



PORTSTORONTO

BILLY BISHOP TORONTO CITY AIRPORT

**NOISE MANAGEMENT SUB-COMMITTEE
MEETING #12**

MEETING MINUTES

January 28, 2021
7:00 pm - 8:30 pm
Zoom Online Meeting
Toronto, Ontario

Minutes prepared by:



PORTS TORONTO

These meeting minutes were prepared by LURA Consulting. LURA provides neutral third-party consultation services for the Ports Toronto Noise Management Sub-Committee. These minutes are not intended to provide verbatim accounts of committee discussions. Rather, they summarize and document the key points made during the discussions, as well as the outcomes and actions arising from the committee meetings. If you have any questions or comments regarding the Meeting Minutes, please contact either:

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Summary of Action Items from Meeting #12

| Action Item | Action Item Task | Who is Responsible for Action Item |
|--------------------|---|---|
| M#12-A1 | Alexander Furneaux will recirculate the meeting minutes from Noise Management Subcommittee Meeting #11 for review by the committee before February 8 th , 2021. | LURA |
| M#12-A2 | Michael MacWilliam will convene a meeting between himself, Mr. Beck, and Dr. Novak to discuss the installation of a noise terminal at Windward Co-Op. | PortsToronto |
| M#12-A3 | Angela Homewood will discuss a future agenda item for the Community Liaison Committee with Gene Cabral to have Colin Novak return prior to the completion of the Ground Noise Study to present. | PortsToronto |
| M#12-A4 | Alexander Furneaux will circulate potential meeting dates for the next subcommittee meeting to be held in late April/early May. | LURA |
| M#12-A5 | Hal Beck to provide Angela Homewood with a list of questions related to ICAOs to inform contacting a representative to speak at a future subcommittee meeting on this topic. | YQNA |

List of Attendees

| Name | Organization (if any) | Attendance |
|--------------------------------------|--|-------------------|
| COMMITTEE MEMBERS | | |
| Hal Beck – Co-Chair | York Quay Neighbourhood Association | Present |
| <i>Vacant position</i> | York Quay Neighbourhood Association | <i>N/A</i> |
| Max Moore | Bathurst Quay Neighbourhood Association | Absent |
| Lesley Monette | Bathurst Quay Neighbourhood Association | Present |
| Bryan Bowen | City of Toronto – Waterfront Secretariat | Regrets |
| PORTS TORONTO REPRESENTATIVES | | |
| Angela Homewood – Co-Chair | PortsToronto | Present |
| Michael David | PortsToronto | Present |
| Michael MacWilliam | PortsToronto | Present |
| FACILITATION | | |
| Jim Faught – Lead facilitator | LURA Consulting | Regrets |
| Alexander Furneaux - Notetaker | LURA Consulting | Present |
| GUEST(S) | | |
| Colin Novak | Akoustik Engineering Limited | Present |

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Appendix A: Meeting Agenda

Appendix B: Pre and Post COVID Levels 2019 vs. 2020

Appendix C: Billy Bishop Toronto City Airport Noise Management Subcommittee
(presentation by Dr. Colin Novak)

Appendix D: Follow-Up Questions and Comments

1. Agenda Review and General Updates

Alexander Furneaux (LURA Consulting) welcomed the members of the Noise Management Subcommittee (NMSC) to their 12th meeting held virtually via Zoom. Mr. Furneaux provided an overview of the agenda and asked the committee for any additional items or updates to be added to the list of agenda items. The meeting agenda is included in **Appendix A**.

- Mr. Beck noted his desire to have a discussion with Angela Homewood about the direction for the subcommittee including what should be addressed over the next few meetings.
- Ms. Homewood noted that Bryan Bowen has been working on getting a staff member from City Planning to come speak on the topic of noise mitigation as part of the development review process through an example of a recent development on the waterfront. It was discussed doing this meeting in-person, however it depends on how long restrictions will continue for.
- Mr. Beck inquired whether it is the expectation that airport recovery will be 3-5 years, or whether we might expect regional air travel to resume quicker than major international airports like Pearson.
- Mr. MacWilliam noted that it is generally the expectation, and this has been seen in other areas of the world such as China, that regional operations have already fully recovered. The uncertain element now is the ever-changing restrictions with the United States. There may be the possibility that we begin to see a ramp up in the summer and fall, depending on the course of the pandemic.
- Mr. Furneaux inquired whether committee members had any items to add to the agenda or comments on the meeting minutes from Noise Management Subcommittee Meeting #11. Ms. Monette requested that the meeting minutes be re-circulated for review. Mr. Furneaux identified he could do so and give until Monday February 8th, 2021 to provide comments on the minutes.

M#12-A1 Alexander Furneaux will recirculate the meeting minutes from Noise Management Subcommittee Meeting #11 for review by the committee before February 8th, 2021.

2. Noise Comparison from Pre-COVID (2019) to COVID (2020)

Michael MacWilliam (PortsToronto) provided a short presentation comparing the change in delta from 2019 to 2020 including the Airport LEQ and the number of Airport Events. Mr. MacWilliam noted several key points:

- In 2019, you can see the Airport Events correlates the seasonal activity of the airport.
- In 2019, there is very little change in the Airport LEQ across all months.
- In 2020, however you can see the drop in Airport Events as well as the drop in Airport LEQ across all four NMT sites.
- Looking at the LDEN change, all three terminals saw a 13.3 to 15.0 decrease in decibels in April, rising to approach normal noise levels by mid-summer.

Mr. MacWilliam's full presentation can be found in **Appendix B**.

- Mr. Beck inquired what the LEQ is for.

- Mr. MacWilliam and Dr. Novak confirmed that the Airport Event totals are noise events that are correlated to a particular aircraft track in the system. Airport LEQs are logarithmically average 1-hours, averaged over 24 hours over the month. The Annual LEQ would be the monthly averaged for the periods selected (Dec 2018-Dec 2019).
- Mr. Beck wished to clarify what the Airport Events represents.
- Mr. MacWilliam explained these are events that the system attributes to airport events. The caveat is that PortsToronto does not go through to verify what each event is so it could not differentiate between an airport and a motorcycle. Dr. Novak added that typically at airports there is a threshold set for these systems that when exceeded the system looks at radar data to attribute the noise to an aircraft in the area. If it is able to associate the noise with an aircraft, then the noise is categorized as an Airport Event.
- Mr. Beck wished to clarify what LDEN stands for.
- Dr. Novak explained that it's a Day-Evening-Night level expressed as a single value for a 24-hour period. It takes hourly LEQs for daytime (7:00 a.m. to 7:00 p.m.), evening (7:00p.m. to 11:00p.m.), and nighttime (11:00p.m. to 7:00a.m.) and adds a penalty to values in the evening and nighttime to reflect our increased sensitivity to noise at these times.
- The YQNA and BQNA representatives indicated they are grateful to see this data being presented but would appreciate being able to see the disaggregated data. Both noted that the community is generally aware, and has observed the change in noise level from April to the summer.

3. Permanent Noise Monitor Terminal Update

Mr. MacWilliam provided a brief update on the installation of additional permanent noise monitor terminals noting that he continues to have issues concerning outreach to Ontario Place to have the monitor that was slated to be installed there in place. Mr. MacWilliam inquired whether Mr. Beck has a contact at the Windward Co-Op.

- Mr. Beck noted that the Co-Op is leaning towards the option that Dr. Novak is least interested in installing on (the stucco wall between the sixth and seventh floor). Mr. Beck noted he wanted to get some information from the contractor involved in the restoration of the Co-Op walls. Mr. Beck noted that although he is not in the same unit, there are willing participants near the site to help.
- Mr. MacWilliam noted that he's of the same opinion as Dr. Novak that the roof would be best suited. Mr. MacWilliam suggested convening a call between himself, Mr. Beck, and Dr. Novak to finalize the location and get a representative from the Co-Op.

M#12-A2 Michael MacWilliam will convene a meeting between himself, Mr. Beck, and Dr. Novak to discuss installation of a noise terminal at Windward Co-Op.

4. Ground Noise Study Update

Michael David (PortsToronto) provided a brief update on the Ground Noise Study. Mr. David noted that since the last meeting, the team has continued to document sources of

ground noise from the airport to feed into noise model and is making good progress towards completing the list of stationary sources (including but not limited to: various aircraft at different throttle positions, security escort vehicles, wildlife pyrotechnics, grass cutting, snow plows, air carts, ferry, air conditioning units, etc.). He noted that the list of hundreds of stationary sources will be included in an appendix to the study report.

- Mr. Beck inquired whether background monitoring in the Ground Noise Study would be able to draw upon the information Mr. MacWilliam presented.
- Mr. David indicated it may help inform the study however given that this monitoring was not undertaken with the explicit focus of the Ground Noise Study, the data is more anecdotal in nature.
- Mr. Beck noted he received several questions after the YQNA meeting about the study and has informed members that circumstances due to COVID have delayed parts of the study. Acknowledging this however, Mr. Beck indicated that although the background noise is artificially low and may not represent the “normal” background noise he still believes having data from now would be useful to compare to when normalcy resumes.
- Mr. David replied noting that the best way to achieve that would be through the temporary noise monitors, however installing the monitors at this time would be cost prohibitive. What could be done alternatively is once the temporary noise monitor terminals are installed in a few months, the team can correlate data with what Mr. MacWilliam is presenting to infer some observations.
- Mr. Beck suggested that the ramp-up period Mr. MacWilliam discussed might be a good opportunity to install the temporary noise monitors as there would be more gaps between airport events and provide a mix of busy and less busy intervals.
- Mr. David agreed however he also noted that getting the lead time coordinated to install the temporary noise monitors to align with the ramp-up would be difficult as the airport does not know when that might come.
- Mr. Beck noted that many in the community believe that 1 to 2 weeks of monitoring is completely inadequate, expressing concerns about misrepresentation of data and environmental factors that have influenced prior studies.
- Mr. David reminded Mr. Beck that the 2 weeks refers to background monitoring only and aircraft movements are not relevant. For example, only streetcars, cars, motorcycles, and other elements of the city “hum” are relevant – the microphones actually switch off when there’s a flyby to avoid distorting the data. Dr. Novak added that it is an industry standard to conduct background noise monitoring for a minimum of 48 hours, so 2 weeks is more than adequate. Dr. Novak also noted that the microphones switch off when the wind is blowing at a speed greater than 15km/h in any direction.
- Ms. Monette noted that many building construction projects have been put on hold due to COVID and wonders whether the resumption of these activities, if they occurred during the time in which the temporary noise monitors were active might misrepresent the background noise.

- Dr. Novak noted that there will always be the challenge of what “normal” activity is and to some extent there will be variability in the city’s noise presenting challenges, including that this noise can vary by season. Dr. Novak noted that “worst case” can be done either as the loudest or quietest background depending on how the data is being used.
- Ms. Monette inquired whether the source noise data would include things like the low droning noise that runs almost constantly.
- Mr. David identified that this is likely the diesel generators that circulate air in the aircraft when they are at the gate. These generators are included as a source noise.
- Mr. Beck posed a question to Dr. Novak related to how the noise model will be calibrated/validated so that we know the model is working to reflect what residents actually experience.
- Dr. Novak replied that he would address this through his update.

5. Guest Presentation from Colin Novak (Akoustic Engineering Limited)

Dr. Novak began his presentation with an overview of the purpose of the Ground Noise Study including the approach which aligns with NPC-300 which was discussed in a previous meeting ([Noise Management Subcommittee #7, July 24, 2019](#)). Through the study process, the team measures all potential sources of noise on the ground through spectral sound pressure level measurements which are then converted to sound power data for each source. The characterization of the sources using sound power level is absent of environmental effects (reflection and/or absorption) as these effects are addressed through the model. The model adheres to the procedures and guidelines of ISO 9613 Part 1 and Part 2. Once this model is fully developed, we will be able to predict the impact from each of the sources at any receptor and calculate the overall acoustic impact of all the sources operating at any given scenario. These impacts can be visualized through colour noise contours overlaid on a map; similar to a heat map showing temperature distribution. In addition to procedural guidelines, the study will also include annoyance components recognizing that airports are slightly different than other sources of environmental sounds.

The following section is organized by the community questions Dr. Novak provided responses to. Dr. Novak’s full presentation can be found in Appendix C.

Question 1 – I know some work on noise has been done at Pearson and perhaps they have some algorithms that could be modified to meet our needs. What kinds of algorithms are available already to parse the noise data being gathered, and if there are not any yet, who will produce these and do the data analysis and when will this occur? And how will we provide input to this person?

Dr. Novak noted that Billy Bishop uses the same permanent noise terminals as Pearson (albeit the software may be slightly different). Specifically, these NMTs can quantify noise events confirmed by radar (providing details such as time, position, altitude, call-number, etc...) related to an aircraft, noise events confirmed to be related to a non-aircraft activity, and ambient noise level. At Pearson, airport events are triggered when the monitor registers a noise of 65 dBA, the monitor then either associates the noise

with an aircraft or categorizes it as a non-aircraft event. All other noise below 65 dBA is categorized as “ambient”. Outputs from these monitors can provide a range of comparative reports by time of day, type of noise (aircraft, non-aircraft, ambient) – essentially the ability to dig into more detail exists, it’s more a case of whether that data would be of value to whatever is being examined.

Question 2 - Want to learn more about dBA versus dBZ and whether Airport Noise Reports can report out using these scales?

Dr. Novak explained that the monitors can record two decibel weightings in real time (so the Billy Bishop could record A and Z weights at the same time). dBA is used as an international standard for reporting environmental noise because it correlates most closely to human perception. A weighting is an adjustment of the physical sound pressure to match the frequency response of the human ear so what we report is reflecting of what we actually hear and perceive. He noted that B weights works better for louder sounds, C is best for technical analysis (such as a studio), and Z weights are linear, or unweighted.

Through a logarithmic graph, Dr. Novak explained that the threshold of hearing changes based on the frequency (the equal loudness curve) – at 1000Hz, 0 decibels is the actual threshold for hearing. As the frequency lowers, the sound pressure must be greater for us to perceive the sound. The same thing happens at a higher frequency. Dr. Novak also noted that as sounds get louder, the equal loudness curve shape changes, flattening in the low frequency. So our hearing ability at different frequencies changes with amplitude.

When this (the equal loudness curve) was standardized, the 40-decibel contour was found to correlate best to the levels to human speech. This curve is then inverted and approximated with a parabola to create a correction factor which is the A weighting correction. These curves were developed when technology was analog and there is data to show that there is very good correlation between the parabola and the curve. If at 100Hz and 40 decibels, there’s an adjustment of approximately -19 decibels.

Dr. Novak noted that he is open to setting up a call with Mr. Bowen and Mr. Moore (given his interest and absence at this meeting).

- Mr. Beck inquired whether the curve is the same for any decibel.
- Dr. Novak explained that this is not the case. For instance, the B weighting curve is for a line at 70 decibels. This is why dBB is better for loud noises given that problem noises aren’t usually in the 40 decibel range, however that isn’t used in practice anymore. Unfortunately, standards have compromises; even if there’s a mistake, at least everyone is making the same mistake.
- Mr. Beck noted that through discussions with Mr. Moore the question of dBA versus dBZ is like comparing two different tests. One is a test for hearing aids (dBA) and the other is a test for noise that we experience which is different than a controlled setting. He noted that there are a lot of people in the community that have latched onto the issues with dBA because it suppresses the bass frequencies people have been complaining about.

- Dr. Novak noted that our ears do this as well. He also highlighted that the rattling windows is structural excitation – in essence the window doesn't behave in the same way as an ear and may respond to a low frequency by moving and rattling. This phenomenon is why you hear the rattle but not necessarily the noise that is causing it because our ears are not sensitive to that low frequency – what we hear is the result of the low frequency impacting the window.
- Mr. Beck inquired whether we feel it.
- Dr. Novak noted you can, drawing on an example from Windsor of a low frequency noise people could hear coming from 20 kilometres away. The noise was above the threshold of hearing, but people were concerned because it was shaking their houses.

Question 3 - Want to better understand the noise characteristics of the airport ferry based on the bass rumbling that is produced?

Dr. Novak explained that while low frequency noise is less perceptible (compared to mid-frequency sounds), we can still hear it at sufficiently high amplitudes. The challenge with low-frequency sounds such as those created by the ferry is that the sound energy can travel very long distances, through solid and liquid surfaces, making it challenging to attenuate. Additionally, as described by Ms. Monette there are other factors such as structural excitation causing rattling noises.

Narrow-band low frequency, which Dr. Novak characterizes as the ferry noise, can also be perceived as more noticeable. As a result, NPC-300 penalizes narrow-band sounds by 5db. Narrow band refers to a third of an octave or smaller.

- Ms. Monette noted that over a long period of time she feels the lower sounds as a vibration in her body, and wonders if there have been any studies on vibration caused by noise both at high and low pitches, and the impacts this can have on the body.
- Dr. Novak replied that it can be dangerous to excite organs at their resonant frequency. Most organs have resonant frequencies of 2 Hz up to 80 Hz. The danger is in these low frequencies are often below the threshold of hearing, so in the 2 to 20 Hz range, however the limit of damage is exceptionally loud (even at 20Hz the limit of damage is 140db). He explained that generally, if you can hear the sound it won't have an adverse impact on your health (speaking of structural excitation of the organs) unless it is deafeningly loud. Dr. Novak provided an example of wind buffeting when a car window is opened. This is a good example of a noise that is louder than you perceive it because it is occurring between 15 to 35Hz. In these instances, the sound pressure can exceed 130 decibels - even though we do not perceive it as being that loud, it is loud given that sense of annoyance.
- Mr. Beck reiterated that there may be more questions going forward given general sentiments from the community that there are issues with bass frequencies caused by the airport that are not being picked up in documentation to-date, or not being measured.

- Dr. Novak noted that they are measuring the frequency spectrum of the sources which will allow the propagation models to report changes in frequency due to environmental factors. This allows us to report frequency impacts at different receptors which is not typically in NPC-300, however if it is of interest that is something that could specifically be reported on.
- Mr. Beck and Ms. Monette noted the residents of the waterfront would be interested in those findings.
- Mr. David noted that the study has a considerable annoyance component to quantify that annoyance to better design and implement mitigation.
- Dr. Novak reiterated that the models do account for environmental factors such as reflection and absorption of sound across different surfaces (such as water). He also noted that sound impacts are also individual, each person experiences these sounds differently.
- Mr. Beck inquired whether there are population annoyance statistics.
- Dr. Novak noted he is not aware of any statistics on which frequencies affect which percentage of people. Related to this, Dr. Novak indicated he can circulate a recent research paper dealing with changes in annoyance thresholds to aircraft noise. The study shows that the threshold for tolerating aircraft noise has decreased (people are more easily annoyed by aircraft noise) compared to 30 years ago. Another study showed relating to annoyance that only 14-27% of complaints were attributable to the noise level while 70% were attributed to non-acoustic factors (such as aircraft passing overhead even if most of the time you can't hear it, you just see it). Dr. Novak indicated he could provide a reference for these studies if desired. Dr. Novak added that he is not discounting the fact that people are annoyed and complaining about airports, however the message to the airports (collectively) has to be centred around digging deeper to find the root cause of the annoyance (acoustic and non-acoustic factors alike).
- Ms. Monette added that part of the annoyance relates to the disruption of waterfront activities, as a result of, noise from the airport. Additionally, Ms. Monette noted the early morning and evening disruption caused by the airport that she thought was protected under the City's noise by-law.
- Ms. Homewood clarified that the noise by-law takes effect at 11:00 p.m.
- Mr. Beck noted the noise by-law has not changed in years, and has in some cases been lifted in some areas due to COVID-19.
- Ms. Homewood suggested that prior to the end of the Ground Noise Study, Dr. Novak could come present to the CLC and provide an opportunity for other community group members to join.
- Mr. Beck asked how many people can come to the CLC meetings.
- Ms. Homewood clarified that there is not a limit (other than the capacity of the room), however they can only ask questions through their community representatives.
- Mr. Furneaux noted that depending on when this presentation occurs, if the meeting is held over Zoom then the amount of participants is only limited by how many people can join the Zoom meeting.

M#12-A3 Dr. Novak to provide a reference and links to recent research papers dealing with changes in annoyance thresholds to aircraft noise.

Following the meeting, Dr. Novak a list of recent research on annoyance thresholds to aircraft noise:

- [The influence of acoustical and non-acoustical factors on short-term annoyance due to aircraft noise in the field - The COSMA study” \(Bartels, S., Marki, F., and Muller, U., 2015\).](#) The study shows that mitigating, non-acoustic factors such as noise sensitivity and expectations, skew the dose response curve significantly. In fact, according to the COSMA study 2014 only 13.6% of annoyance was explained by acoustic factors alone
- [The increase of aircraft noise annoyance in communities. Causes and consequences \(Guski, R, 2017\).](#) The number of flights continuing to increase, due to quieter aircraft, noise abatement procedures and operating restrictions. In the same timescale *the number of people that identify themselves as highly annoyed by aviation noise has increased*, partly due to changes in social attitudes.
- [Annoyance from transportation noise: relationships with exposure metrics DNL and DENL and their confidence intervals \(Miedema, H. M. & Oudshoorn, C.G., 2001\).](#)
- [Neighbourhood Environmental Survey. \(Federal Aviation Administration, 2021\).](#) The FAA conducted a neighbourhood environmental survey covering 13 environmental concerns, between Oct 2015 and Sep. 2016, focused on communities around 20 airports. The survey had over 10,000 mail responses and followed up with over 2000 telephone interviews.
- [Survey of Noise Attitudes 2014 Audit \(Civil Aviation Authority, 2017\).](#) Attention to paragraph 5.48.
- [Community tolerance level as a paradigmatic shift in development of dosage-response relationships \(Fidell, S., 2017\).](#)
- [Assessing the Impact of Aircraft in the Vicinity of Major Canadian Airport. \(Sgro, J. A., 2019\).](#)

M#12-A4 Angela Homewood will discuss a future agenda item for the Community Liaison Committee with Gene Cabral to have Colin Novak return prior to the completion of the Ground Noise Study to present.

Question 4 - Measuring the average 1-minute peaks do not reflect the impacts felt by people as it is the duration of the peak that is what can be the most disruptive to people when they sleep. As such, can the format of the data and a template be created for how the data would be summarized in the Ground Noise Study report and shared in advance so that the committee can review? For instance, they've noted in the past that in the case of the ferry horn, Leq-1hr does little to measure the annoyance of that singular event.

Mr. Beck first clarified that in NPC-300 there can be instantaneous impulses up to 80 decibels, which is part of the problem where there are these short, very loud sounds. Dr. Novak discussed that NPC-300 is written to recognize that these sounds will happen

every so often. The sound energy is included in the calculation however if these impulses happen on a more regular basis, there are thresholds given to them. Instead of measuring in dBA, they're measured in dBAI which has a different time weighting that better correlates to the annoyance associated with these events. Dr. Novak reminded the subcommittee that impulsive sounds related to safety (such as horns) are exempt as long as it is appropriate. In short, impulsive sounds are covered differently under NPC-300.

- Mr. Beck clarified that the impulsive noise in question is more-so associated with the ferry flap.
- Dr. Novak noted that noise would be considered impulsive, would need to be measured in dBAI, and would require quantifying its usual occurrence. To his understanding this noise source differs based on the maintenance of the rubber strip.

Questions 5 and 6 - Given that it is currently very quiet near the airport compared to normal, is this a good opportunity to calibrate the ground noise model? For instance, an ongoing concern was identified about the use of a ground-based model in a marine environment discussing how the ground may absorb 10 dB whereas the water may only absorb 1dB. As such, has there been any thought to test at different frequencies of how noise travels? Is there any thought to consider the effect of noise bouncing off concrete buildings along the waterfront?

Dr. Novak explained that the model will account for the properties of these surfaces, which is part of the ISO standard. He noted that these methods and the science has existed for a while, however now with computers we are better able to apply these coefficients.

- Ms. Monette inquired how much reflection there is based on different materials.
- Dr. Novak noted that if an absorption coefficient is 0, the surface is purely reflective. The outcome of a reflection can actually be an increase in sound level (the direct acoustic energy and the reflected energy).
- Ms. Monette expanded on her question inquiring whether there are materials, building orientations, and building design features (such as balconies) that impact sound reflection and absorption.
- Dr. Novak replied that yes, it is possible, however the model does not account for the detailed surface of the structure. In essence, it treats all structures as a plain surface.

Question 7 - Can the model measure noise at different frequencies based off noise emitted from different runway offsets and heights, if you were on a boat in the lake and if you were in the community walking or at home on your condo balcony?

- Mr. Beck wished to clarify Dr. Novak's comment about noise being able to increase.
- Dr. Novak elaborated that it depends on the scenario. Depending on the incidence of the angle. Depending on where the receiver is located, the sound can pass the receiver, then reflect back in the reverberant field, resulting in a

theoretical increase of 3 decibels. The model accommodates for this phenomenon.

- Mr. Beck noted that this is exactly the experience people in YQNA have been describing. He also noted that one thing that has not been assessed is that folks in towers are getting noise directly from the plane as it flies by as well as the reflected noise from the water.
- Dr. Novak clarified that the 3 decibels are the maximum, providing the example that when you double 50 decibels it is actually 53 decibels. It won't actually be 3 decibels because a reflective sound is travelling farther than direct energy, and due to the incidence of the angle there will be energy loss in the reflection at the water. The sound will however still be louder than if it was just the direct sound alone. Dr. Novak reminded the subcommittee that the Ground Noise Study does not include any sounds experienced once aircraft leave the ground.
- Mr. Beck noted that he was inquiring how the airborne aircraft noise would be stripped out of the data.
- Dr. Novak explained that the team will manually listen to all data to remove aircraft noise. This can be assisted through flight information which can be timestamped to get pretty close, then the data is removed. For instance, if the aircraft impacts for 90 seconds that time is removed so it does not contaminate the ambient sound – NPC-300 requires the study to do this.
- Mr. Beck and Ms. Monette raised that it would have to be another study that looks at the aircraft noise and its impact on the environment.
- Dr. Novak noted that there are really no protocols for a study like that, which is why the NEF contours are used.
- Ms. Monette noted that the issue is the NEF does not cover all the things the subcommittee has highlighted through this discussion.
- Mr. Beck noted that he has spoken with Ms. Homewood about a need to better understand NEF, devoting an entire meeting to the topic.
- Dr. Novak noted that although NEF are representing noise exposure and annoyance to a degree, they should not be used to correlate to sound levels. They are a municipal planning tool and they should not be used for anything else.

Question 8 - Restate the two components to the Ground Noise Study – the source noise observations (measured at the source of various noise emitters from the airport while on the ground) which feeds into the noise model, and the background noise which measures the background noise at various points around the airport. For the ambient noise measurement, this requires the installation of a temporary noise monitor for at least 1 week to measure the hum. A member of the committee, expressed frustration that there are no monitors on tall buildings to understand the noise profiles of aircrafts as they fly by.

Dr. Novak in closing wished to emphasize the ground sources given that the aircraft noise when it's in the air is what it is. However, there is a greater potential to deal with noise generated on the ground to help inform which strategies would be most cost effective to mitigating impacts. Dr. Novak noted there are three approaches to noise

mitigation: controlling sound at the source, redirecting or absorbing sound, and controlling sound at the receiver. Controlling sound at the receiver would be beyond the scope of the airport, entailing standards and regulation related to construction, and even then, these would not improve the condition of people when they are outside or have windows or doors open.

Dr. Novak also noted that it is important to consider the improvement you get as a result of mitigation measures. A 1 or 2 decibel reduction is not perceivable – noticeable change only comes into effect when the change is greater than 3 decibels, it is more noticeable when there is a 5-10 decibel change. So it does become a question of whether the mitigation effort is worth it or whether those funds could be directed elsewhere.

- Ms. Monette noted that the change in flight paths into Billy Bishop seem to be working and that she can tell when come in slower and land more gently, that overall, it is less noisy.
- Dr. Novak noted that a gentler slope, less flap, less thrust, and fewer corrections all contribute to a quieter experience, however these flight paths cannot always be achieved.
- Ms. Homewood noted that the new flight paths came in at the end of 2019 as part of the Master Plan.
- There was a general discussion that the experience of these new flight paths may differ once normal airport operations resume.
- Mr. Beck indicated that he thought a longer, gradual descent would pose more issues as it has the aircraft descending closer to the water longer.
- Mr. MacWilliam and Dr. Novak replied that by coasting down into the airport with less thrust and flap, this cuts down on the noise created by the aircraft considerably.

6. Business Arising

Mr. Furneaux inquired whether there were any additional items to address prior to adjourning.

- Mr. Beck flagged that it would be good to discuss ICAO lateral descent and takeoff threshold points and how aircraft are certified to that.
- Ms. Homewood noted that she would have to ask Gene for a contact to discuss ICAO.
- Mr. MacWilliam noted that these are aircraft certification standards requiring someone from the aircraft manufacturing world to come speak, and that comes together with NEFs because that is how they are developed.
- Mr. Beck posed the question of which should be discussed first.
- Mr. MacWilliam indicated that he feels it would be better to look at ICAO first then NEF once the Tripartite Agreement is being discussed again. Mr. Beck agreed.
- Mr. Furneaux noted that he would circulate a couple of potential meeting dates for the next subcommittee meeting by email following the meeting.

M#12-A4 Alexander Furneaux will circulate potential meeting dates for the next subcommittee meeting to be held in late April/early May.

- Mr. Beck noted we should discuss with Ms. Homewood the topics for the next meeting, suggesting the ICAO discussion could be next meeting.
- Ms. Homewood agreed it would be important to have a discussion to know what the agenda would be so she can reach out through Gene's contacts. Ms. Homewood suggested Mr. Beck send an email with the items he feels the subcommittee needs to know so she can identify the right person to come discuss this topic.

M#12-A5 Hal Beck to provide Angela Homewood with a list of questions related to ICAO to inform contacting a representative to speak at a future subcommittee meeting on this topic.

- Ms. Monette reminded PortsToronto staff to reach out to her when they are preparing to install the temporary noise monitors as she can help provide assistance where possible.
- Mr. David noted that by the next meeting PortsToronto should have a fairly good sense of what the airport ramp up will look like.

The meeting adjourned at 9:30 p.m.

Following the meeting additional comments and questions were received from members of the subcommittee. These comments and questions are included in **Appendix D**.