

## TRUCKEE TAHOE AIRPORT DISTRICT

**BOARD OF DIRECTOR STAFF REPORT** 

AGENDA TITLE:	Noise Mitigation Strategies Discussion and Review of Runway 11/29 configuration alternatives found in the 2015 Master Plan				
MEETING DATE:	August 23, 2017				
PREPARED BY:	Hardy Bullock, Director of Aviation & Community Services				

**RECOMMENDED ACTION:** Review the attached information discussing potential noise mitigation strategies and the Runway 29 Eastward Extension outlined within the adopted 2015 Truckee Tahoe Airport District Master Plan. Receive guidance and answers to questions related to the Chapter 4 Alternative Analysis outlining the cost benefit of extending runway 29 as a method to reduce community annoyance.

**DISCUSSION:** In an effort to reduce annoyance from aircraft overflight Staff is presenting concepts for Board review. While not an exhaustive list of current options, the three concepts, *Pilot Incentives, Diesel Powered Aircraft*, and *Runway Modifications* are relevant to the current discussion of possible solutions.

**Pilot Incentives:** The tower gives the airport some level of direct control over aircraft. Additionally the District does have influential control over pilot behavior through incentive programs and voluntary curfews, noise abatement procedures, and cultural protocol such as safety conduct. Pilot Incentives is commonly discussed at KTRK as a method to assure procedure compliance. An example is the hangar tenant incentives that discount rent when pilots promise to abide by the voluntary curfew. Other programs included discounted fuel to take a test on the airports noise abatement procedures. There has been recent discussion related to flight training incentives. The goal to reduce total training flights and repetitive flights specifically. Staff conservatively estimates 5000 annual touch-and-go training operations. One concept that is widely discussed is to offer a training stipend to operate repetitive training flights elsewhere. The program would provide a subsidy to the pilot for the time in route to other airports which would

have the positive effect of reducing repetitive operations here at KTRK. In concept this idea has great merit however as staff has researched this concept, we see some difficult hurdles which include:

- 1. The transference of annoyance to other communities
- 2. The equitable administration of the program
- 3. The verification of compliance
- 4. The possible effects on safety from reduced airport familiarity

Staff feels that it is very likely that any incentive program we launch that moves touch and goes operations to other airports without close coordination and approval from that airport would be unsuccessful. The incentive concept is worth watching and discussing. Other incentive programs aimed at procedure compliance, curfew compliance, or operating behavior such as route selection should be options continually available to the Board. Staff has sought a legal opinion form Aviation Legal Counsel Peter Kirsch on this concept. His response is forthcoming and will be shared with the Board, ACAT, and public.

Diesel (Jet A) Aircraft Technology: A concept that may deserve analysis and discussion is to make touch and go/repetitive operations quieter rather than trying to move them. Director Jones has requested a closer look at the diesel aircraft technology presented in July of 2015 as a possible solution to the touch-and-go training flight impacts. Aircraft power plant technology now includes diesel (Jet A) engines which produce a lot of torque at lower RPM. The result is a quieter engine which produces stable power at altitude. The use of turbo charging and light weight composite props adds to performance without adding noise. In 2015 Staff presented a potential diesel aircraft manufactured by Red Hawk and measured by HMMH Noise Consultants. The result, in general was that diesel aircraft operate at a significantly lower noise energy level in all phases of flight. While the aircraft exhibited desirable quiet operating characteristics, the 135HP engine lacked the necessary performance to operate at our elevation. Recently both Piper and Cessna have received FAA certifications for a better preforming 155 HP diesel training aircraft. Director Jones and Staff would like to review this new technology and reconsider the concept of replacing an existing training aircraft that commonly conducts repetitive operations with this new quieter technology. Staff has discussed the concept with Sierra Aero and they support the proposed initiative. Staff and Director Jones would like to begin conversations on this topic in preparation of the FY2018 Budget.

**Runway Modifications:** The Truckee Tahoe Airport District completed a comprehensive Master Plan in 2015. This document is considered integral in the proper management, planning, and development of airports. This document is considered valid for a period of 10-15 years or such time as the strategic values or mission objectives of an airport greatly change. Length and load bearing of aircraft movement surfaces is a key attribute defining an airports capacity. Longer, wider runways accommodate larger aircraft only if the surrounding terrain permit this. The Board of Directors, within the Master Planning process looked closely at runway configurations, lengths, and load bearing capacity to insure no action developed additional capacity or allowed capacity to exceed local demand for aircraft operations.

The Board, Staff, Consultants and the Community looked closely at 4 different alternatives to reduce annoyance through runway configuration changes. The table below outlines these 4 potential alternatives. The goal of each to develop a runway surface that allows the aircraft to be higher at the point when passing overhead in areas of development. A longer runway to the east will allow the aircraft to ground roll, become airborne, and climb at a further distance from homes to the west. The ultimate path of the aircraft would remain unchanged but it would hopefully be higher thus quieter.

Space Intentionally left Blank

ALTERNATIVES:	ALTERNATIVE 1A		ALTERNATIVE 1B		ALTERNATIVE 2A		ALTERNATIVE 2B	
Description	Extend Runway 11-29 1,322' east with 1,332' displaced threshold at both runway ends.		Extend Runway 11-29 1,322' east with 874' displaced threshold on Runway 29 only.		Extend Runway 2-20 south to 5,000' with 556' displaced threshold on Runway 2 and widen to 100'.		Widen Runway 2-20 to 100'.	
Airfield Impacts	0.300'		7.000' (No Change)		5.000'		4.650' (No Change)	
Runway Width	100' (No	Change)	100' (No	Change)	10	00'	10	0'
Declared Distances	Runway 11	Runway 29	Runway 11	Runway 29	Runway 2	Runway 20	Runway 2	Runway 20
TORA TODA ASDA LDA	8,322' 8,322' 8,322' 7,000'	8,322' 8,322' 8,322' 7,000'	7,000' 7,000' 7,000' 7,000'	7,000' 7,000' 7,000' 5,678'	5,000' 5,000' 5,000' 4,444'	4,444' 5,000' 5,000' 4,945'	None	None
Taxiways	Extend Taxiway A east 1,322' to new end of Runway 29.		Extend Taxiway A east 1,322' to new end of Runway 29. Reduce Taxiway A at new approach end of Runway 11.		Offset Taxiway G, for new design category.		Offset Taxiway G, for new design category.	
Runway Safety Area Standards	Declared Distances used to satisfy RSA requirements.		Declared Distances used to satisfy RSA requirements.		Declared Distances used to satisfy RSA requirements.		No Change	
Impacts to Airport Property Use	Reduction in available building area west of relocated approach end of Runway 11 due to RPZ and approach surface shift.		Reduction in available building area west of relocated approach end of Runway 11 due to RPZ and approach surface shift.		Minor. Runway visual zone would shift slightly limiting hangar build out at east and of apron.		No significant change.	
Off-Airport / Community Impa	cts							
Over flight Impacts	Increased height of aircraft departing Runway 29 and arriving on Runway 11 would reduce overflight impacts west of Airport. Potential increase in aircraft weights / range.		Aircraft would depart on a lengthened Runway 29 allowing greater altitude when overflying nearby residences west. See Single Event and		Increased utilization for departures on Runway 2.* Increased utilization or Runway 2-20 by all aircraft classifications*		Possible increase in utilization of Runway 2-20 by all aircraft classifications' *- Decreased utilization if Runway 11-29 extended	
Community Noise					extended. Grid Analysis Graphics			
Impacts to Off-Airport Land Use Zones	Increased restri	ictions east.	Increased restrictions east and reduced restrictions west.		No Change		No Change	
Aeronautical Factors								
Construction impacts to airport operation (e.g., downtime, temporary changes, etc.)	Nighttime work inside RSA – 2 months (Rwy 11-29 closed at night). Daytime closure up to 7 days. Airport closed for 36 hours.		Nighttime work inside RSA – 2 months (Rwy 11-29 closed at night). Daytime closure up to 7 days. Airport closed for 36 hours.		Nighttime work inside RSA – 2.5 months (Rwy 11-29 closed at night). Daytime closure up to 7 days. Airport closed for 36 hours.		Nighttime work inside RSA – 2.5 months (Rwy 11-29 closed at night). Daytime closure up to 4 days. Airport closed for 36 hours.	
Runway Protection Zone	Runway 11 departure RPZ crosses Martis Creek Road. Requires FAA approval.		RW 11 departure RPZ crosses Martis Creek Road. Requires FAA approval.		With declared distances, Hwy 267 removed from Rwy 2 RPZ.		No changes. Highway 267 would remain inside Rwy 2 RPZ.	
			requires FAA approval.		Portion of Rwy 20 RPZ remains off property.		Portion of Rwy 20 RPZ remains off property.	
Potential Property Acquisition (RPZ compliance)	10.0 acres (Runway 29 RPZ)		10.0 acres (Runway 29 RPZ)		11.4 acres (Runway 2 RPZ)		11.4 acres (Runway 2 RPZ)	
Attract Larger Airplanes and Operating Weights and Range	Possible with longer published runway length for Runway 11-29.		Not likely since Runway 11- 29 would remain the same length, while reducing LDA on Runway 29.		Possible with longer published runway length and width for Runway 2-20. However, the extension will not result in a runway longer than 11-29, meaning the longest runway at TRK would remain unchanged.		Not likely since Runway 2-20 would remain the same length.	
Effect on All-Weather Capabilities	No Cł	lange	No Cł	ange	No Change		No Change	
Effect on Night Operations	None. No new i lighting propose	nstrument ed.	None. No new lighting propos	instrument ed.	None. No new instrument lighting proposed.		None. No new instrument lighting proposed.	
Critical Airspace Approach and Departure Surface Considerations	No Change to i approach capal	nstrument bilities.	No Change to i approach capa	nstrument bilities.	No Change to instrument approach capabilities.		No Change to instrument approach capabilities.	
NAVAIDs	No Change		No Change		No Change		No Change	
Environmental Impact Potential								
Wetlands	Minor or N	lo Impact.	Minor or N	lo Impact.	Potential impact south of Rwy 2 Connection of of practical to miti culverting.	t to wetland -20. ditch may be gate by	None	
Earthwork / Fill	18,500 CY		18,500 CY		62,500 CY		None	
Impervious Surfaces (Runways and associated Taxiways)	23,700 SY of additional pavement. (includes extension to Twy A)		23,700 SY of additional pavement. (includes extension to Twy A)		18,778 SY of additional pavement. (does not include Txw G improvements)		13,100 SY of additional pavement. (does not include Txw G improvements)	
Construction Costs								
Estimated Costs (Design, Build and Environmental)	\$6.1 N	Aillion	\$6.1 M	Aillion	\$6.8 1	Aillion	\$3.4 Million	

Based on cost, runway construction, extension, and modification is considered expensive within the realm of possible noise reduction solutions. Other solutions outlined within the Master Plan include off airport mitigation such as residential sound insulation, enhanced flight control concepts such as control towers, procedures, and surveillance, land use designation and protection of open space, and building development.



The design drawing below outlines the potential extension of runway 29.

The use of the displaced thresholds allows aircraft to use the surface for takeoff but not landing. This allows the total useable landing surface to remain unchanged thus preventing additional capacity for large aircraft through longer runway length. An important point to consider is that a future Board may, once paved, use that surface for additional capacity. This concept is important and received considerable discussion from the community during the Master Planning process. Articulating the benefits of a longer runway as a means of reducing community annoyance is possible. It requires accurate messaging and a methodical, long term communication strategy. During the masterplan process the public objected to infrastructure changes that would allow additional capacity but strongly supported ideas to reduce annoyance. The cost of extending the runway 1322' is approximately \$6.1 million dollars.

Another concept to reduce annoyance includes the lengthening and widening of runway 2/20. During the flight planning process jet and turbo prop aircraft will typically select a runway greater than 5000 feet. Some companies that flight plan for operators such as Net Jets only view surfaces longer than 5000 based on one engine inoperative restrictions and performance. The alternative chapter within the Master Plan outlines the option to extend runway 2/20 southward in an effort to utilize this runway and potentially reduce operations on runway 11/29. The potential benefit is increased use and utilization of airspace north of the airport in areas of lower residential density. Additional concerns surround the prevailing wind which seldom favors runway 2 heading in a northerly direction. The incremental addition of length may not incentivize operators to use the runway. Extending into the range of 7000+ feet is not possible based on terrain, geography and land use/ownership constraints.

An important factor in evaluating the effectiveness of alternatives that extend runway 29 eastward is the height of aircraft over affected residential areas and the degree to which the alternative improves an observer's perception of the event and the related noise exposure. To assess the visual impacts, existing and future flight profiles were evaluated. This was done by observing the departure profiles of three aircraft that TRK identified as prominent operators: the turbo jet Cessna Citation V (560), the turboprop Piaggio P180 Avanti, and the single-engine piston Cessna 172. The figure below illustrates the flight profiles of aircraft after departure from the existing Runway 29 end and proposed Runway 29 end. Each graphic is broken into two viewports: a plan view of the departure path, and a profile view. The plan view gives a comparison of where aircraft are located above neighborhoods in relation to time after departure roll. The profile view compares the altitude of aircraft on a standard departure path, from the existing and proposed end of Runway 29.



The decision to fund a runway extension centers on its ability to reduce annoyance in a measurable way. The final height delta or difference over the point where the airport property ends was approximately 269 feet. A jet will increase its climb gradient as its speed increases. The faster the aircraft travels roughly equates to a better rate of climb while close to the airport. Jets may climb at a proportionally higher rate by the time they arrive over the bypass or the Alder intersection area. The geometry of annoyance is worth mentioning. It is the belief of Staff that annoyance is a broad description for a number of feelings elicited when aircraft are seen or heard arriving or departing the airport or overhead a residences. The sight picture of an aircraft turning is more alarming, low aircraft disturb people based on safety concerns or misperception of operating safety margins. The frequency, duration and intensity of aircraft noise vary depending on its direction of flight, angle of attack and altitude. This collection of things outlines some of the attributes affecting perceived annoyance. It was originally determined that the relative small

benefit of extending the runway may not positively impact the conditions outlined here but should be thoroughly considered when evaluating all potential alternative to reduce community noise and annoyance.

Potential Benefits for Extending Runway 29 1322' Eastward

- Aircraft are higher over the bypass and areas west and north of the airport which may reduce community annoyance
- Aircraft have a higher margin of safety on longer/wider runways
- Aircraft have a higher margin of safety with additional altitude
- Aircraft have additional terrain and obstruction clearance when departing runway 29

Potential Costs for Extending Runway 29 1322' Eastward

- \$6.1 million cost with adjustment for inflation based on the date of construction
- Unknown environmental impact
- Land use/Ownership impacts
- Difficult to quantify direct benefit to community
- Community Perception
- Increased annual maintenance cost
- Unknown grant funding eligibility

**WHAT'S NEXT:** With Board direction and approval Staff will provide additional details related to potential projects outlined here including scope, budget estimates, and timelines.

**FISCAL IMPACT:** Unknown at this time. Additional details required to develop pro forma and program budget.

**SAMPLE MOTION(S):** None required.

## ATTACHMENTS:

Masterplan Alternatives Chapter 4

Diesel Aircraft Memo from HMMH

Aircraft brochure Cessna

Aircraft brochure Piper