

**Centennial Airport Community Noise Roundtable
Study Group Committee**

Quarter 1 2024 Update Report

June, 5th 2024

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EXECUTIVE SUMMARY

This is the third progress report of the Centennial Airport Community Noise Roundtable (CACNR) Study Group Committee (Study Group) and covers the work done in Q1 of 2024 over the course of eleven meetings. The Study Group has embraced an iterative learning process and the reports are intended to build off one another.

The first report focused on the establishment of the group and six mitigation strategies the Study Group identified as viable and that could be implemented immediately or before the summer of 2024. This second report focused on mitigation strategies adopted in Q4 of 2023 as well as mitigation strategies the Study Group has considered but not adopted. The content from the first and second reports are included herein with edits and updates. Notable updates ([all updates to previous information indicated in blue](#)) include:

1. Update on Noise Abatement Information in Chart Supplement Page 12
2. Update on Proactive Outreach & Education to Flight Schools Page 13
3. Update on Proactive Checking of Extended Traffic During Nighttime Hours Page 14
4. [Addition of Study Area Data Analysis Section \(not indicated in blue\) Page 24](#)

[The purpose of this third report is to begin to publish data that measures the amount of overflights over the community North of the Airport, looking specifically at the defined study area. The data presented in this report compares Quarter 1 of 2023 \(pre-mitigation implementation\) to Quarter 1 of 2024 \(post-initial mitigation implementation\). The goal of the data is to examine how the number of overflights is changing over the communities, and whether or not the data reflects that any mitigation strategies are lessening the impact. The process and methodology of data analysis and reporting is included in the **Study Area Data Analysis** section which is located on Page 24.](#)

Suggestions and potential mitigations can be submitted to the Study Group for consideration using the Google Form provided in this document. For more information on this please refer to the **Feedback and Considerations for the Study Group** section located on page 29.

The Study Group continues to meet to assess the viability of additional mitigations, measure and determine the success, if any, of adopted mitigation strategies, and consider modifications to strategies. The 2024 Q1 progress report is scheduled for publication in time for the June CACNR meeting. As a reminder, quarterly progress reports are a Study Group goal, like the 2024 Q1 report, there may be delays. Our community's patience and understanding is appreciated as we work diligently to solve this complex problem.

GLOSSARY of TERMS

ACPAA - Arapahoe County Public Airport Authority

ADO - FAA Airports District Office

ANCA - Airport Noise and Capacity Act

ANOMS™ - [Airport Noise and Operations Monitoring System](#)

APA - Centennial Air Traffic Control Tower

ATC - FAA Air Traffic Control

ATO - Air Traffic Organization

CACNR - Centennial Airport Community Noise Roundtable

CDOT - Colorado Department of Transportation

Centennial Airport Voluntary Noise Abatement Procedures - The creation of the voluntary noise abatement procedures was one of the recommendations from the previous Part 150 Study that concluded in 2008. Several stakeholders were involved in the creation of these procedures including the FAA, CACNR, ACPAA and based pilots and flight schools.

FAA - Federal Aviation Administration

Full Stop Taxi Backs - aircraft lands on runway, comes to a full stop, taxis off runway and takes taxiway back to runway threshold before taking off and entering into the pattern traffic.

FTE - [Full Time Employee, in this instance refers to the full time noise analyst hired by ACPAA after a recommendation of the CACNR/Study Group.](#)

Itinerant - aircraft that are based at other airports

NATCA - National Air Traffic Controllers Association

N.O.I.S.E. - National Organization to Insure a Sound-Controlled Environment

Preferred Traffic Pattern Area - Traffic pattern that is south of Arapahoe Road, North of Lincoln Avenue and East of Interstate 25.

Stop & Go's - aircraft lands on runway, comes to a full stop, then takes off again from the same runway and enters into the pattern traffic.

Study Group - Centennial Airport Community Noise Roundtable Study Group
Committee

Touch & Go's - aircraft lands on the runway then takes off again and enters into the pattern traffic.

Traffic pattern - the typically race track shaped pattern aircraft fly in preparation for landing. Traffic patterns typically consist of an upwind, crosswind, downwind, base and final.

TPA - Traffic Pattern Altitude

BACKGROUND

In the fall of 2022, residents began reporting an increase in flights due to an extended pattern of traffic over the communities to the north and west of the airport, resulting in them reporting a degradation in their quality of life. As of the spring of 2024, despite efforts to identify and implement solutions, overflights continue.

ABOUT THE Study Group

Community, CACNR, Airport Authority Board, and staff generated several potential solutions. Upon examination and realization that those solutions would not be easy to implement, and acknowledging a need for both flight schools and the FAA at the table, the need for a working group became apparent to work through the legal and technical challenges and constraints.

Formation of Study Group

The formation of this Study Group came after a significant amount of feedback and support from the community, CACNR, ACPAA Board and staff, elected officials including Senators Bennet and Hickenlooper, Congressman Crow, Governor Polis, Hon. State Representative Dickson, the Arapahoe County Commissioners, Greenwood Village Mayor and City Council, Cherry Creek School District, and the Normandy Group.

Creation of this Study Group was officially approved by CACNR on March 1, 2023 (see minutes of March 1, 2023 CACNR Meeting). In a preliminary meeting on July 6, 2023 with the FAA Regional Office, the FAA agreed to provide technical support to the Study Group provided confidentiality could be provided for the FAA representatives. In the initial meetings with the FAA Regional Office, it was acknowledged that (1) the group would need to get started as quickly as possible and that there would be no specific end date to the group's work and (2) some mitigations would hopefully be able to be implemented quickly while others could take much longer to research, test, and implement.

Function of Study Group

The Study Group was formed to work collaboratively to address the noise exposure created by the extended traffic pattern. This group was solely tasked with addressing noise exposure to the community and not other environmental concerns such as lead emissions from aircraft. Although lead emissions are not the focus of this Study Group, implemented mitigations could have the side benefit of reducing lead emissions.

The group is designed to propose, test and/or implement, and measure the effectiveness of noise mitigation strategies to reduce - to the greatest practical extent - exposure to aircraft noise for the communities north and west of the airport without moving the noise to another community.

Working on an “as quickly as possible” basis, the group meets weekly or biweekly to generate ideas of potential strategies. These strategies are assigned to members of the Study Group to explore their viability with technical and/or legal experts and conclusions are brought back for the next possible meeting. Viable strategies are then recommended for implementation by responsible parties and implemented where possible. For strategies whose viability is still being determined, next steps are identified and pursued. Decisions on which strategies are moved forward or not are made unanimously by the Study Group members, aside from Mead and Hunt and HMMH participants whose participation is a supplement to the Part 150 Study Centennial Airport.

Composition of the Study Group

Based on the collaborative, working nature of the Study Group, the complexities of the issue, the speed of work, and the frequency of meetings, a small but representative group was identified and approved by CACNR. The Study Group participants were selected to represent a broad range of stakeholders that would bring varying degrees of technical expertise and experience to the group. This included participants with a direct link to the affected community and CACNR, experience with national and local noise issues, legal, pilot and air traffic background and technical expertise, and pilots and airport tenants that would or could be directly affected by any mitigations proposed or recommended by the Study Group. The Study Group also includes and meets with additional experts as needed to provide additional legal and technical input on the proposed mitigation strategies.

The CACNR Study Group Committee consists of:

Brad Pierce – Member CACNR, President of N.O.I.S.E., member of the FAA NextGen Advisory Committee and former Aurora City Council Member

Chris Eubanks – Chair of CACNR, Pilot, and Castle Pines City Council Member

Jessica Campbell – ACPAA Board Member, Arapahoe County Commissioner Dist. 2 *representing the affected community*, attorney

Mike Fronapfel – ACPAA Executive Director, ex-officio member of CACNR

Flight School Representatives – ongoing participation from engaged flight schools that are based at Centennial Airport

FAA Representatives – ongoing participation from members of FAA management, ATC and NATCA with participation from other technical and legal experts from appropriate divisions of the FAA as needed.

Kate Andrus and Hardy Bullock, Mead & Hunt and Gene Reindel, HMMH: Part 150 Study team members

History of Work

The first meeting was held on July 21, 2023. There were a total of sixteen Study Group meetings in 2023. So far in 2024 11 meetings have been held. The first through third meetings covered the rules and guidelines of the Study Group including the confidentiality of the FAA and Flight School participants, procedure for updates and communication to the public and elected officials, identifying and defining the problem and the drivers that are the cause of the problem. The fourth through 27th meetings focused on identifying mitigation strategies, data and information needed, and feedback from members and technical experts on the viability of potential strategies.

ABOUT THE PROBLEM

Challenges and Limitations

There are several challenges with finding viable mitigations to the problem. Those challenges include, but are not limited to the following: maintaining safety, physical constraints, airspace limitations, variation in the mix of aircraft type, aircraft performance limitations, legal limitations (Interstate commerce law, Airport Noise and Capacity Act (ANCA), grant assurances, unreasonable access restrictions, unjust discrimination prohibitions, contractual limitations) controller and pilot workload, the ability of the FAA and Airport to reasonably manage and implement mitigations.

Drivers and Variables

The Study Group identified several drivers for the extended pattern including the May 2021 midair accident that occurred north of the airport, the resulting changes in how the FAA managed the aircraft in the pattern, increases in aircraft traffic/operations, itinerant traffic, variation of aircraft type, inconsistency among flight schools, specific training operations like stop and goes and taxi backs.

Variables the Study Group identified include aircraft arrivals, aircraft type (speed), operation type, weather, pilot comfort/ability and non-scheduled operations.

MITIGATION STRATEGIES

Mitigation strategies are any implementable program, measure, or action aimed to reduce the number of flights and noise north and west of the airport.

APPROACH TO MITIGATION STRATEGIES

The Study Group structures its work from a list of mitigation strategy ideas. These mitigation ideas come from community members, Study Group members, and examples from other airports. The list is not fixed. As ideas are brought forward, they are added to the list for assessment. The Study Group will assess every idea that is brought forward and analyze appropriately.

In Q3 2023, the Study Group did an initial review of all mitigation ideas on the list at the time and ranked them from easiest (cheapest, most clearly legal, few administrative steps, fastest) to the hardest (most expensive, no clear legal authority, many steps to implement, would take years to implement). As new ideas come in, they are evaluated and ranked. Given that the Study Group is designed to implement potential fixes sooner rather than later, it has started with the “easiest to implement” mitigation ideas.

The Study Group assesses each idea for the angle or element of the overflights it seeks to cure, its direct connection to overflights or noise, which entity has the authority to approve the mitigation strategy, which entity is responsible for implementation, whether an entity has the legal authority to implement it, its impact on the FAA’s ability to maintain safety, whether it will reduce overflights, whether it is technically possible to implement, and whether it is practically feasible to implement. When appropriate, the Study Group refers ideas to relevant experts.

Because the goal is to implement strategies as quickly as possible, decisions made by the Study Group are unanimous. Mitigation strategies that are adopted are then referred by the group to the relevant entity (CACNR, ACPAA, FAA-ATC, etc.) to implement.

Strategies that are considered but not adopted by the Study Group fall into one or more of five categories: (1) there is not legal authority to implement the strategy, (2) the strategy would decrease safety, (3) it will not reduce overflights or noise, (4) it is not technically possible to implement, (5) it is practically unfeasible to implement. Strategies that fall into categories (4) and (5) may be pushed to the bottom of the list for further evaluation rather than be permanently ruled out.

The following two sections ***Adopted Mitigation Strategies*** and ***Mitigation Strategies Considered but not Adopted*** lay out mitigation strategies in three categories, first in a

table and then with further explanation as appropriate. These categories are FAA - ATC strategies, Pilot Education/Awareness strategies, and ACPAA Operations strategies.

ADOPTED MITIGATION STRATEGIES

FAA-ATC STRATEGIES

Maintain and enhance operational safety, increase air traffic controller awareness of noise sensitive areas, reduce aircraft overflights of the community.

Utilize East Side of Airport During Nighttime Hours	
Adopted Mitigation Strategy:	During the late evening and early morning hours when FAA - ATC determines it's possible, utilize Main Runway (17L/35R) so that pattern work is conducted east of the Airport over commercial areas.
Problem Mitigation Addresses:	Pattern traffic over the community during late evening and early morning hours
Reduction of Noise Exposure:	Reduce the amount of late evening and early morning pattern traffic over the community.
Safety:	Maintained
Noise:	Reduced during nighttime hours
Authority to Approve:	FAA-ATO
Responsible for Implementation:	FAA-ATO
Implementation Date:	October 2023
Explanation:	In effort to be a good neighbor to our communities, it has been added to our facility's Standard Operating Procedures for controllers to utilize the east side of the airport for the traffic pattern when volume permits during late night and early mornings. This will place aircraft primarily over businesses and industrial parks instead of neighborhoods.
Measurable Impact:	Data on the number of flights directed away from neighborhoods during nighttime hours will be included in future reports
Updates:	All current and future air traffic controllers have or will receive(d) briefings/training regarding this adopted mitigation.

Noise Sensitive Areas on the Tower Radar Display	
Adopted Mitigation Strategy:	Noise sensitive areas added to radar display in the tower.
Problem Mitigation Addresses:	ATC awareness of noise sensitive areas in relation to aircraft in the traffic pattern.
Reduction of Noise Exposure:	By assisting ATC in identifying noise sensitive areas more easily, ATC be more aware of when overflights of the community are occurring.
Safety:	Maintained
Noise:	Potential reductions
Authority to Approve:	FAA-ATO
Responsible for Implementation:	FAA-ATO
Implementation Date:	October 2023
Explanation:	These maps will provide Air Traffic Controllers with awareness of the surrounding communities. While sequencing aircraft into 17R and 17L, controllers have to make the decision to extend the 17R traffic to follow traffic inbound to 17L or have the 17R aircraft complete a short approach. The maps aid the controllers in seeing the community and knowing the impact of extending to the North.
Measurable Impact:	ATC will collect data from controllers on their use of the maps.
Updates:	All current and future air traffic controllers have or will receive(d) briefings/training regarding this adopted mitigation.

Limit Number of Aircraft in the Pattern	
Adopted Mitigation Strategy:	Limit number of aircraft in traffic pattern
Problem Mitigation Addresses:	Extended pattern traffic and increased noise exposure to the community
Reduction of Noise Exposure:	Fewer aircraft could result in the traffic pattern being extended less frequently
Safety:	Maintained
Noise:	Potential reduction
Authority to Approve:	FAA-ATO
Responsible for Implementation:	FAA-ATO
Implementation Date:	Ongoing
Explanation:	<p>Air traffic will limit the number of aircraft in the traffic pattern to ensure controller workload is manageable and maintain a safe, orderly and efficient flow of traffic.</p> <p>Restricting the number of aircraft in the pattern for safety and to manage controller workload also results in a flight path closer to the runway's final approach course, which benefits the community by reducing noise levels.</p>
Measurable Impact:	Data is forthcoming
Updates:	Ongoing

Pilot Education & Awareness Strategies

To increase pilot education and awareness of community noise concerns, and to share mitigation strategies they can implement to reduce the communities' noise exposure.

Adopted Mitigation Strategy:	Noise Abatement Information on Chart Supplement
Problem Mitigation Addresses:	Centennial Airport receives flights from all over the US. Transient pilots are thus not always aware of the noise sensitive areas or preferred traffic pattern
Reduction of Noise Exposure:	A Chart Supplement is information provided about a local airport environment. Pilots are expected to review a chart and its supplements before taking flight. Enhanced awareness will drive a reduction in overflights of noise sensitive areas when pilots have discretion
Safety:	Maintained
Noise:	Potential reduction
Authority to Approve:	ACPAA & FAA
Responsible for Implementation:	ACPAA, FAA, & CDOT
Implementation Date:	Originally, 10/1/2023. Update, Summer 2024. Next Update, Fall 2024
Explanation:	ACPAA is working to update the current chart supplement. There are several updates and/or enhancements to the chart supplement that can be made to improve its efficacy as a communication and education tool.
Measurable Impact:	Once implemented, ACPAA will work to amplify. True impact may not be measurable, but will likely contribute to an overall reduction in noise.
Updates:	Airport Staff is working on draft language to better align with the FAA proposed guidance on Noise Abatement Information in the Chart Supplement. The new language will clearly define the traffic pattern area, identify noise sensitive areas, and potentially provide a graphical depiction for pilots. The goal is to provide an easy to understand guide to Noise Abatement not only for local pilots, but to greatly assist in transient pilot understanding of the Noise Abatement Procedures at Centennial. Once new language is finalized it will be provided to CDOT for publication in future editions of the Chart Supplement.

Proactive Outreach & Education to Flight Schools	
Adopted Mitigation Strategy:	Develop and implement proactive outreach and education program to flight schools to increase pilot awareness of voluntary fly quiet procedures and preferred pattern area
Problem Mitigation Addresses:	Due to rapid turnover, flight school instructors and students are often unaware of noise issues, voluntary noise abatement procedures, or preferred traffic pattern area.
Reduction of Noise Exposure:	By developing & implementing a proactive outreach and education program, will keep flight instructors up to date on noise abatement efforts.
Safety:	Potential enhancement
Noise:	Potential reductions
Authority to Approve:	ACPAA, FAA-ATO
Responsible for Implementation:	ACPAA, FAA -ATO
Implementation Date:	In progress
Explanation:	There is a significant amount of flight instructor and student pilot turnover at flight schools based at Centennial Airport. Airport staff and local FAA representatives have committed to meeting quarterly with each flight school to discuss ways to make their operations safer, convey community concerns about noise and lead exposure, discuss recommendations on how they can help mitigate the noise exposure to the surrounding communities and to provide progress updates on how our voluntary noise abatement and mitigation procedures are working, and to explore ways to improve on them.
Measurable Impact:	The initial focus will be on outreach and establishing regular meetings
Updates:	The first meeting was held on May 23, 2024. The FAA Air Traffic Personnel discussed airport specific safety issues and considerations, while Airport Authority Staff discussed noise issues including, mitigations recommended by the Study Group, Voluntary Noise Abatement Guidelines, and current noise reports. The meeting was attended by over 30 local flight school personnel. The meetings are to be held quarterly with the next one scheduled for August of 2024.

ACPAA Operations Strategies

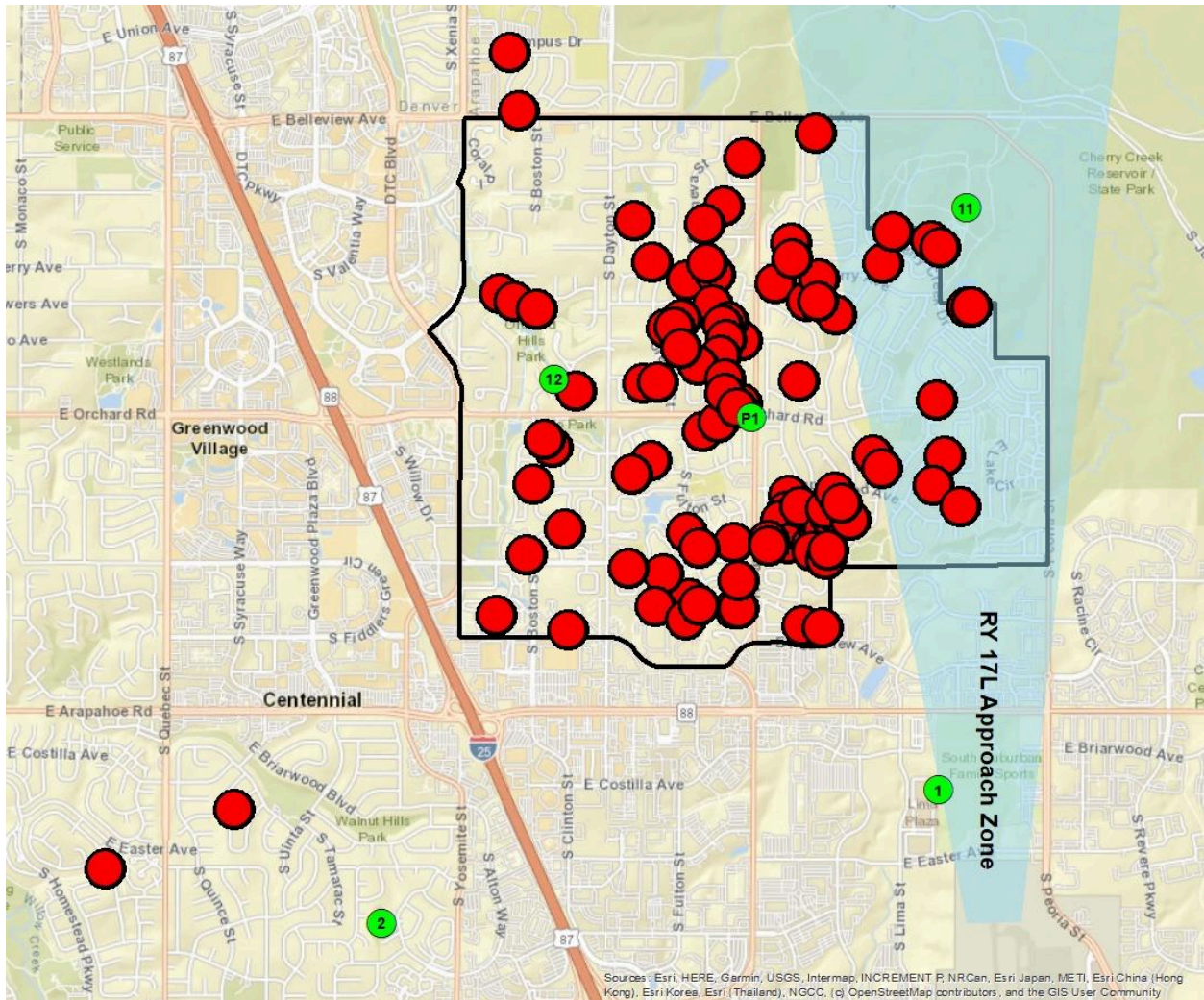
To provide methods to proactively identify and measure improvements in community noise exposure and the effectiveness of the implemented mitigation strategies.

Proactive Checking of Extended Traffic During Nighttime Hours	
Adopted Mitigation Strategy:	Airport staff will check for extended pattern traffic during nighttime hours (10 pm - 7 am) daily.
Problem Mitigation Addresses:	The occurrence of extended pattern traffic during nighttime hours (10 pm - 7 am).
Reduction of Noise Exposure:	By having Airport staff monitor outlier nighttime extended pattern traffic on a daily basis, the airport can quickly respond to outliers, and when able, determine causes and work to prevent the instances from occurring in a more proactive manner.
Safety:	Maintained
Noise:	Potential reduction
Authority to Approve:	ACPAA
Responsible for Implementation:	ACPAA
Implementation Date:	October 2023
Explanation:	Starting in October 2023 Airport staff began to actively track aircraft flying an extended pattern during night-time hours (10 pm - 7 am). If an aircraft is observed conducting an extended training pattern during night-time hours and there is no other aircraft in the pattern or on approach to a parallel runway airport staff will identify and contact the flight school and/or pilot and remind them to follow the voluntary noise abatement guidelines that specify keeping the pattern traffic south of Arapahoe Road, east of I-25 and north of Lincoln Avenue.
Measurable Impact:	Data is forthcoming. A handful of outliers have been identified since fall of '23. With the hire of an Airport data analyst, data will be more reliable.Reduction will be in the prevention of recurrence and ideally contribute to the overall reduction in overflights.
Updates:	The Noise Analyst in conjunction with the Noise and Environmental Specialist have been regularly looking at nighttime outliers and analyzing data. In Q1 2024 the operators of seven nighttime outlier aircraft have been contacted by the Noise and Environmental Specialist and reminded of the Voluntary Noise Abatement Guidelines. Outreach continues when nighttime outliers are identified.

Airport Add Full-Time Employee for Data Analysis	
Adopted Mitigation Strategy:	Airport hire a full-time employee dedicated to data analysis
Problem Mitigation Addresses:	Improve airport staff's ability to provide investigation, analysis and reporting of data from Airport Noise and Operations Monitoring System (ANOMS)
Reduction of Noise Exposure:	Uniform data on overflights is needed to measure the extent of overflights, noise exposure, and the results of mitigation strategies.
Safety:	An enhanced understanding of flight data will help the Airport better work with the FAA to identify mitigation strategies that will maintain or enhance safety while addressing overflights.
Noise:	A full understanding of flight data is essential to addressing the overflights.
Authority to Approve:	ACPAA
Responsible for Implementation:	ACPAA
Implementation Date:	Hired February of 2024
Explanation:	In February 2024, Centennial Airport created a new full-time position to support our Noise and IT Departments. This new employee will in-part focus on analyzing historical and ongoing flight data to evaluate within the defined study areas the effectiveness of the Study Group's implemented mitigation strategies. Updates on effectiveness of the implemented mitigations will be included in future reports.
Measurable Impact:	Indirect. This position enables us to measure the impact of mitigation strategies.
Updates:	<p>On a lobbying trip to DC, members of the Study Group requested data analysis support from the FAA for the Study Group's work. The FAA indicated support for that request. That is being followed up on and confirmed.</p> <p>The full-time employee continues to do various data analysis tasks for the Study Group to evaluate the overflights and as well as examining the effectiveness of implemented mitigation strategies. This report includes data prepared by the Noise Analyst.</p>

Analyze Flight Track Data within the Defined Study Area	
Adopted Mitigation Strategy:	Analyze flight track data within the defined study area north and west of the airport.
Problem Mitigation Addresses:	Understanding the history of flights and current flights in the study area is essential to addressing the overflights and measuring the impact of mitigation strategies.
Reduction of Noise Exposure:	Ultimately this analysis will lead to mitigation strategies that reduce noise exposure.
Safety:	Indirect positive impact as the Study Group and Airport work with the FAA.
Noise:	Potential Reduction
Authority to Approve:	ACPAA
Responsible for Implementation:	ACPAA
Implementation Date:	February 2024
Explanation:	<p>In consultation with the community, the Airport noise program staff, and informed by historical data, the Study Group has identified the below boxed area in the map to focus its data analysis.</p> <p>The area of analysis will encompass the residential areas bordered generally by DTC Blvd to the west, E Bellevue Ave to the north, S. Peoria St to the east and E. Peakview Ave to the south. The flight tracks will be filtered to include only local training pattern traffic. This will also allow us to separate out the aircraft that are arriving and departing the main runway versus aircraft that are likely flying in the training traffic pattern. This area map includes the general location of homes that filed noise complaints with the airport in 2023 as well as the locations of the permanent and portable noise monitor locations. Please see the proposed study area maps below.</p>
Measurable Impact:	Indirect.
Updates:	Data Analysis Ongoing. See page 24 for update on data analysis and mitigations.

Defined Study Area Map



Note: The red dots indicate households that filed complaints with the Airport in 2023. The black line represents the boundary of the study area. In this graphic, unlike those presented in monthly noise reports, dots are not scaled based on the number of complaints. Complaints in the RY 17L Approach Zone are less in number. That area experiences a different pattern of traffic and is related but distinct from the areas to the west of the RY 17L Approach Zone.

MITIGATION STRATEGIES CONSIDERED BUT NOT ADOPTED

The Study Group identified a number of possible actions that **were not accepted** because they (1) decreased safety or (2) did not negatively impact safety but did not reduce noise.

FAA-ATC STRATEGIES

Maintain and enhance operational safety, increase air traffic controller awareness of noise sensitive areas, reduce aircraft overflights of the community.

Go Back to Previous Air Traffic Management	
Rejected Mitigation Strategy:	Go back to previous air traffic management: less positive control, parallel landings
Problem Mitigation Addresses:	Extended pattern traffic and increased noise exposure to the community.
Reduction of Noise Exposure:	Less aircraft overflights.
Safety:	Safety decreased
Noise:	Potential reduction
Authority to Approve:	FAA- ATO
Responsible for Implementation:	FAA- ATO
Reason Strategy Not Adopted:	<p>The FAA's primary responsibility is managing air traffic in the safest and most efficient way possible. Positive control and staggering of landings increase safety.</p> <p>Air Traffic Controllers call base turns for aircraft for safety reasons and ATC has seen an improvement in safety at Centennial Airport because of the safety mitigation. Calling 17R base turns to "stagger" with traffic on 17L helps ensure safe and efficient operations. See below for further explanation.</p>

On May 12, 2021, there was a midair collision between a Cirrus aircraft and a Metroliner while the aircraft were inbound to Centennial Airport. The Cirrus was on a right base turn¹ for runway 17R and the Metroliner was straight in for runway 17L. The Metroliner

continued and landed on Runway 17L and the Cirrus landed in Cherry Creek State Park utilizing the pilot's airframe parachute.

¹ Base turn is a phase during the aircraft's traffic pattern for landing. It involves making a 90-degree turn from the downwind leg toward the final approach.

The FAA's continuing mission is to provide the safest, most efficient aerospace system in the world. While the collision did not result in injuries or fatalities, the Centennial Air Traffic Control Tower (APA) conducted an evaluation of safety into and out of the Centennial Airport.

At this time, the common practice was for aircraft to fly the 17R traffic pattern (west of APA) independently of the traffic on 17L.

APA identified the following data for activity between June 24, 2019 and June 24, 2021 (including the time frame in which the collision occurred):

- **Wrong Surface Landing²:** APA had 5 wrong surface landings and 4 reports of aircraft lined up for the wrong runway and corrected by ATC.
- **Pilot Initiated Go Around due to Collision Avoidance Resolution Advisory (TCAS RA)³:** APA had 37 go arounds due to aircraft responding to a TCAS RA for traffic on the parallel runway.
- **Suspected Surface Loss Involving Two Aircraft⁴:** APA had 14 reports of suspected loss of surface separation between two aircraft.

After evaluating these events, APA determined that air traffic controllers would stagger the arrivals into 17R and 17L. This procedure protects for aircraft that fly through their final⁵ and enhances safety with positive control⁶, rather than depending on pilots to see each other, using Visual Flight Rules (VFR). As a result, Air Traffic Controllers actively separate aircraft inbound to the parallel runways, which has proven to further enhance safety at the Centennial Airport.

APA identified the following data for activity between June 24, 2021 and August 15, 2023:

- **Wrong Surface Landings:** APA had only 1 wrong surface landing and 12 reports of aircraft lined up for the wrong runway and corrected by ATC. The increased

² A wrong surface landing occurs "when an aircraft lands or departs, or tries to land or depart, on the wrong runway or on a taxiway. It also occurs when an aircraft lands or tries to land at the wrong airport."

³ A Pilot Initiated go around occurs when the pilot determines they will not be at a safe altitude or heading to complete a landing in a safe manner and they abandon the approach. Air Traffic control will sequence them for the airport to attempt another landing.

⁴ A "surface loss" occurs when aircraft on surface movement areas (taxiway or runway) do not meet minimum separation requirements

⁵ The final approach course is the last segment of an aircraft's approach to landing. It is a straight flight path aligned with the extended centerline of the runway. During the final approach, the aircraft descends and aligns itself with the runway for a smooth landing. Pilots aim to maintain a stabilized approach during this phase.

⁶ Positive Control for air traffic controllers means having continuous contact with an aircraft and providing specific instructions and clearances to ensure safe and orderly air traffic. This involves actively managing the aircraft's movements, ensuring proper separation from other aircraft, and maintaining situational awareness for controlled and secure airspace.

number of aircraft being identified lining up for the incorrect runway proves an increased scan and awareness for aircraft on the final approach course.

- **Pilot Initiated Go Around due to Collision Avoidance Resolution Advisory (TCAS RA):** APA had 15 go arounds due to aircraft responding to a TCAS RA for traffic on the parallel runway. By sequencing arrivals, fewer aircraft operated in conditions that required go arounds for safety.
- **Suspected Surface Loss Involving Two Aircraft:** APA had 7 reports of suspected loss of surface separation between two aircraft. This has improved due to enhanced tower teamwork and visual scanning throughout the airport environment. Controllers are fully aware of what the other controllers are doing and are able to see unsafe situations developing and make corrections in a timely manner.

APA Safety Data on Air Traffic Procedures		
Type of Safety Event	June 24, 2019- June 24, 2021	June 25, 2021- August 15, 2023
Wrong Surface Landing	5 Wrong surface landings, 4 Lined up for wrong runway and corrected.	1 Wrong surface landings 12 Lined up for wrong runway and corrected
TCAS RA Go Around (Pilot Initiated)	37	15
Surface Loss of Separation	14	7

The data above shows improved safety due to the mitigations that were compared to the years prior to the midair collision. The FAA's goal is to always improve safety, not reduce it. Air Traffic Controllers call base turns for aircraft for safety reasons and the

FAA has seen an improvement in safety into APA because of the mitigation. Calling 17R base turns to "stagger" with traffic on 17L helps ensure safe and efficient operations for the following reasons:

- **Sequence and Separation:** By instructing aircraft to make a base turn, air traffic control can sequence incoming flights and maintain safe separation between them. This reduces the risk of mid-air collisions and ensures that each aircraft

has adequate space to complete their approach and landing.

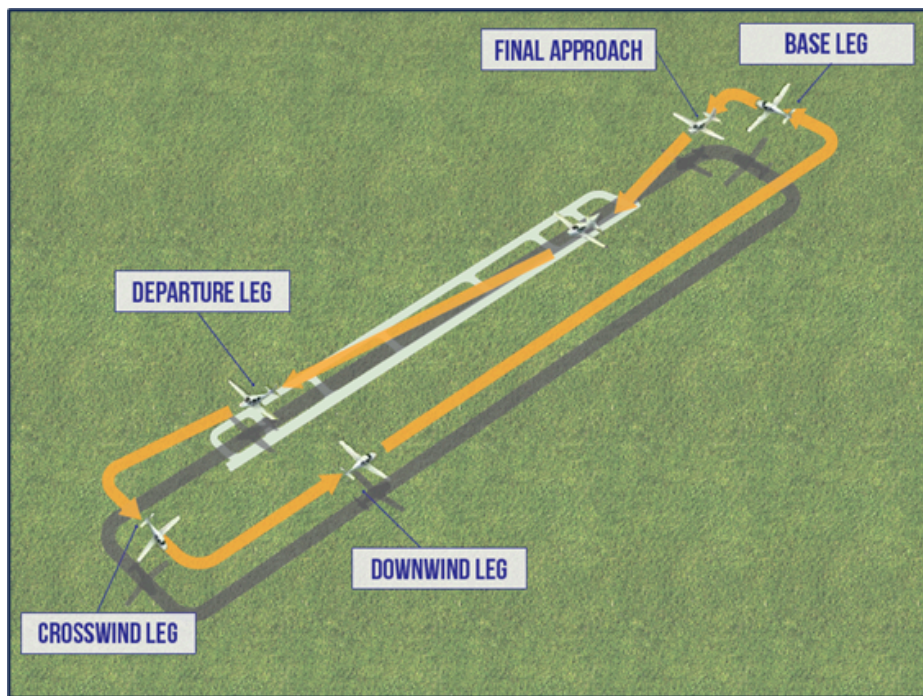
- **Traffic Flow Management:** Coordinating base turns allows air traffic controllers to manage the flow of traffic into the airport, preventing congestion and ensuring that aircraft are spaced out to avoid conflicts.
- **Conflict Resolution:** In busy airspace, it's crucial to have a clear plan for each aircraft descent and approach. Base turns help resolve any potential conflicts between arriving and departing aircraft, making the airspace safer and more organized.

Require Increased Pattern Altitude	
Rejected Mitigation Strategy:	Require an increased pattern altitude
Problem Mitigation Addresses:	Noise exposure to the community
Reduction of Noise Exposure:	Increased distance from noise source
Safety:	Maintained
Noise:	No noticeable reduction
Authority to Approve:	FAA-ATO
Responsible for Implementation:	FAA-ATO
Reason Strategy Not Adopted:	Requiring an increased altitude will increase the number of flights north and west of the airport (contradicting the purpose of this Study Group) while providing no decipherable reduction in noise.

The traffic pattern altitude (TPA) is the mean sea level altitude at which an aircraft will enter or remain in the pattern as shown in the graphic below – the TPA being the altitude outside of the departure leg and final approach. The potential kinetic energy of the aircraft is a balance of altitude and speed. Each aircraft has a specified approach speed, denoted by (Vref); “V” being velocity, and “ref” being reference for the aircraft weight, configuration, and the runway and atmospheric conditions at the time of flight. Vref is fixed by the aircraft manufacturer. This only leaves altitude as the adjustable variable.

If the altitude is increased, the aircraft extends its distance on the downwind leg prior to turning on the base leg to maintain a relatively fixed glide path angle or rate of descent on final approach, which is stabilized and safe. Therefore, if the TPA is increased, the distance on the downwind leg must be extended for the aircraft to safely reduce its energy and land on the runway. In the case of APA, this would result in aircraft extending the downwind leg further north of Arapahoe Road when landing to the south and would go against one of the goals of this Study Committee, which is to reduce the length of the downwind leg to not extend beyond Arapahoe Road.

The TPA is not an effective method for reducing aircraft overflight noise. The current TPA would have to be doubled, to 2000-3000 feet above ground level to result in a decrease of 6 dB. The perceptible limit of sound change starts at 3 dB, so unless the TPA is raised significantly, the reduction of noise would be barely detectable, and ANY change to the TPA would result in a longer downwind leg, which is contrary to goals voiced by the committee to limit the overflights north of Arapahoe Road.



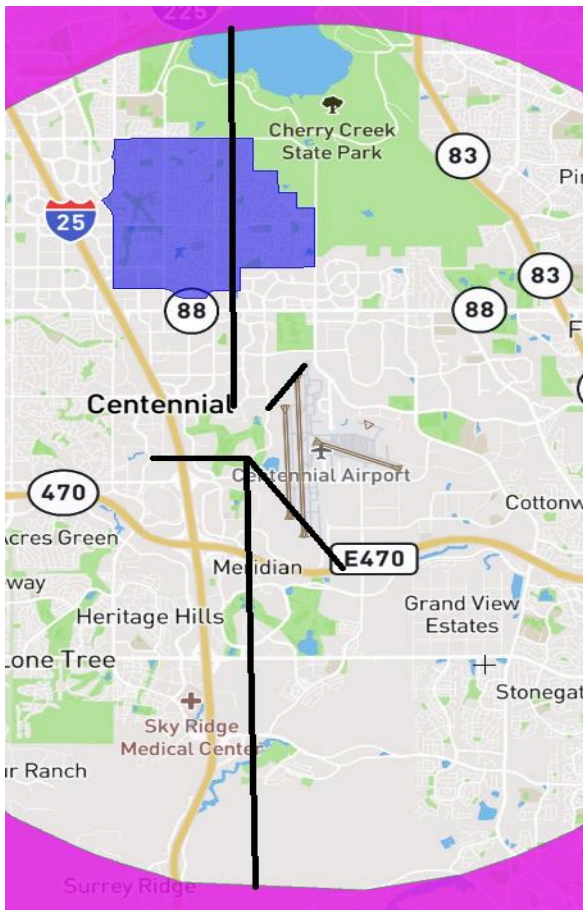
STUDY AREA DATA ANALYSIS

PURPOSE

The purpose of this data analysis is to quantify the number of touch-and-go aircraft extending into the study area (seen in blue below) located North of Peakview Ave, South of Belleview Ave, East of DTC Blvd., and West of S. Peoria St.. The data analysis compares the first Quarter of 2023 to the first Quarter of 2024. This data period examines pre and post implementation of mitigation strategies.

PROCESS/METHODOLOGY

Using Centennial Airport's Noise and Operations Monitoring System (ANOMS™), all aircraft tracks were filtered to only include those that pass through defined gates along the Runway 17R/35L traffic pattern. A gate is essentially a window in the sky, created using the ANOMS™ system, that an aircraft track passes through. The aircraft track must pass through all associated gates (shown below) to be considered established in the traffic pattern. Many methods of data processing were tested to establish the best method of identifying community overflight activity. Airport Staff worked with the ANOMS™ vendor to determine data fidelity and ensure the data process used is an accurate representation.



- The study area is represented by the blue polygon.
- Gates are indicated by the black lines.
- Gates capture both North and South flow configurations.
- The Centennial Airspace is represented by the magenta ring along edge of figure. This is shown to demonstrate “gates” go to the airspace edge to ensure all touch-and-go aircraft tracks are captured and counted.

Q1 2023 v. Q1 2024 ANALYSIS

SUMMARY

Compared to overall touch-and-go operations percentage wise, there was a 1.7% decrease in total aircraft entering the study area in Q1 2024 compared to Q1 2023. The number of touch-and-go aircraft increased by 9.8% from Q1 2023 to Q1 2024, and the number of aircraft entering the study area increased 6.1%. There was a 13.8% increase in Q1 2024 as compared to Q1 2023 of the number of aircraft remaining outside the study area. While the positive trends cannot be definitively tied only to Study Group mitigations, the implemented measures likely contributed to a higher percentage of aircraft remaining outside the study area. This type of data will be used by the Study Group to examine effectiveness of implemented mitigations as well as looking at all future mitigations.

FIGURE 1

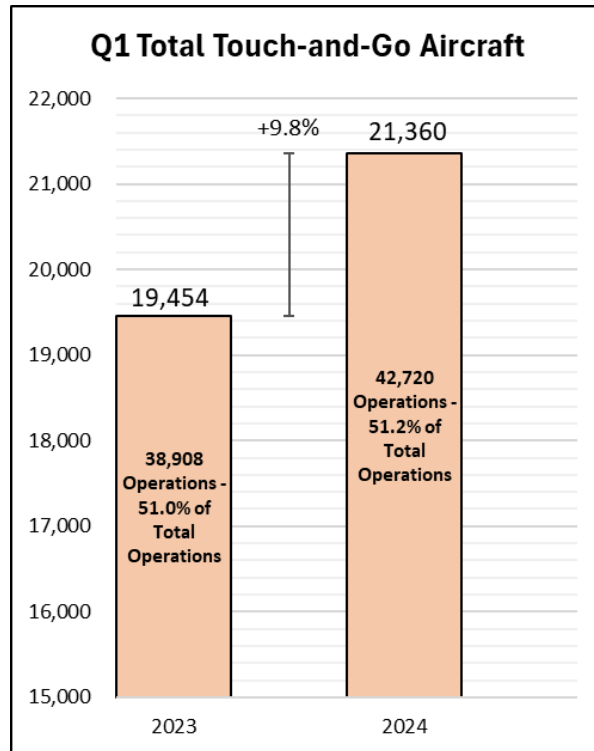


Figure 1 shows a comparison of Q1 2023 v. Q1 2024 and the total number of touch-and-go aircraft. In Q1 2023 there were 19,454 touch-and-go aircraft, while in Q1 2024 there were 21,360 touch-and-go aircraft. These numbers represent how many aircraft entered the study area. In Q1 2023 the touch-and-go aircraft accounted for 38,908 operations which was 51% of total APA operations. In Q1 2024 the touch-and-go aircraft accounted for 42,720 operations which was 51.2% of total APA operations. A touch-and-go is counted as one takeoff operation and one landing operation, which is double the aircraft count. From Q1 2023 to Q1 2024 there was a 9.8% increase in touch-and-go aircraft.

Takeaways:

- Total touch-and-go aircraft were up 9.8% in Q1 2024.
- Overall percentage of touch-and-go aircraft relative to total APA operations has remained constant.

FIGURE 2

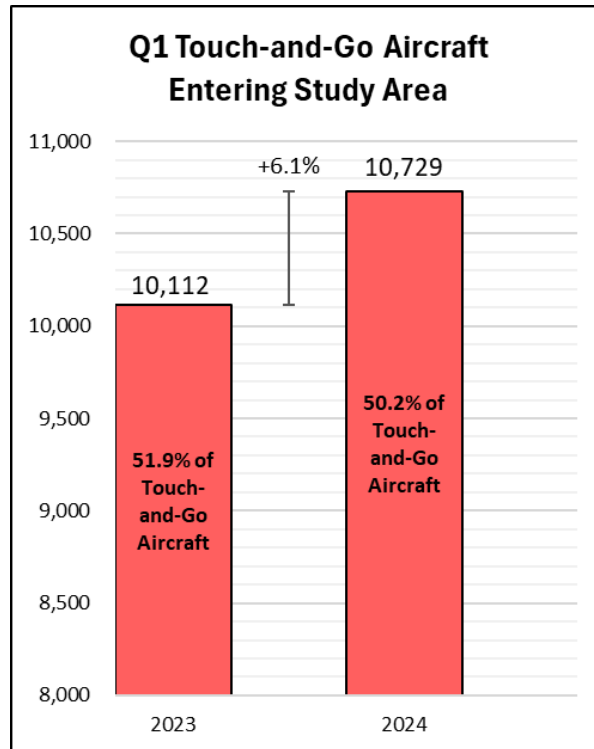


Figure 2 shows the number of touch-and-go aircraft that entered the study area (i.e. aircraft that went North of Peakview Ave.). Data from Figure 2 is derived from the total number of touch-and-go aircraft in Figure 1. In Q1 2023 there were 10,112 touch-and-go aircraft that entered the study area, while in Q1 2024 there were 10,729 touch-and-go aircraft that entered the study area. In Q1 2023 out of all touch-and-go aircraft 51.9% of aircraft entered the study area. In Q1 2024 out of all touch-and-go aircraft 50.2% of aircraft entered the study area. From Q1 2023 to Q1 2024 there was a 6.1% increase in touch-and-go aircraft that entered the study area.

Takeaways:

- While Figure 1 showed an increase of 9.8% in touch-and-go aircraft there was a 6.1% increase of aircraft entering the box.
- 1.7% less of total touch-and go-aircraft entered the study area in Q1 2024 than in Q1 2023 (Difference in percentages within red bars).

FIGURE 3

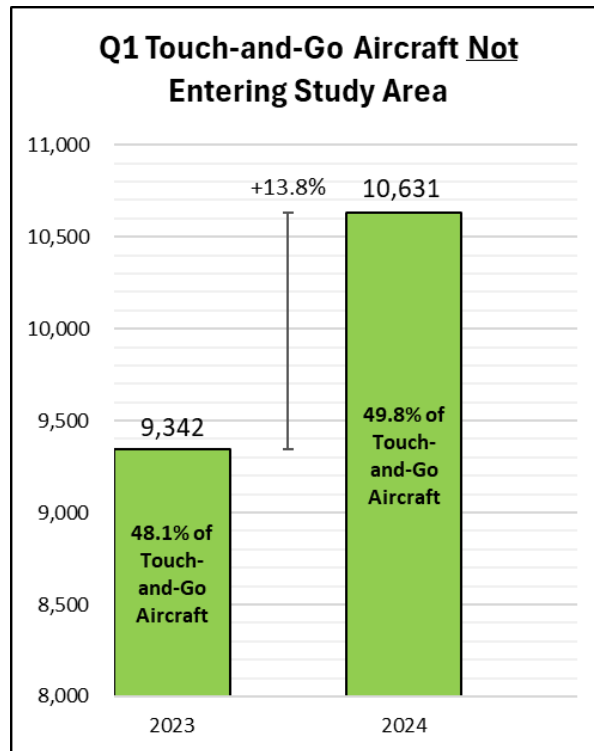


Figure 3 shows the number of aircraft that remained outside the study area (i.e. did not go North of Peakview Ave.). Data from Figure 3 is derived from the total number of touch-and-go aircraft in Figure 1. In Q1 2023 there were 9,342 touch-and-go aircraft that remained outside the study area, while in Q1 2024 there were 10,631 touch-and-go aircraft that remained outside the study area. In Q1 2023 out of all touch-and-go aircraft 48.1% of aircraft remained outside the study area. In Q1 2024 out of all touch-and-go aircraft 49.8% of aircraft remained outside the study area. From Q1 2023 to Q1 2024 there was a 13.8% increase in touch-and-go aircraft that remained outside the study area.

Takeaways:

- There was a 13.8% increase in Q1 of 2024 of aircraft not entering the study area.
- 1.7% more of total touch-and-go aircraft (difference in percentages within green bars) remained outside the study area in Q1 2024 compared to Q1 2023, even while the total number of touch-and-go aircraft increased.
- 10,631 aircraft remained South of Peakview Ave. and did not overfly the communities to the North.

FEEDBACK AND CONSIDERATIONS FOR THE Study Group

In Q1 2024, the Study Group received three comments with several suggestions on the online submission form. Each comment and suggestion is considered and suggested mitigations are explored. The Airport Authority Board also received a letter from the City of Greenwood Village with suggested mitigations that will also be taken into consideration by the Study Group.

We encourage aviation professionals, legal experts, and community members to examine the reasoning behind our conclusions. Should you disagree and have evidence to consider or a differing interpretation of the law, please fill out the google form [HERE](#). Additionally, as it has been our commitment from the outset to consider all potential solutions, we invite you to submit potential solutions through the form as well.

A few notes about the form and how the Study Group will respond to submissions:

- All submissions will be read and considered based on their relevance to the work of this group, which is overflight and noise abatement for the area north and west of the airport.
- Because the work of this group is in addition to the duties of the members, do not expect a response. The default will be no response. However, where more information or context would be helpful or is needed, a response may be sent.
- Group members respectfully request constructive responses only. This form is an experiment and if abused, there will be consideration of deleting the form.

URL for the feedback form: <https://forms.gle/uxDUFgkkkvDBG31s8>

Current and past reports may be found [HERE](#).