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### Measuring concept: Noise impact in the neighborhood due to operation of VIMC

Dear Andrew.

Vancouver Island Motorsports Circuit (VIMC) plans sound level measurements to determine appropriate sound level limits for the neighborhood. The community and its acoustic consultants from Navcon Engineering as well as the neighbours should be involved in this process. The main objective of the measurements is to find a suitable solution for the venue and the people in the area.

The whole process is subdivided into two steps:

- 1) the actual measurements
- 2) the determination of sound level limits from the measurement results and a monitoring concept to ensure, that future operation of the venue stays within these limits

In the following, we would like to suggest a measuring concept for VIMC.

## 1. Measurements

### **Who is involved in the process**

The measurements should be carried out in coordination with the municipality and the neighbors.

The actual measurements should be checked and observed by engineers in the neighborhood and also on the circuit.

### **Operation of the venue**

Operation of the circuit during measurements should represent a maximum operation regarding number and type of vehicles (worst case operation!). All recently introduced mitigation measures will be taken into account (no sports mode, no obtrusive race vehicles etc.).

Operation should be carried out as follows:

- Minimum number of 5 stints of 20 minutes duration each with maximum operation on the circuit.
- In between stints a pause of 40 minutes to change measurement location in the neighborhood
- Free driving w/o instructor car
- Proper weather conditions (dry track)

### **Measurement instruments and weather conditions**

All sound level meters, microphones and calibrators must be of class 1 (IEC 61672-1). The devices should record the average sound level  $L_{Aeq}$  and the maximum level  $L_{AFmax}$  with a time resolution of 1 second.

On the day the of measurement there should be no precipitation and a dry circuit for optimum driving conditions. The ground should neither be frozen nor covered with snow.

### **Measurement points**

Sound measurements are carried out parallel at trackside and in the neighborhood.

The main trackside microphone should be positioned at a suitable position at the first third of the start/ finish straight with a distance of 15 m to the driving line. A second trackside microphone should be positioned at a similar spot at one of the other straights in order to ensure the vehicles go "full throttle" there also. The position of the second microphone can be moved to a different straight from stint to stint.

The choice of the measurement position in the neighborhood depends strongly on weather resp. wind direction. In order to guarantee optimum sound propagation a steady downwind situation (wind going from circuit to receiver) is essential. If the wind direction does not allow measurements at specific dwellings (see our report 6154.1G01-17 of 2017/09/26), the measurements must be carried out at suitable "substitute measurement points" regarding sound propagation conditions (downwind, similar vegetation) and distance to the circuit.

The measurements should be carried out at least at three measurement points in the neighborhood.

### Duration of measurements

The main measurement instruments at trackside should be running non-stop from the beginning of operation until the end including pauses. The second trackside measurement instruments will be relocated from stint to stint as needed.

The measurements in the neighborhood should be carried out during the stints (20 minutes) with suitable downwind conditions.

After each stint, the meter should run for an additional 10 minutes to record the actual ambient noise without circuit operation.

## 2. Determination of sound level limits and noise monitoring

### Determination of sound level limits

As the operation during the measurements should represent a worst case operation of the circuit, it is senseful to derive sound level limits out of the measurement results.

For that, a suitable period of time (->duration of measurements) has to be evaluated regarding the average sound level  $L_{Aeq}$  and the maximum level  $L_{AFmax}$ . The readings for  $L_{Aeq}$  and  $L_{AFmax}$  then can be set as limits in the neighborhood and also as trackside reference values.

### Future noise monitoring

To ensure and prove towards municipality, that operation is within these limits, VIMC agreed to install a permanent noise monitoring system.

VIMC is planning permanent noise monitoring at track side but also directly in the neighborhood. Since measurements in the neighborhood can be superimposed by other sound sources we like to point out that it can be very time-consuming to subsequently interpret and evaluate the measurement data with regard to the sound exposure actually caused by VIMC.

So, the basis of a permanent noise monitoring system is to measure the sound emission at trackside, to ensure that limits in the neighborhood are not exceeded. Permanent measurements in the neighborhood can complement the monitoring if necessary. This noise monitoring principle is implemented at various facilities and especially at motorsports venues.

For further details, please see our report 6154.1G01-17 of 2017/09/26, chapter 10.

Yours sincerely

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