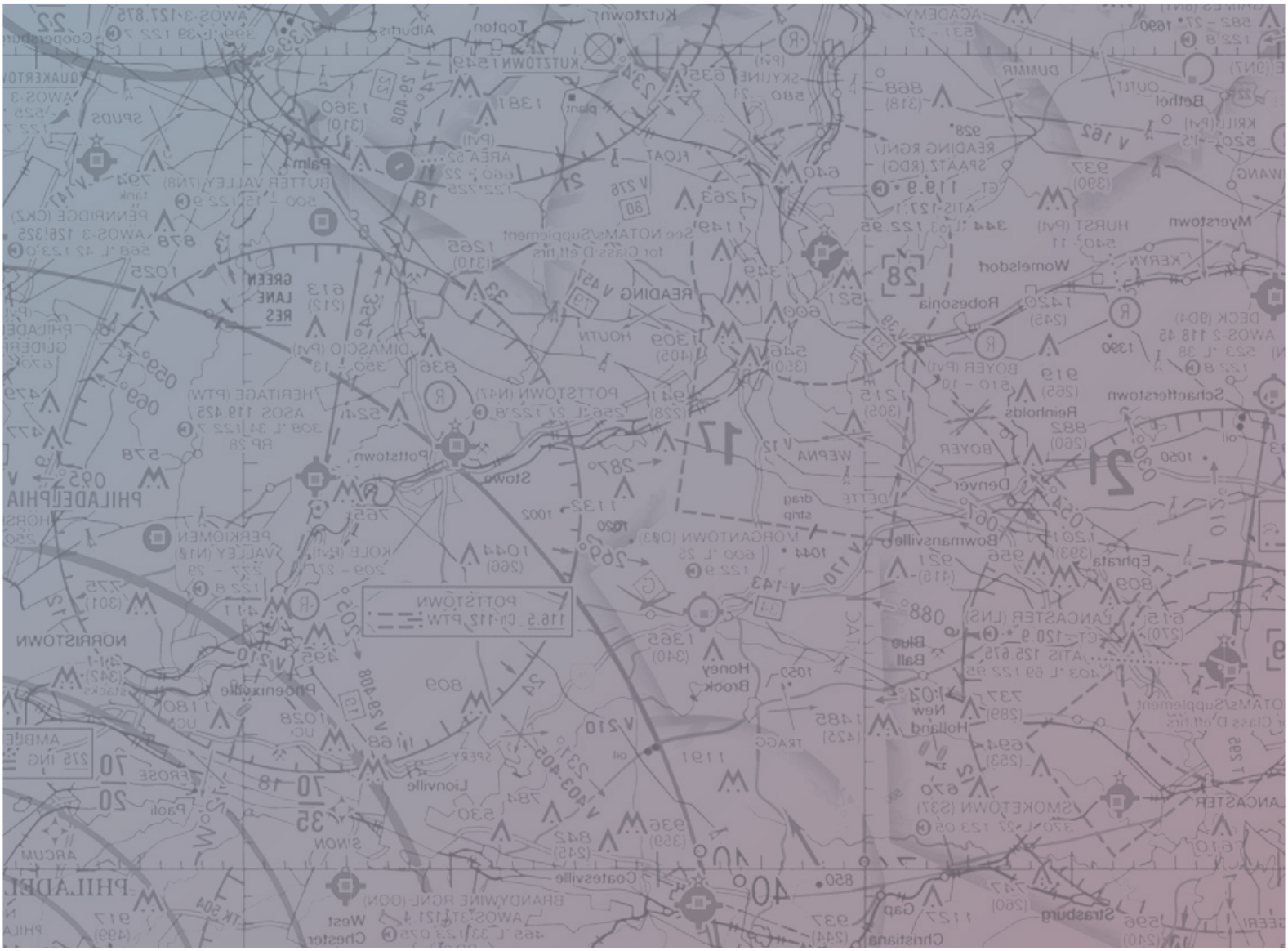
GEOGRAPHIC AREA COVERED: New Castle County in Delaware; Cecil County in Maryland; Burlington, Camden, Gloucester, Mercer, and Salem counties in New Jersey; Bucks, Chester, Delaware, Montgomery, and Philadelphia counties in Pennsylvania.

ABSTRACT: This technical report documents the methodology for the DVRPC Aircraft Operations Counting Program. This cyclical counting program utilizes acoustic counts of fixed-wing takeoffs to estimate operations at regional non-towered airports. This report documents the collection and processing of these observations and other key facility data that are included in program deliverables. Results are used by multiple sources to monitor aircraft activity levels in the Delaware Valley and as a base for planning and forecasting documents.

STAFF CONTACT:
Michael Ruane
Manager, Office of Freight & Aviation Planning
215.238.2888 | mruane@dvrpc.org

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

190 N Independence Mall West, 8th Floor
Philadelphia, PA 19106-1520
phone: 215.592.1800
fax: 215.592.9125
www.dvrpc.org



DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION

190 N Independence Mall West
8th Floor
Philadelphia, PA 19106-1520
215.592.1800 | fax: 215.592.9125
www.dvrpc.org

Connect With Us!