

AWG NEWSLETTER

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AIRCRAFT GENERATED NOISE

What is it, how is it perceived by residents, what are the control levers for managing it

Most of us on the ground associate the noise from aircraft as being from the engines, but it is far more complex than that. Aircraft "noise" for planes on departure and arrival is created by many sources- the airframe fuselage cutting through the air, wingtips, landing gear position, flap settings, aircraft engine nacelles and fan blades, engine exhaust, etc. For instance, even if aircraft engine noise was totally eliminated, there would still be significant noise generated, and maybe even more irritating (airframes can generate high pitched sound). As an added complexity, there are other factors that play into how we perceive the noise. For instance weather, including temperature, wind, and moisture in the air (cloud cover or fog) may greatly increase the noise level perceived. The most significant may be lateral distance from the flight track, hence the push for center of bay departure tracks.

Within this complex environment, there are multiple stakeholders who can and do have an impact. These include:

FAA—who approve safe arrival and departure procedures for each runway at all airports nationally

Airports—who grant airlines and others authority to operate at their facilities and establish local rules

Airlines, general aviation (GA) and government users—who use the procedures issued by the FAA, incorporate those into their own proprietary programs based on fleet assets, age of equipment, etc.

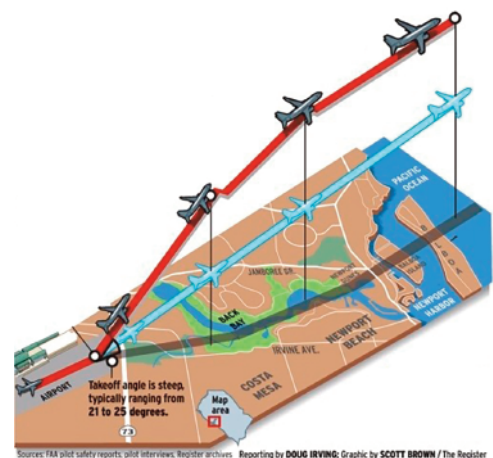
Communities and community organizations near the airport—Example for John Wayne Airport would be the cities of Newport Beach and Costa Mesa, Airport Working Group of OC, AirFair, SPON, and CAANP.

The formula for success is for all the above stakeholders to work together in a collaborative manner to address common objectives in reducing negative impacts of airport operations on the surrounding areas. AWG is fully invested in working toward this objective and has been developing strategies to execute to enhance success. Achieving success will not be a sprint, but a marathon, but significant foundational groundwork is well underway. This includes: 1) the FAA issuing new departure procedures like the STAYY2 procedure which is intended to provide a flight path over the centerline of Newport's Upper Back Bay versus over land and homes. 2) Newport Beach contracting Harris Miller Miller & Hanson, Inc. (HMMH) to study the airport noise issues around current departure procedures, and, potentially define an optimal plan procedure, and, 3) Frontier Airlines and Delta flying quieter aircraft (the Airbus 321 NEO and B717 respectively). These are positive developments, but more effort and collaboration is needed.

Focus on aircraft departure noise control

Key questions to be addressed in identifying the best community friendly departures from JWA, given that the equipment (aircraft type) scheduled is not directly controllable at this time:

- **How the aircraft are flown by the airline & crew – Altitude and speed issues:** Current Noise Abatement Departures- NADP1 and NADP2. NADP1 is the procedure originally designed to allow noisier aircraft to depart JWA and be able stay within the Noise Monitor limits along the departure path by departing on a steep initial takeoff and cutting back power (now at 800 feet) with a less steep climb. The net of this is it reduced engine noise significantly, but kept the airframe potentially closer to the ground, depending on the climb angle. NADP1 also extends the time of the noise annoyance as the aircraft traveling at a slower speed, covers less ground per second. Conversely, NADP2 (referred to as the "distant" departure) is flown with a less steep takeoff, no engine cutback, and a gradual altitude climb. (see graphic below).



Today's aircraft / engine combinations generally can fly the NADP2 without triggering any noise monitor limits and hence more airlines are now using it.

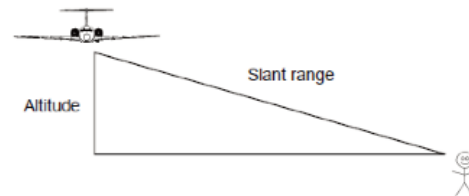
- Which procedure is more beneficial in noise annoyance reduction to a greater community population? Would a modified NADP1 with a higher altitude cutback in power (sometimes referred to as "higher, faster") yield a better community impact? Or would a higher climb angle NADP2 at "quiet power settings" be preferable?

- Newport Beach's HMMH study will provide strong database on which to make some educated inferences, but maybe not definitive answers until various alternatives are actually flown by the airline's equipment. This will require good collaboration with the operations departments of the airlines (an AWG focus effort, see *AWG Outreach Activities* article).
- **Where they are flown—Departure procedures and actual “Ground track” issues:** PIGGN, FINNZ, HHERO, STAYY, or other options—What are the comparative values to the different procedures as regards ground tracks? No airline is mandated to begin flying the new STAYY procedure (it is an option, not a mandate), and it may take more than a year to fully integrate into a carrier's operations if they make that choice. Hence, we need to work with airlines to get compliance with how they fly any of the approved procedures—
- Departures from JWA are predominately manually flown versus using auto pilot assisted. Flight plans and departure “papers” are generated at the airlines 24/7/365 systems operations centers (SOC's), like United's in the Chicago area, and uploaded to the aircraft flight management system (FMS—the on-board computer in the cockpit). Takeoff procedure detail is displayed on the cockpit FMS screen for the pilot / co-pilot use. For example, at JWA, this means that each airline has a slightly *different* stored departure procedure for a PIGGN departure in their FMS, and based on precise weather forecast on winds, temperature, tail number being flown, and traffic, it is further modified. Third, since the departures are manually flown, the pilot must execute the procedures as near as possible to the plan. Being slightly late on the initial post takeoff turn, will require the pilot to fly over different ground to vector to the old TOING waypoint and be far west over Baycrest/Dover Shores. (At 200mph airspeed, a 2-second late turn equals approx. 600 feet lateral shift westward.)
- Noise and pollution impact for off track westerly departures? The noise level at a point near Irvine Avenue/Santiago would definitely be higher, but may not be as great to one's ears as commonly

thought, as it is partly psychological (seeing a plane directly overhead affects one's perception). The reason is that a moderate side-ways lateral distance from the vertical flight track may not be as much a noise increase in decibels as believed by the observer. See the graphic below presented at the Aviation Noise & Emissions Symposium (Long Beach, Feb. 2018).

Mitigating Aviation Noise

- Remember, when moving aircraft away from residents, it takes a doubling of the distance to achieve a 3 dB reduction in the noise level
- Except for direct overflight, slant range is more important than altitude.



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Noise experts say that it takes a 5db increase or decrease change to be recognized by most human ears, so for an aircraft at 1600 feet altitude, a shift west of almost 3000 ft. from the normal center bay track would be necessary to be a discernable noise increase.

Bottom line

Regardless of whatever FAA approved departure procedure is being used by an airline for a particular flight, how that airline incorporates that procedure for their fleet and tail numbers, and how the specific cockpit crew flies the “plan” on each departure is critical in how successful JWA's noise management program will be. *This is why the community stakeholders identified above are collectively reaching out to the airline carriers for their support.*

FLIGHT TRACK ANALYSIS – OCT 2017

John Wayne Airport's Access and Noise Office (ANO) is responsible for collecting data on every departure from John Wayne. Their mission and purpose on this is to ensure airlines, general aviation, and government operators adhere to the rules of John Wayne Airport management, work on annual commercial passenger allocations / departure slots, and to detect noise violations (using data from the 10 noise monitoring stations around JWA). In executing their primary mission, they also have access to a huge amount of information on all flights, 7x24. With the burden of their workload, not enough time is available to do “one off” analysis on trends which the data might indicate if you peel the onion.

To supplement the efforts of the ANO, and to leverage the knowledge, expertise, and time availability of several members of AWG's board, we requested a sample of data which we could review, analyze and report back to our board and membership. Based on our request, ANO provided 2 data sets – one with all commercial flights for all the flights on Oct. 26, 2017, and one with data on the initial STAYY departures by Southwest Airlines in March and April of 2018. Below are some high level (and preliminary) findings from our analysis. This is based on a known fact that commercial operators and individual cockpit crews will fly the same FAA approved departures differently. The question is what patterns and operating procedures yield the most community friendly results in regard to noise, and whether the STAYY offers any advantages based on the initial data.

Oct 26, 2017 Analysis / Observations

Eliminating the regional jets / commuter flights from the data resulted in 119 flights with usable data. We collected departure time, flight # and carrier, departure weight, aircraft type, and at each noise monitor station, the noise reading and altitude. Some general preliminary findings were:

Noise Monitor (NM)	Average Altitude	Average Reading	Difference
NM 5 (East Bluffs)	1568 ft	84.9 (SNL db)	
NM 6 (Santiago)	1706 ft.	85.9 (SNL db)	+1.0 SNL db
NM 7 (close to Dover Shores)	2334 ft.	82.8 (SNL db)	-2.1 from NM5 & -3.1 from NM6

Observations

1. Even though the “average” aircraft departure was higher at noise monitor 6 than 5, the noise monitor reading was higher by +1.0 SNL db. **More analysis is required to see if higher is quieter.**

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AWG OUTREACH ACTIVITIES AND SPECIAL EVENTS – 1ST HALF 2018

Recent changes in FAA approved flight departure patterns have activated residents and community groups locally, and countrywide. The goal of Airport Working Group of Orange County (AWG) is to approach resident concerns about airport impacts with fact-based analysis and problem-solving, then leverage our expertise and our relationships with stakeholders for change.

We strive to maintain collaborative communication with all of the key stakeholders in operations at John Wayne Airport: the FAA, the airport operator (County of Orange), airlines serving JWA, and the community and municipalities impacted. To facilitate progress toward the common objective of reduction of impacts to the community, AWG has taken a leadership role in reaching out to each of the key entities.

FAA—AWG's interaction with the FAA has been more limited due to Metroplex lawsuits. However, since the settlement in January, 2018, we have engaged with FAA officials and their representative will be presenting at the AWG Annual Meeting in June.

Airport Operator—AWG's primary contact with the Airport is the Access and Noise Office (ANO), managed by the County. Our relationship has been collaborative and should continue to be so. Over the past twelve months, they have provided us a significant amount of individual flight data, noise monitor data and actual flight tracks flown by the carriers, which has helped us build a database resource for analysis and observational findings.

Commercial Airlines—AWG's key focus over the past year has been reaching out to the commercial carriers because they have control over daily operations and thus, joint discussions are more likely to yield the greatest change in impacts for residents.

AWG Board member, Lauren Kleiman, organized a pilot roundtable, in October of 2017, with participants from United Airlines, Frontier Airlines, American Airlines and the City of Newport Beach. It was an informal exchange of information, which allowed us to better understand how the operators fly various departures, including STAYY (new 2-turn procedure that follows the bay centerline).

Lauren also facilitated conference calls, and in-person meetings with senior management for Southwest Airlines. It has opened the door to further dialogue and possible partnering on joint solutions. We anticipate further meetings once we have comprehensive data to discuss.

Finally, Lauren has forged a relationship with the Chief Pilot's Office for American Airlines operations, with a local meeting to take place this month (June).

All of our communication has been both positive and welcomed and we will continue down this engagement strategy with the other airline stakeholders. More to follow....Check our website for updates (www.awgoc.com).

Community and Municipalities—AWG continues to work closely with the other signatories to the original John Wayne Settlement Agreement. The City of Newport Beach looks to AWG as an important player in matters related to Airport concerns and as a reliable source of information and expertise. Our Board members sit on the City's Aviation Committee and participate in regular conference call updates to stay informed on City efforts.

We are working to engage other neighboring cities, beginning with Costa Mesa and inland cities impacted by flight arrival tracks. AWG keeps open lines of communication with other community groups and maintains a social media presence to keep the public informed. Visit us on Facebook site "awgoc".

UC Davis Aviation Noise & Emissions Symposium- Feb. 25-27, 2018 – Long Beach, CA

UC Davis sponsors annual symposiums on the impacts of aviation on local communities and what the industry is doing to help mitigate those. The topics over the 2½ days included focus on new science, legislative efforts, and community interactions being undertaken by the national aviation community. AWG attended the event to broaden our understanding of the factors at play at John Wayne Airport so that we can be more effective at finding solutions and effectively getting those proposed and evaluated for airline operations. Airlines and other parties involved will only accept change if we can provide facts and analysis to support our positions and we want to be as effective as possible on your behalf. Relationships were created with elected officials, airports, consultants, the FAA and community members from Chicago, Atlanta, Phoenix and other sites. What lessons they have learned and how we may leverage their successes in our search for solutions to the impacts of NextGen noise and emissions is the ultimate goal.



AWG Board members, City of Newport Beach representatives and our hosts

Flight Safety – test fly the STAYY departure from John Wayne Airport (on a G550 simulator)

On April 3rd AWG worked with the Flight Safety International's Long Beach Learning Center to demonstrate the new STAYY Departure in their state of the art Gulfstream 550 full-motion simulator. The participants, which included AWG members, a John Wayne Airport Access and Noise Office representative, and an Elected Official from Newport Beach were hosted by Regional Sales Manager Jason Svoboda and Simulator Instructor Paul Mundt. After clearing security, we gathered in a high-tech classroom and learned about what makes Performance Based Navigation and Required Navigational Performance Standard Instrument Departures like the STAYY different, and to better understand the training and aircraft equipment required to utilize them. We then proceeded to the Simulator Bay and Instructor Mundt and a Simulator Operator gave us each an opportunity to "fly" the existing departure and the STAYY departure, and compare the two using the very realistic full-motion of this multi-million dollar simulator. We all came away with a much better understanding of the changes coming with Performance Based Navigation procedures like the STAYY. This was an incredible opportunity.

Collectively, we thought the procedure was flyable and would in fact track the Back Bay centerline fairly closely and we continue to support its formal approval for all carriers at JWA.

AWG Airport Working Group of Orange County, Inc.

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PLEASE SUPPORT THE EFFORTS OF AWG BY MAKING A CONTRIBUTION TODAY.

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1048 Irvine Avenue – PMB 467 – Newport Beach, CA 92660**

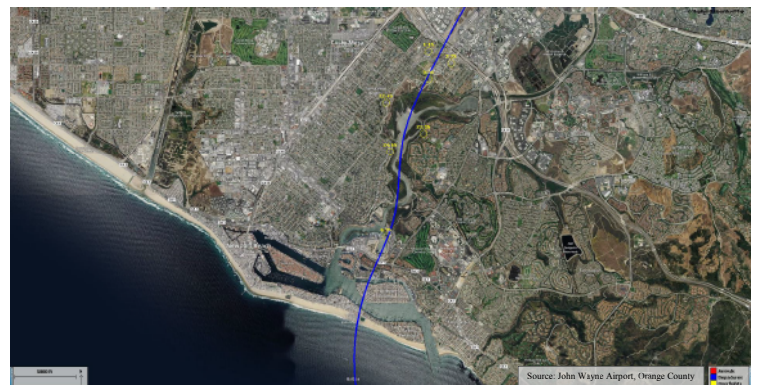
If you would like further information or to report any noise complaints, visit our website at: www.awgoc.com

2. The difference on Oct 26 between average readings between NM5 and NM6 of 1.0 SNL db was small (less than 5db is hard for the average human ear to discriminate the difference). It appears “noise” is fairly equally shared at those 2 locations, so it is a broad community issue.
3. An altitude difference of 600 ft between NM6 and NM7 in itself (disregarding how it is flown as to engine power) did not yield a human ear discernable noise level reduction
4. Payload (departure weight in passengers, aircraft, fuel, and cargo) seems to be a strong factor in higher noise levels. This is intuitive in that a higher weight requires more power to climb and achieve altitude and the average altitude of heavy flights at the noise monitors was lower.
5. Aircraft type does matter as we know: Delta Airlines B717 aircraft were significantly quieter than all other types (excepting the new Frontier A320NEO which did not fly on Oct 26).
6. The 10 noisiest flights on Oct, 26 – 7 were United and 3 were American. This may be a payload weight factor as most of these were heavy on departure with passengers and fuel (ex., east bound flights).

Net-net: Newport Beach’s decision to contract with HMMH to gain real intelligence and understanding of the noise both historically and projected is a wise step. With knowledge and support from airlines, we might be able to at least optimize current equipment performance in reducing noise. Stay tuned.

**STAYY Departure Flight Performance:
Mar-April Preliminary Observations**

JWA’s ANO office provided sample data on the Southwest Airlines initial test flights on the new center bay, 2 turn STAYY2 departure track. Only a small part of this data has been analyzed to date. The preliminary review indicates the change in Noise Monitor readings for STAYY flights compared to the normal PIGGN departure track is minor. Factors such as payload, weather, age of equipment, etc. were not included and may impact the results, hence observations are still preliminary. However, it appears the STAYY may not deliver the noise reduction impact we hoped.



Southwest Airlines STAYY 2 turn departure: 4-3-2018.

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