

# Using Virtual Sound Demonstrations to Demonstrate Changes in Noise to Communities

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# Noise Impact Assessments in Ontario

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Numerically based reports - based on sound level measurements and noise modelling.

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Evaluated against a hard limit (e.g. NPC-300 guideline levels) or a change in noise levels from the current ambient or objective.

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Noise levels often described using comparisons (e.g. vacuum at 70 dBA, 120 dBA for jet aircraft)

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Changes in noise levels described as “significant” or “insignificant” or in terms of community response.

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Uses mostly “Leq” or continuous equivalent sound level as a metric – for good reason.



# Terminology & Auralization

**Auralization** – a procedure designed to model and simulate an acoustic scenario for a listener.

Auralization

A technical word – the meaning is not easily inferred



Sound  
Demonstration

Friendly term – the meaning can be more readily inferred.

**The goal of an auralization for community consultation:**

To help stakeholders make an informed decision about how they feel about the predicted changes in **sound level** and **sound character**.



# Project Overview – Ontario Line

## Ontario Line

### ONTARIO LINE

- Elevated
- Joint OL-GO Corridor
- Underground
- Tunnel Portal
- Bridge
- Maintenance & Storage Facility
- Existing Subway
- In Delivery Line 5 Eglinton
- Existing GO Rail
- Proposed GO Rail Station
- ⊙ Interchange Stations

Ontario Line North

Lakeshore East Joint Corridor

- What noise related challenges does it face?
- Standard technical reports of the predicted noise impacts are difficult to interpret and understand how it will sound.

# Community Concerns

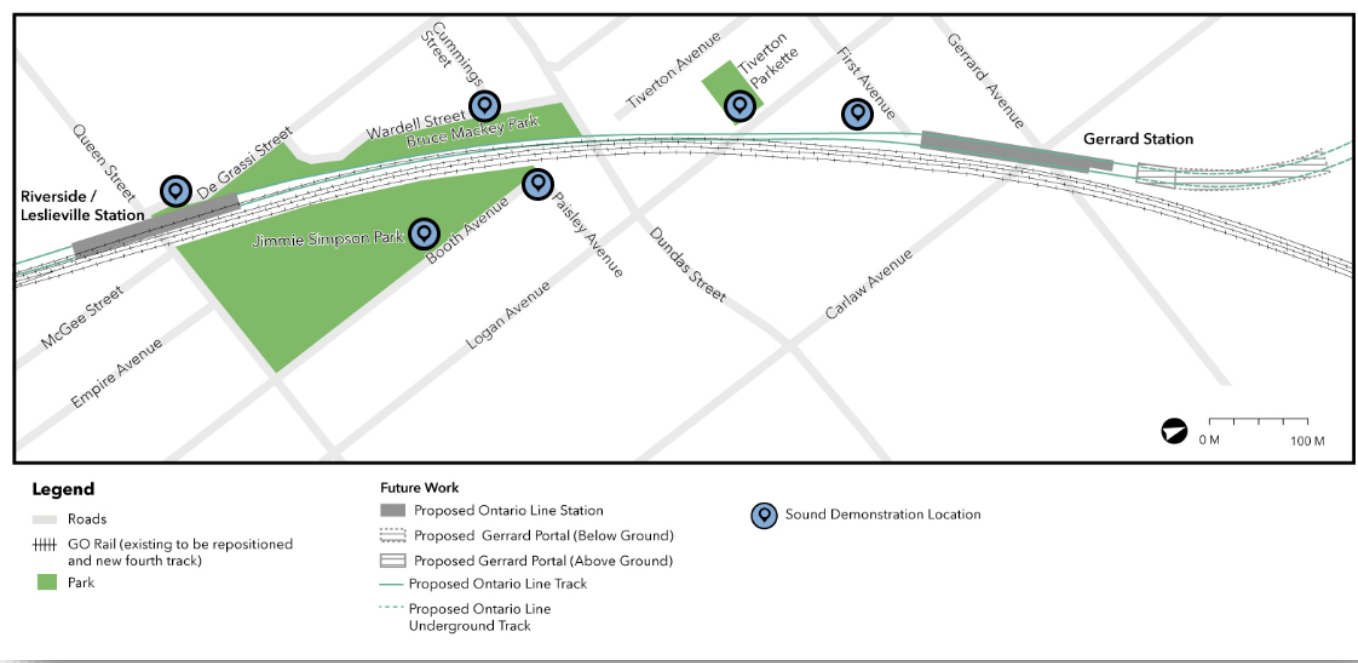
- Increase in train pass-bys
- New types of train pass-bys
- Increased number of tracks
- Changes in track alignment (closer to homes)



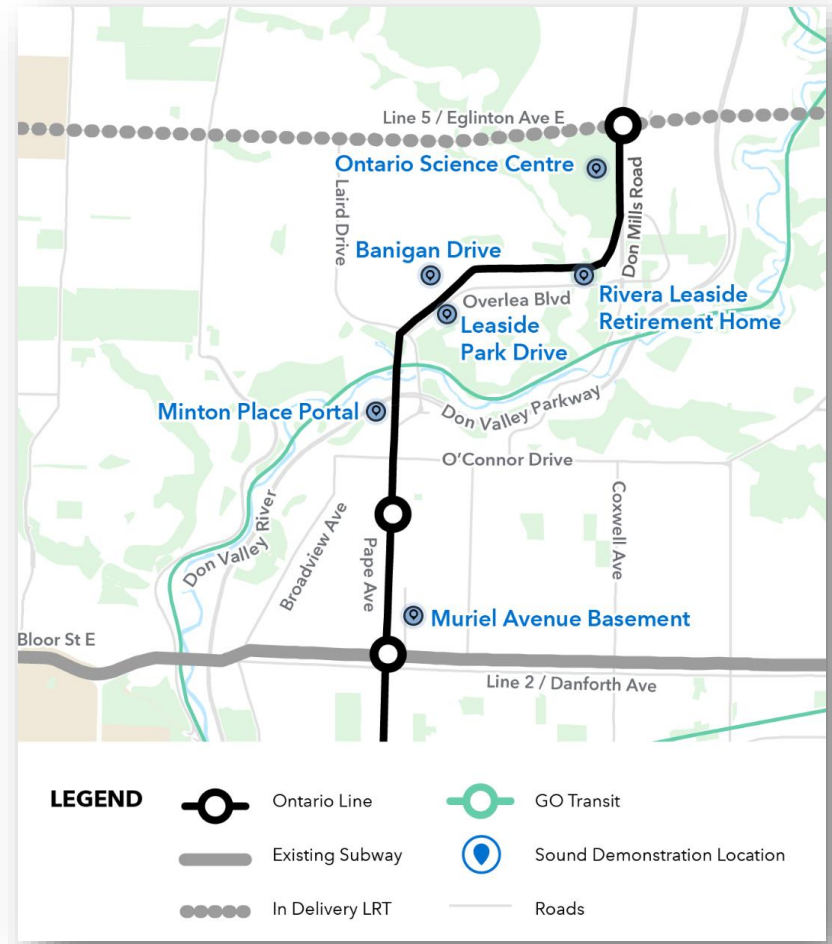
# Sound Demonstration Locations

## Lakeshore East Joint Corridor – 6 Sound Demonstrations

- Queen and Degrassi Street
- Jimmie Simpson Park
- Bruce Mackey Park
- Tiverton Parkette
- First Avenue
- Booth and Paisley Avenue



## Ontario North Section – 6 Sound Demonstration



- Leaside Park Drive
- Banigan Drive
- Rivera Leaside Retirement Home
- Ontario Science Centre
- Minton Place
- Muriel Avenue Basement



# Sound Recordings

## Synchronised:

- Sound Level Meter
  - Ambisonic Microphone
  - High resolution camera
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- Ambient sound recordings  
(avoiding busiest and quietest times of day.)
    - These also included GO Trains
  - New Train Model doesn't exist yet
    - Proxy Ontario Line trains sound recordings at range of distances from the pass-by. – Used a similar vehicle from the Waterloo LRT line.



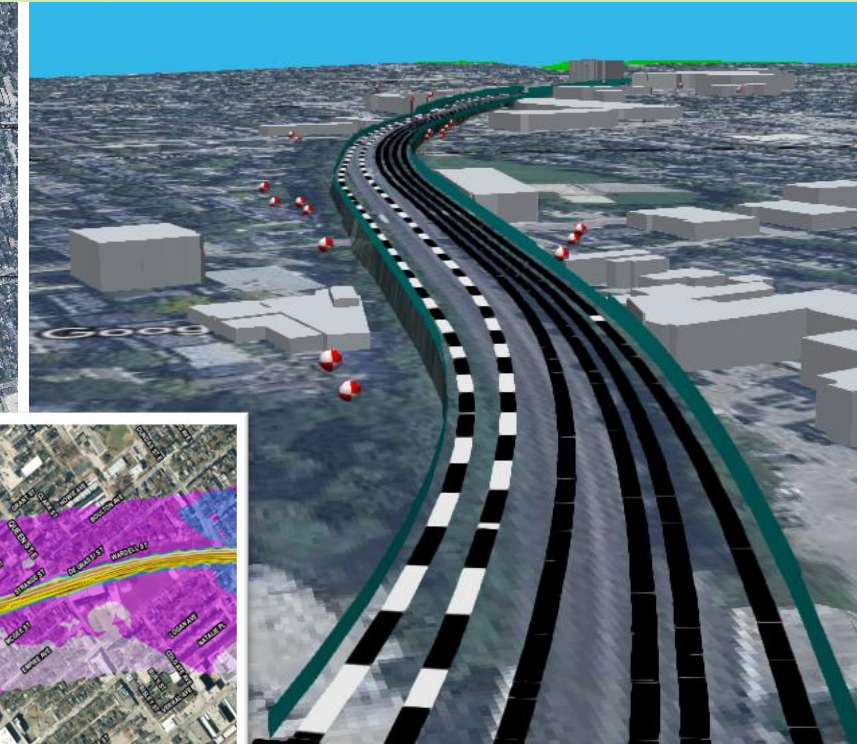
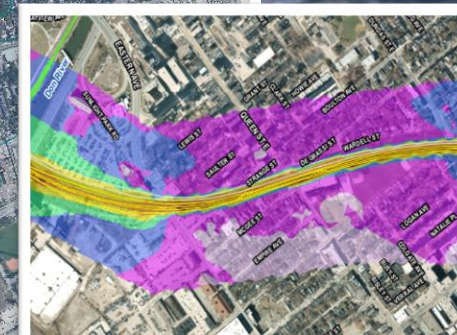
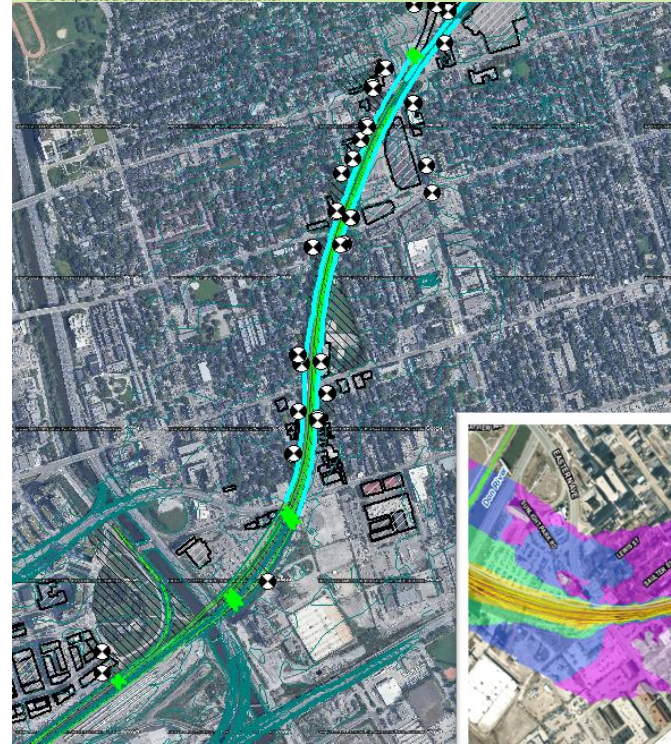
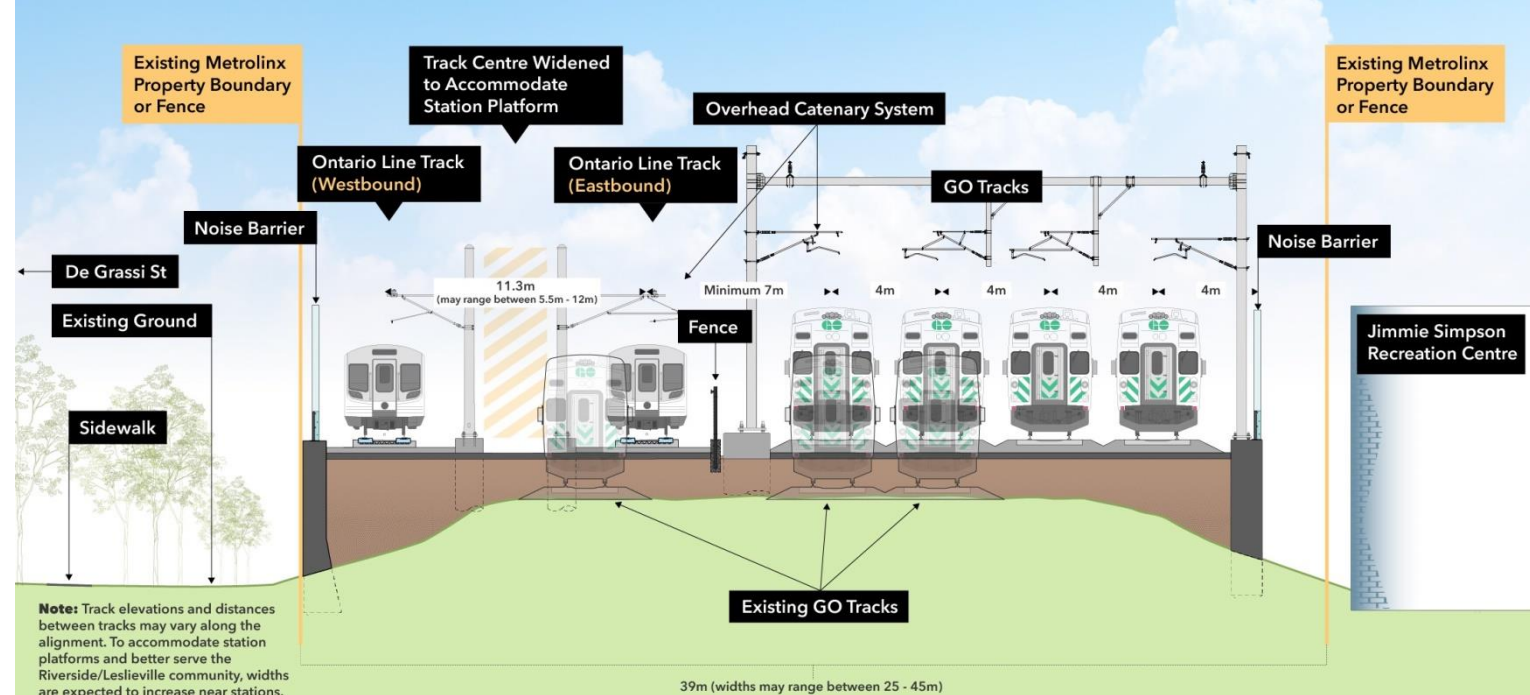


# Noise Modelling

- For noise impact assessment the predicted levels were assessed for:
  - Existing scenario
  - Project without barrier
  - Project with barrier

The predicted level differences are what we want people to understand from listening to the auralizations.

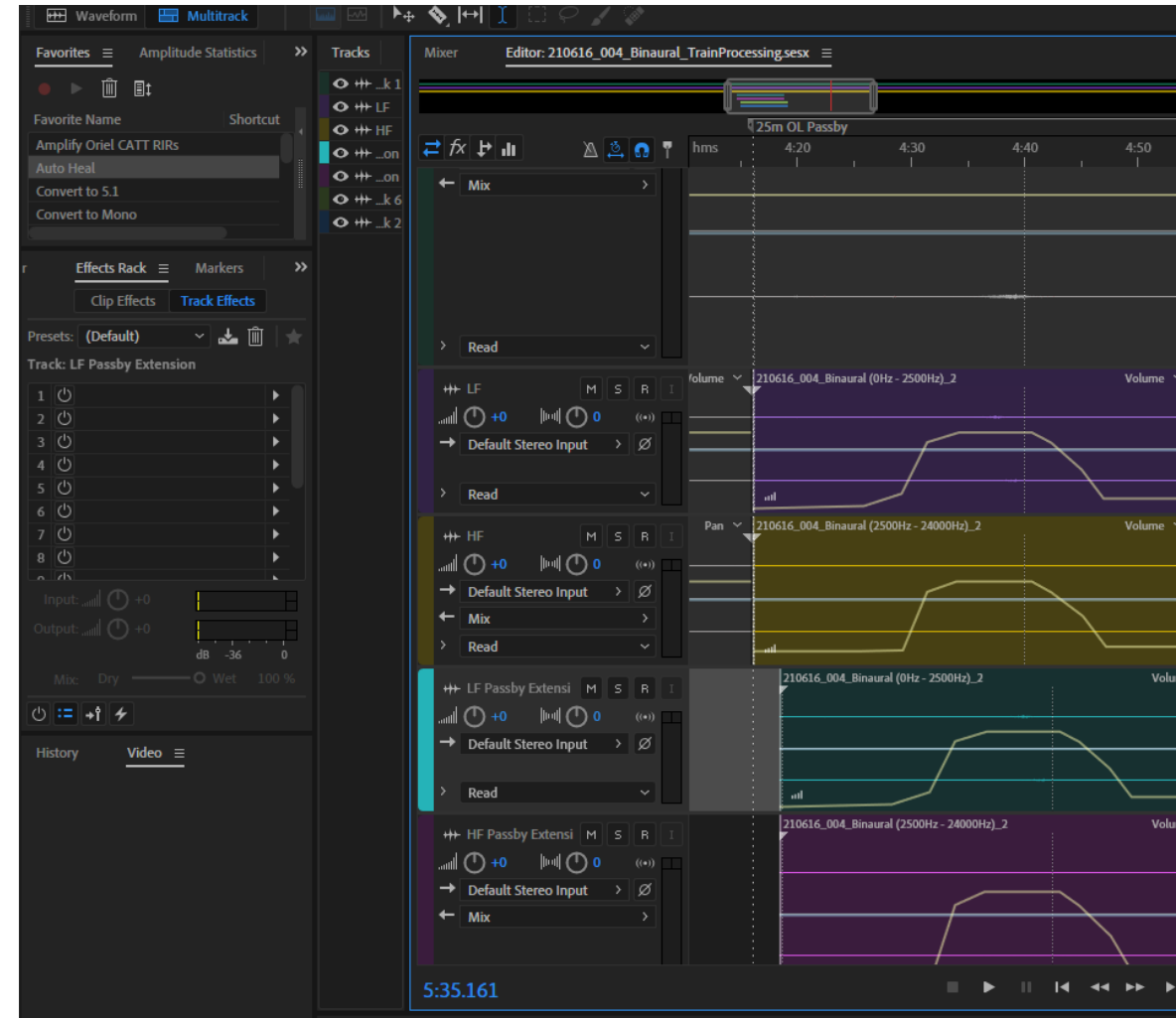
As well as differences in sound character





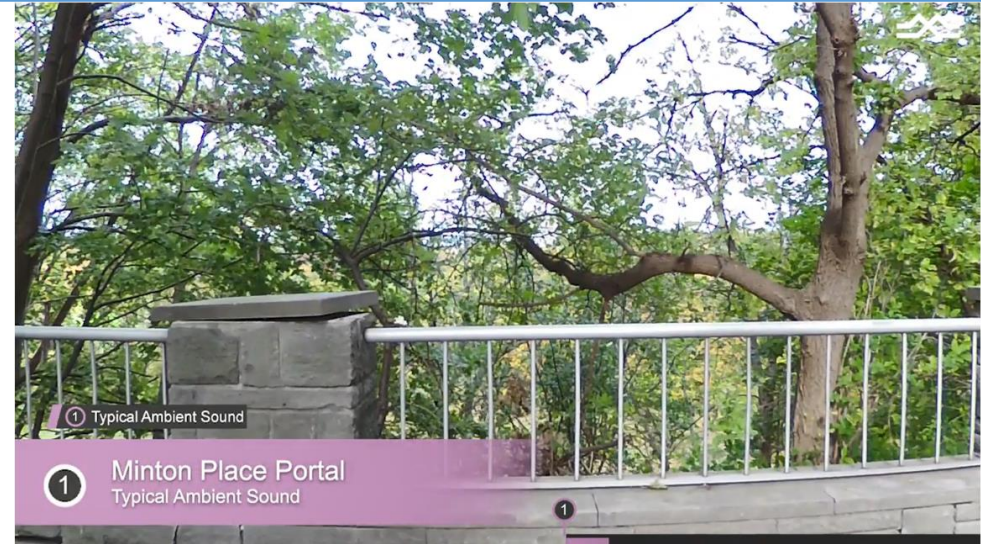
# Audio Editing and Spatial Processing

- Train recordings corrected to the represented listening distance and ambisonically panned as required to match the visual.
- With and with barrier insertion loss added



# Visualization

Existing



Future





# Visualization

Existing



Future





# Website Overview



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Welcomes user to the site and provides a **short narrated animation** to explain **what a sound demonstration is** and how to use the site

# Website Overview



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Main area for viewing the sound demonstrations at 12 locations

# Website Overview



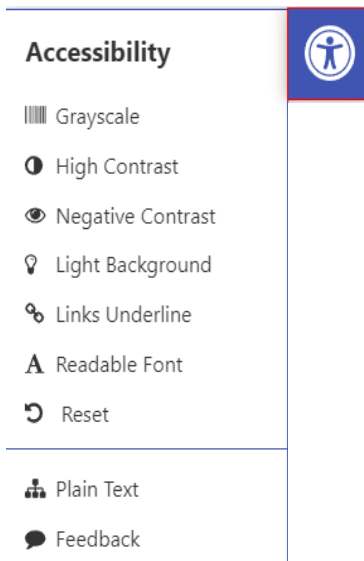
Users encourages to feedback about the project based on what they have understood



# Web-Tool Overview

- User Considerations
  - Simple user interface
  - Works on all major browsers and devices, handheld and desktop.
  - Accessibility
    - Handles window resizing and different aspect ratios
- Testing and challenges
  - Tested on different browsers Chrome, Edge, FireFox, on many devices

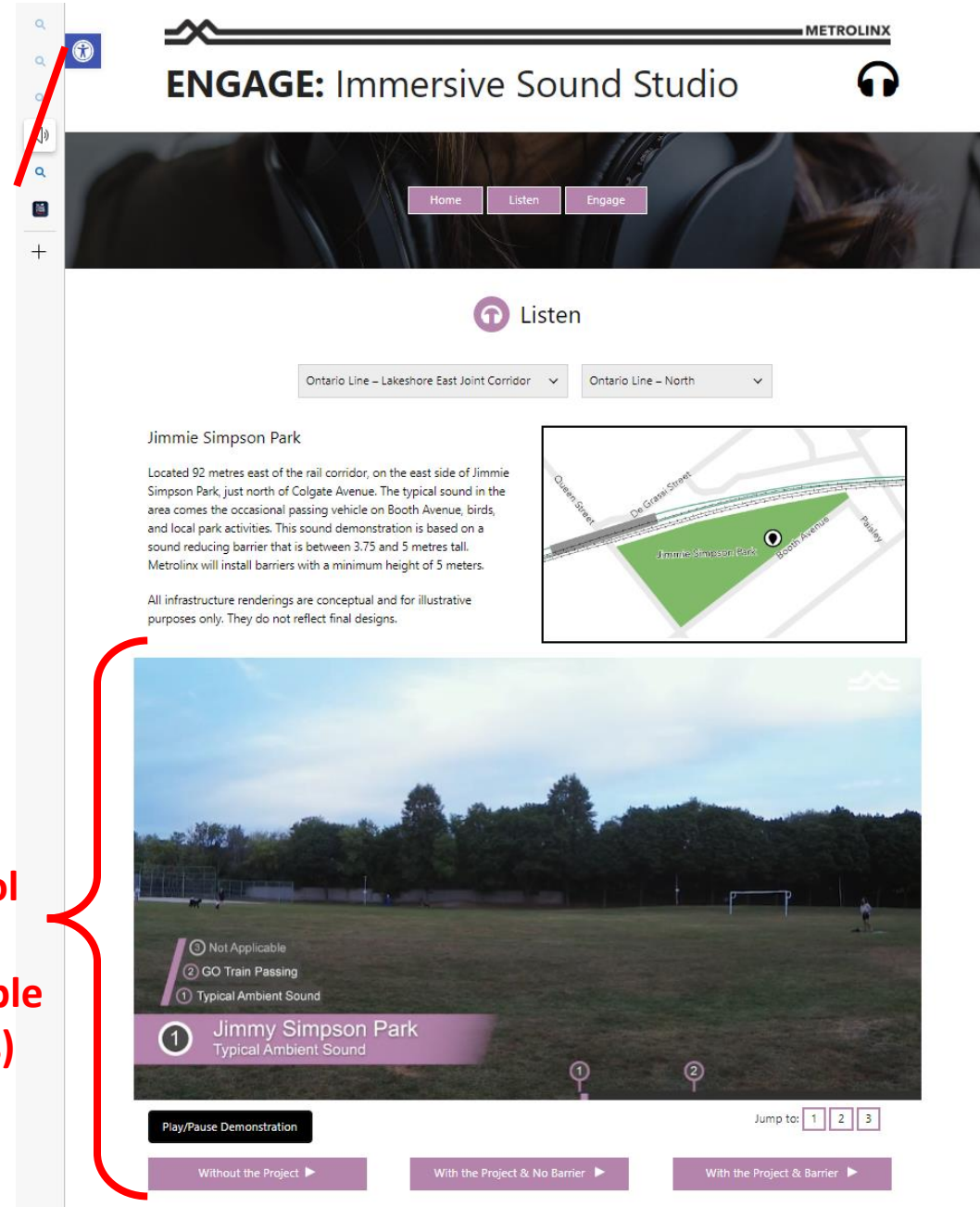
**Accessibility Options for Blind or Visually Impaired, colour-blind users**



**Accessibility**

- Grayscale
- High Contrast
- Negative Contrast
- Light Background
- Links Underline
- Readable Font
- Reset
- Plain Text
- Feedback

**Main Web-Tool Area (Also compatible with e-readers)**



**ENGAGE: Immersive Sound Studio**

Home Listen Engage

Listen

Ontario Line - Lakeshore East Joint Corridor Ontario Line - North

**Jimmie Simpson Park**

Located 92 metres east of the rail corridor, on the east side of Jimmie Simpson Park, just north of Colgate Avenue. The typical sound in the area comes from the occasional passing vehicle on Booth Avenue, birds, and local park activities. This sound demonstration is based on a sound reducing barrier that is between 3.75 and 5 metres tall. Metrolinx will install barriers with a minimum height of 5 metres.

All infrastructure renderings are conceptual and for illustrative purposes only. They do not reflect final designs.

Not Applicable  
GO Train Passing  
Typical Ambient Sound

**1 Jimmy Simpson Park**  
Typical Ambient Sound

Play/Pause Demonstration

Jump to: 1 2 3

Without the Project With the Project & No Barrier With the Project & Barrier

## Web-Tool

- Capable of switching instantly between existing, with project and with project and mitigation;
- Able to jump forward and backwards to key moments while keeping audio/video streams in sync;



Play/Pause Demonstration

Jump to:  1  2  3



Listen to how we predict the location to sound relative to the other options and with the Ontario Line but without the benefits of a sound level reducing barrier.



# Sound Demonstration Example

All infrastructure renderings are conceptual and for illustrative purposes only. They do not reflect final designs.



Play/Pause Demonstration

Jump to:

Without Project ▶

With the Project & No Barrier ▶

With the Project & Barrier ▶





# Lessons Learned/Limitations

- Difficult to control audio quality and user experience with an online platform (headphones, listening device);
  - For future events – in person sound demos are recommended, as calibrated, high-quality headphones can be used. Discussions can be had to supplement the demos.
- Single pass-by sound demos do not account for increased sound events;
  - Can create longer sound demonstrations with multiple pass-bys.
- Costly – likely not practical for smaller projects at this time
- General scepticism – may feel the demonstrations are too optimistic
  - Demos ideally used to support personal interactions with stakeholders, not avoid them.

# Conclusions

- Sounds demonstrations are a useful tool that can be used to supplement and add to noise impact assessments, especially for larger projects;
- Well received by the transport authority and stakeholders;
- We want to have the demonstrations in-person in the future- for a higher quality user experience for stakeholders;
- Continue to improve the sound demonstration concept based on public feedback.

# Questions?

## Thank you!

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