Noise Monitoring Terminals
How and Why We Monitor Aircraft Noise

CENAC Meeting

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Monitoring Aircraft Noise - Infrastructure

Hardware

- Environmental noise is measured using a Noise Monitoring Terminal (NMT)
- Bruel & Kjaer Type 1 sound level meter inside a weather tight cabinet and an all weather microphone
- Noise data is measured in real time and communicated to servers in Australia via 3G communications
- Number and locations for NMT installations are determined using specific criteria

Software

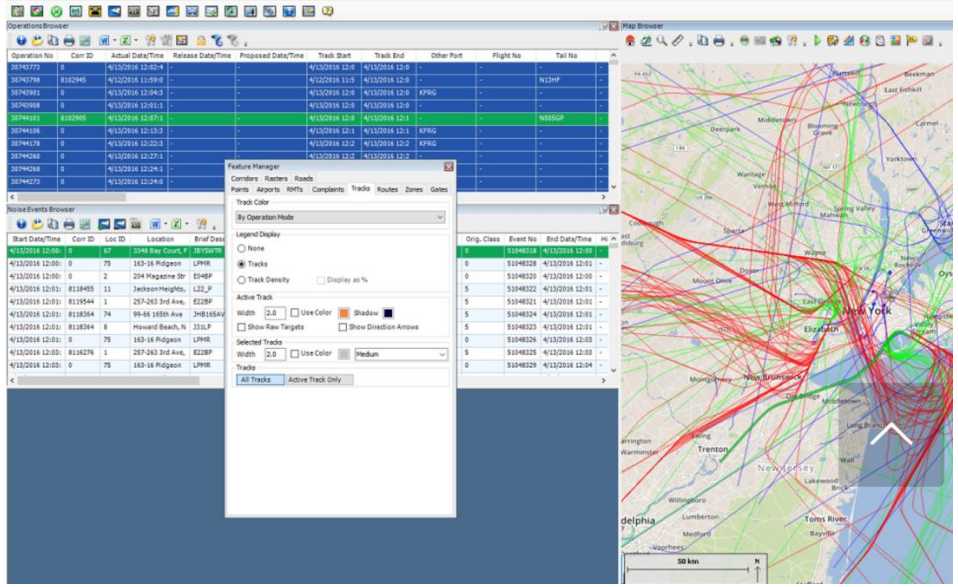
- ANOMS - Airport Noise Monitoring and Management
- Install base is approximately 250 airports worldwide
- Integrates real noise data to specific flight operations and aircraft
- Provides a databank of historical noise data to facilitate future planning
- Document tool to record and correlate community complaints to noise levels and aircraft operations

Portable Noise Monitoring

- Environmental noise can also be measured using a portable Noise Monitor for areas without a nearby permanent NMT

Why is Aircraft Noise Monitoring Important

- Noise exposure – Document the noise level for aircraft arriving and departing the airport
- Flight track correlation – Match noise levels to which aircraft are flying
- Operational reports – Understand real noise level impacts on communities
- Community relations – Analyze noise data over time to report on trends to plan for future changes and help set community expectations and build understanding



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Typical NMT Installation

Sound Level Meter

Modem

Mast

NMT Cabinet

Microphone

Portable Noise Monitor

NMT Site Location Criteria

- Proximity of NMT to aircraft flightpaths
- Proximity of NMT to existing noise monitor locations
- Proximity of NMT to noise sensitive land uses
- Background noise levels
- Utility sources, site access and security
- Terrain and building interference; reflection/absorption

2015 NMT Review

- A review of the Noise Monitoring Terminal (NMT) locations in our surrounding communities was identified as one of the 2015 initiatives of GTAA's Five Year Noise Management Action Plan, developed with the Community Environment Noise Advisory Committee.
- Traffic levels and operations had changed since the last NMT Review; therefore a new review was needed to ensure that we are accurately measuring airport noise impacts.
- The CENAC working group identified the need for eight additional sites. Their recommendation was approved and all monitors have since been installed.

GTAA – 25 Existing NMT Installations

NOISE MONITORING TERMINALS

TORONTO
1. WEST HUMBER COLLEGIATE INSTITUTE
2. ACADIA AVE.
4. ERIKSDALE AVE.
7. JAMES S. BELL PUBLIC SCHOOL
30. RICHVIEW AMBULANCE STATION
31. BLACKFRIAR PARK
36. ROBERT HICKS PARK
37. ORIOLE PARK

MISSISSAUGA
5. GARNETWOOD PARK
9. NAV CANADA POND STREET
14. MARVIN HEIGHTS PUBLIC SCHOOL
18. BRAEBEN GOLF COURSE
27. MEADOW GLEN PARK
38. LISGAR GREEN PARK
39. TOBIAS MASON PARK

BRAMPTON
11. BALMORAL PARK
12. GRENOBLE PUBLIC SCHOOL
13. NEW LIFE COMMUNITY CHURCH
20. SOUTH FLETCHERS SPORTSPLEX
21. PEEL VILLAGE GOLF COURSE
22. BRAMPTON FIRE STATION #209

VAUGHAN
34. WADE GATE PARK
35. MATTHEW PARK

HALTON HILLS
32. HALTON HILLS

OAKVILLE
33. OAKVILLE

Toronto Pearson

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Noise Metrics – Measured and Calculated What do they Mean?

Leq – Averaged acoustic energy over the measurement time period

Lmax – Maximum noise level measured within defined period of time

L_N (statistical noise) – Noise level exceeded "N" percent of the measurement time

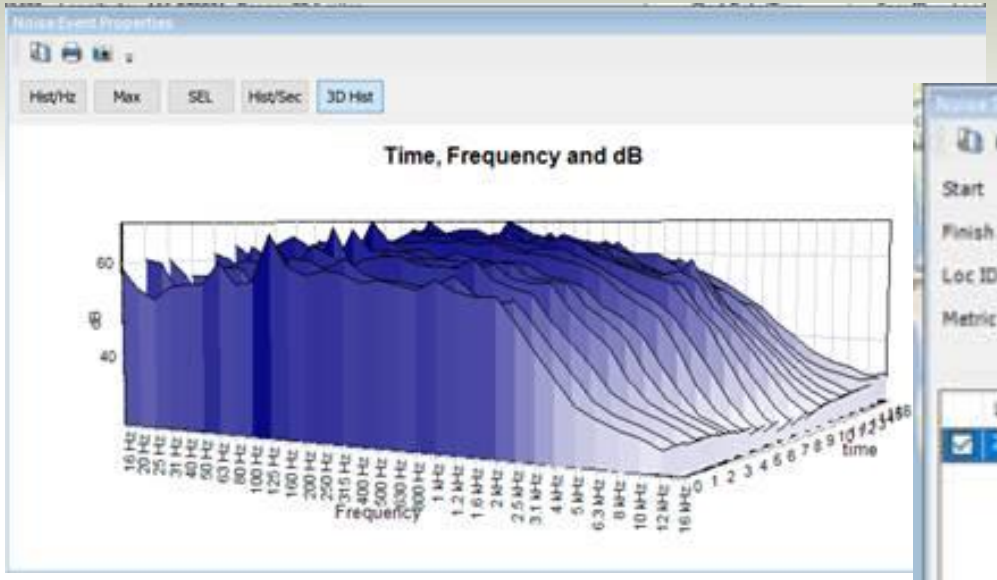
SEL – Noise event level normalized over a one second period

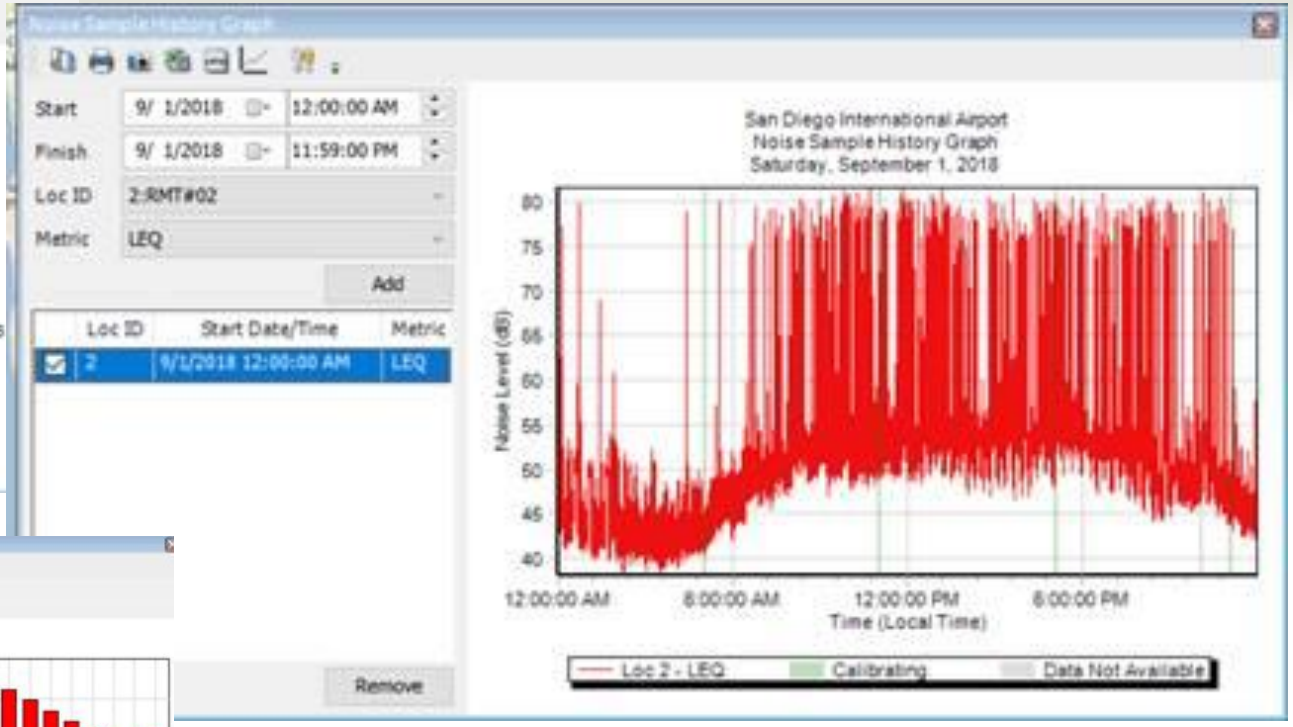
EPNL - Perceived noise level, goes beyond the physical measured quantity

L_{DEN} - Single valued equivalent Day-Evening-Night level

1/3 octave frequencies - Frequency spectrum divided in 1/3 octaves

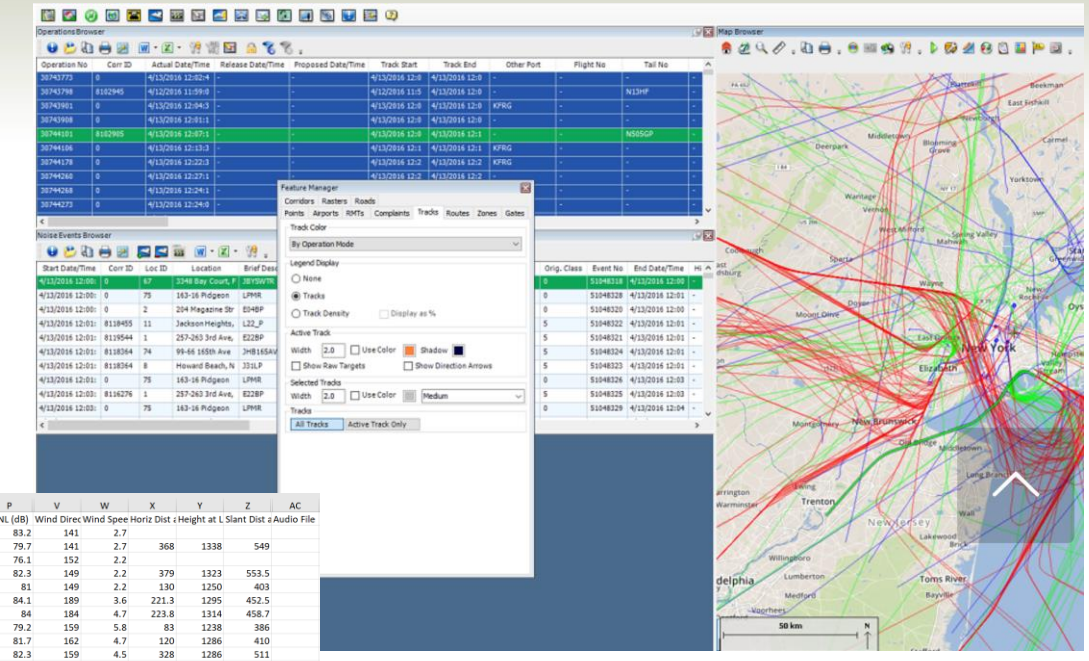
Noise Metrics





Other Relevant Reported Information

- Aircraft details
- Position
- Weather
- Event duration



	A	B	C	D	E	F	G	H	I	J	K	L	N	O	P	V	W	X	Y	Z	AC
1	Start Date/	Corr ID	Loc ID	Location	Brief Descr	SEL (dB)	LMax (dB)	Max Date/	Duration (s	Class	Orig. Class	Event No	Threshold	SEL C Flag	EPNL (dB)	Wind Direc	Wind Spee	Horiz Dist	Height at L	Slant Dist	Audio File
2	########	0	26	756 Gatew	RMT#26	83	71.7	########	32	5	0	63930765	60		83.2	141	2.7				
3	########	22877341	26	756 Gatew	RMT#26	80.3	69.9	########	26	1	0	63930777	60		79.7	141	2.7	368	1338	549	
4	########	0	26	756 Gatew	RMT#26	77.3	69.2	########	13	5	0	63930818	60		76.1	152	2.2				
5	########	22877357	26	756 Gatew	RMT#26	83.9	73.8	########	26	1	0	63930866	60		82.3	149	2.2	379	1323	553.5	
6	########	22877353	26	756 Gatew	RMT#26	82.1	71.5	########	26	1	0	63930878	60		81	149	2.2	130	1250	403	
7	########	22877390	26	756 Gatew	RMT#26	83.4	72.6	########	29	1	0	63930985	60		84.1	189	3.6	221.3	1295	452.5	
8	########	22877358	26	756 Gatew	RMT#26	85.5	76.3	########	30	1	0	63931029	60		84	184	4.7	223.8	1314	458.7	
9	########	22877359	26	756 Gatew	RMT#26	79.9	70.9	########	23	1	0	63931274	60		79.2	159	5.8	83	1238	386	
10	########	22877382	26	756 Gatew	RMT#26	83.1	71.9	########	31	1	0	63931528	60		81.7	162	4.7	120	1286	410	
11	########	22877478	26	756 Gatew	RMT#26	83.3	73.6	########	21	1	0	63931860	65		82.3	159	4.5	328	1286	511	
12	########	22877479	26	756 Gatew	RMT#26	84.3	73.7	########	33	1	0	63932066	65		83.9	159	4.5	241	1246	450	
13	########	22877427	26	756 Gatew	RMT#26	82.5	72.4	########	19	1	0	63932193	65		81.4	163	5.4	370	1317	546	
14	########	22877480	26	756 Gatew	RMT#26	79.3	69.6	########	11	1	0	63932243	65		78.1	163	5.4	213	1263	440	
15	########	22877472	26	756 Gatew	RMT#26	81.9	71.9	########	18	1	0	63932321	65		80.4	159	6	70	1224	380	
16	########	22877504	26	756 Gatew	RMT#26	82.3	72.8	########	18	1	0	63932457	65		81.1	159	6	88	1231	386	
17	########	22877556	26	756 Gatew	RMT#26	83.3	73.4	########	20	1	0	63932467	65		83.1	159	6	362.9	1255	527.4	
18	########	0	26	756 Gatew	RMT#26	80.8	74	########	15	5	0	63932664	65		81.7	159	4.7				
19	########	22877505	26	756 Gatew	RMT#26	79.6	69.9	########	13	1	0	63932810	65		78.7	159	4.7	51	1225	377	
20	########	22877406	26	756 Gatew	RMT#26	82.6	74.3	########	17	1	0	63932854	65		83.1	159	4.7	740	1356	848	
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22	########	22877424	26	756 Gatew	RMT#26	84.5	75.9	########	20	1	0	63933000	65		82.6	158	4.7	334	1268	511	
23	########	22877481	26	756 Gatew	RMT#26	83.3	73.1	########	19	1	0	63933072	65		82	158	4.7	137	1235	401	
24	########	22877506	26	756 Gatew	RMT#26	81.9	72.7	########	18	1	0	63933120	65		80.8	158	4.7	144	1190	390	
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27	########	22877426	26	756 Gatew	RMT#26	81.5	71.5	########	18	1	0	63933289	65		79.9	160	5.6	403	1281	561	
28	########	22877428	26	756 Gatew	RMT#26	81.6	71.5	########	19	1	0	63933373	65		81.1	160	5.6	106	1211	384	
29	########	22877429	26	756 Gatew	RMT#26	84.4	74.3	########	21	1	0	63933411	65		84	160	5.6	415	1281	570	
30	########	22877415	26	756 Gatew	RMT#26	82.8	73.9	########	20	1	0	63933429	65		82.2	160	5.6	317	1444	543	
31	########	22877419	26	756 Gatew	RMT#26	82.3	73.7	########	18	1	0	63933512	65		81.7	160	5.6	237	1204	437	

How else can Noise Monitoring Data be Used?

- A method to monitor community impacts during periods of construction and maintenance
- A research tool; investigate social impacts from aircraft noise
- Means of comparing effectiveness of noise mitigation initiatives or impacts of procedural changes
- Community relations, urban planning and education

Thank you for listening!