# Environmental Noise Impact Study

# Villalago Residences

## Proposed Residential Townhouse Development

Highway 50 and 5 Sideroad
Town of Caledon

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Project: 116-0170

Prepared for

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# Environmental Noise Impact Study

# Villalago Residences

## Proposed Residential Townhouse Development

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## 1.0 PURPOSE

Valcoustics Canada Ltd. (VCL) previously prepared a Transportation Noise Study dated May 27, 2016 in support of the re-zoning application (RZ 16-06 - 21T-16-003C) for the proposed residential development located near Highway 50 and 5 Sideroad in the Town of Caledon (Bolton). The purpose was to assess the potential impact of transportation source noise (road and rail traffic) on the subject site and determine the appropriate mitigation measures required to meet the applicable Ministry of the Environment and Climate Change (MOE) noise guideline limits.

This report updates the previous study based on changes to the site plan, and also includes an assessment of the noise impact due to the various surrounding stationary noise sources.

## 2.0 THE SITE AND SURROUNDING AREA

### 2.1 SITE LOCATION

The site is located at the southeast corner of the intersection of Highway 50 at 5 Sideroad in the Town of Caledon.

The Bolton South Hill Land Use Plan shows the northern portion of the site designated for high density residential and the southern part of the site for mixed low/medium density residential. Appendix A shows the Bolton South Hill Land Use Plan.

The site is bounded by:

- Existing commercial uses to the north (Queensgate Commercial Plaza);
- Landsbridge Street and existing residential uses, with existing residential uses beyond, to the east;
- the Canadian Pacific Railway (CPR) MacTier Subdivision, with the existing Montera Lumber Mill and a vacant retail/office building beyond, to the south; and

- Highway 50/Queen Street South to the west, with the existing Husky Injection Moulding Systems Ltd. Facility as well as other industrial facilities beyond, to the west.

Note that 5 Sideroad will be eliminated as part of the development.

A Key Plan is included as Figure 1. The study is based on the Site Plan prepared by One Riser Designs dated March 21, 2017 and the Preliminary Grading Plan prepared by Rand Engineering Corporation dated March 2017. The site plan is included as Figure 2.

### 2.2 PROPOSED DEVELOPMENT SITE

The proposed development consists of eighteen three-storey residential townhouse blocks, four semi-detached dwellings and one single-family dwelling.

There will be at-grade outdoor amenity areas at the following locations:

- rear yards in between Blocks 6 and 18;
- rear yards in between the semi-detached dwellings;
- a rear yard on the south side of the single family dwelling; and
- a private amenity area (common to the development) to the south of Block 17.

At all other Blocks, the outdoor amenity area will be in the form of a second storey raised deck (balconies). The decks will be less than 4 m in depth.

Note, the east side of Blocks 1 to 5, 7 and 8; the west sides of Blocks 13 to 17 and the areas in between Blocks 9, 10, 11 and 12 are the front yards and have not been designed as outdoor amenity areas.

## 3.0 NOISE SOURCES

### 3.1 TRANSPORTATION NOISE SOURCES

The primary transportation noise sources with potential to impact the site are road traffic on Highway 50 and rail traffic on the CPR MacTier Subdivision. As mentioned above, 5 Sideroad will be closed in the future, and traffic volumes on other surrounding roadways are minor compared to Highway 50 and have therefore not been considered.

Road and rail traffic data correspondence are included as Appendix B.

#### 3.1.1 Road Traffic

Existing (2015) and ultimate road traffic volumes for Highway 50 were obtained from the Region of Peel. The data contained day/night split, truck percentages and posted speed.

Note, the grade of Highway 50 is elevated relative to the site, as the highway overpasses the railway line.

The road traffic data is shown in Table 1A.

### 3.1.2 Rail Traffic

CPR rail traffic for the MacTier Subdivision applicable to the year 2016 was obtained directly from CPR. The CPR rail traffic data was escalated to the year 2037 design condition at a rate of 2.5% compounded annually (20-year projection). This extrapolation period was used to be consistent with the Town of Caledon policy for escalation of road traffic volumes.

The rail traffic data is summarized in Table 1B.

The CPR MacTier Subdivision is classified as a Principal Main Line. Rail activity includes freight traffic only. Current trackage at this point consists of two mainline tracks.

## 3.2 STATIONARY SOURCES

There are several industrial/commercial establishments in the vicinity of the site. The facilities of potential concern are:

- Queensgate Plaza to the north, located at 1 Queensgate Boulevard;
- Monterra Lumber Mills Ltd. to the south, located at 12833 Highway 50; and
- Husky Injection Molding Systems Ltd. to the west, located at 500 Queen St S.

Figure 1 shows the locations of the above stationary sources.

Other commercial or industrial sources are far enough removed that significant noise impact would not be expected. Thus, other facilities have not been considered further as part of this study.

### 3.2.1 Queensgate Plaza

Queensgate Plaza is a commercial plaza containing a Shoppers Drug Mart and several smaller retail establishments.

The main noise sources at the plaza include various rooftop mechanical equipment as well as truck movements and idling at the Shoppers Drug Mart loading area on the south side of the building. Sound data for the rooftop equipment were taken from measurements done by VCL on July 20, 2016. Information on truck activities were based on observations made on site, as well as additional information provided by Shoppers Drug Mart.

The noise assessment for Queensgate Plaza is described further in Section 5.2 below.

### 3.2.2 Husky Injection Molding Systems Ltd.

Husky Injection Molding Systems Ltd. (Husky) is an injection molding assembly and refurbishing facility. The facility has an Environmental Compliance Approval (ECA) number 4436-A4CMWQ (dated December 11, 2015). An AAR was prepared as part of the application. It is understood, based on communications with Husky, that an acoustic model (using the CadnaA software package) was prepared for the facility as part of the application.

Initial communications with Husky occurred, at the facility, on June 16, 2016. Subsequently, Husky requested a non-disclosure agreement be signed. The intent was that the Husky acoustic model would be provided for use in the assessment of the noise impact at the subject site. However, after the initial communications, and several months of waiting, Husky indicated the acoustic model

would not be provided. Husky indicated they would only provide the Acoustic Assessment Summary Table from the AAR. (It is noted that the Husky ECA Section 5.3 requires Husky to make the Acoustic Assessment Summary Table available to any person either by posting on the internet or having it available at the facility). The Acoustic Assessment Summary Table did not contain enough information to make any substantial conclusions about the noise impact at the subject site.

Thus, to assess the noise impact from the Husky operations, long term sound monitoring was done. The measurements and results are discussed further in Section 5.3.

### 3.2.3 Monterra Lumber Mills Ltd.

The Monterra Lumber Mills facility (Monterra) processes spruce/pine/fur lumber products for industrial applications. Final products include furring strips and studs. The facility has a Certificate of Approval (CofA) Number 2978-58NL5Q (dated March 28, 2008), under Section 9 of the Environmental Protection Act.

Noise emissions from Monterra were assessed as part of the CofA application process through the MOE. This was documented in an AAR dated June 17, 2005 prepared for the facility (Reference 4). The AAR assessed the noise impact from the facility onto the existing residential dwellings on the west side of Landsbridge Street, to the southeast of the subject site. These residential dwellings are located closer to the Monterra Mill facility than the proposed dwellings on the subject site.

The AAR concludes that, with the addition of some physical mitigation measures, the noise impact from the facility would comply with the MOE guideline limits at all existing residential dwellings. Thus, since, the proposed dwellings are located farther from the noise sources at Monterra than the existing residences, the noise guidelines would also be expected to be met at the subject site.

Notwithstanding the above, a more detailed assessment was done using the information presented in the AAR. The assessment is discussed further in Section 5.4.

## 4.0 ROAD AND RAIL NOISE IMPACT ASSESSMENT

### 4.1 TRANSPORTATION NOISE CRITERIA

### 4.1.1 MOE

The applicable noise guidelines for new residential development are those in MOE Publication NPC-300, *"Environmental Noise Guideline, Stationary and Transportation Sources - Approval and Planning"*.

The environmental noise guidelines of the MOE, as provided in Publication NPC-300, are discussed briefly below and summarized in Appendix C.

#### 4.1.1.1 Architectural Elements

In the daytime, the indoor criterion for road noise is $L_{eq\ Day}$ (1) of 45 dBA for sensitive spaces such as living/dining rooms, dens and bedrooms. At night, the indoor criterion for road noise is $L_{eq\ Night}$ (2) of 45 dBA for sensitive spaces such as living/dining rooms and dens and 40 dBA for bedrooms.

(1) $L_{eq\ Day}$ - 16-hour energy-equivalent continuous sound level (0700-2300 hours).
(2) $L_{eq\ Night}$ - 8-hour energy-equivalent continuous sound level (2300-0700 hours).

The architectural design of the building envelope (walls, windows, etc.) must provide adequate sound isolation to achieve these indoor sound exposure limits, based on the applicable outdoor sound exposure on the facades.

4.1.1.2 Ventilation

In accordance with the MOE noise guideline for road traffic sources, if the daytime sound level ($L_{eq, Day}$), at the exterior face of a noise sensitive window is greater than 65 dBA, means must be provided so that windows can be kept closed for noise control purposes and central air conditioning is required. For daytime sound levels between 56 dBA and 65 dBA inclusive, there need only be the provision for adding air conditioning at a later date. A warning clause advising the occupant of the potential interference with some activities is also required. At nighttime, air conditioning would be required when the sound level exceeds 60 dBA ($L_{eq\ Night}$) at a noise sensitive window (provision for adding air conditioning is required when greater than 50 dBA).

4.1.1.3 Outdoors

For Outdoor Living Areas (OLA's), the guideline is 55 dBA $L_{eq\ Day}$ (0700 to 2300 hours), with an excess not exceeding 5 dBA considered acceptable if it is technically not practicable to achieve the 55 dBA objective, providing warning clauses are registered on title. Note that for road traffic sources, a balcony is not considered an OLA, unless it is the only OLA for the occupant and it is:

- at least 4 m in depth; and
- unenclosed.

### 4.1.2 Region of Peel

The Region of Peel guidelines are essentially the same as the MOE guidelines except that the nighttime level for triggering the air conditioning requirement is 1 dBA more stringent (i.e., lower) than the levels specified by the MOE – i.e., mandatory air conditioning for nighttime sound exposures of 60 dBA or greater, and the provision for adding air conditioning for levels between 51 to 59 dBA inclusive.

A maximum desirable sound barrier height of 4 m (relative to roadway centreline) is indicated with a maximum acoustic fence component height of 2.4 m, although a height of no more than 2.0 m is preferred.

### 4.1.3 Town of Caledon

The Town of Caledon's policy is:

- not to accept the 5 dBA excess above the 55 dBA objective in outdoor living areas;
- that traffic noise predictions are to be based on the ultimate or future projections (20 year future design condition) of traffic volumes; and
- road traffic noise predictions should use a traffic speed which is 10 km/h over the posted speed.

The Town of Caledon Development Standards, Policies and Guidelines, Section 3.18.5 permits a maximum sound barrier wall height of 2.4 m. Greater heights are allowable with the use of berms.

In addition, sound barrier walls are to be constructed of vinyl or concrete and cannot be constructed of wood.

### 4.1.4 Federation of Canadian Municipalities/Railway Association of Canada

The standard mitigation requirements of the Federation of Canadian Municipalities and the Railway Association of Canada (FCM/RAC) suggest a dwelling setback of 30 m for a residential development adjacent to a principal main line, if in combination with a safety berm at least 2.5 m above the property line grade (at a 2.5:1 slope). A 5.5 m high sound barrier is also suggested (e.g. 3.0 high acoustic fence atop a 2.5 m high safety berm).

Warning clauses specific to the railway for all dwellings within 300 m of the right-of-way are recommended.

Aside from "standard" requirements regarding the setback of dwellings and safety berm/sound barrier configuration, the sound level design objectives of FCM/RAC are similar to those of the MOE.

## 4.2 PREDICTED SOUND LEVELS

Using the traffic data in Tables 1A and 1B, the sound levels, in terms of $L_{eq\ Day}$ and $L_{eq\ Night}$, were determined using STAMSON V5.04 – ORNAMENT, the computerized road traffic noise prediction model of the MOE.

The daytime and nighttime sound levels were calculated at the top storeys for each dwelling, that is 4.5 m above grade representing the second-storey windows of the semi-detached and single family dwellings and 7.5 m above grade representing the third-storey windows of the townhouse blocks. At the outdoor amenity areas, the receptor height used was 1.5 m above grade.

Table 2 shows the predicted sound levels due to transportation noise sources. A sample calculation is included as Appendix D.

The highest plane-of-window sound levels of 70 dBA daytime and 69 dBA nighttime are predicted to occur at the southwestern face of Block 17, closest to Highway 50 and the CP Railway.

The daytime OLA sound levels predicted at Blocks 6 and 18, the semi-detached dwellings and the single-family dwelling are predicted to be below 55 dBA.

Note, although not considered outdoor amenity areas, the sound levels at the front yards of Blocks 1 to 5 and 7 to 12 are predicted to be below 55 dBA.

Note that the guideline limits would not apply at the amenity area to the south of Block 17, as it is a common use space for the development, and would be considered similar to a park feature from the acoustic perspective.

## 4.3 NOISE CONTROL MEASURES

The noise control measures for transportation noise sources can generally be classified into two categories which are inter-related, but which can be treated separately for the most part:

(a) Architectural elements to achieve acceptable indoor noise guidelines;

(b) Design features to protect the OLA's.

Figure 3, Table 3 and the Notes to Table 3 summarize the transportation noise abatement recommendations.

### 4.3.1 Exterior Wall and Window Construction

The required Sound Transmission Class (STC) ratings for the exterior facades were calculated assuming windows have a surface area equalling 30% of the associated room floor area, and exterior walls were assumed to have a surface area equal to 80% of the associated room floor area.

The exterior wall and window requirements are based on standard assumptions and should be checked once detailed floor plan and elevation drawings are available for the dwellings.

Based on these assumptions:

- Blocks 1 to 4 and 13 to 17 require brick veneer exterior wall construction and windows of up to STC-38; and
- all other blocks as well as the semi-detached dwellings and the single-family dwelling require exterior wall construction meeting STC 41 and window construction meeting STC 28. These are considered minor upgrades to the minimum non-acoustical requirements of the OBC.

Note, due to the proximity of the Queensgate Plaza, windows and exterior walls with upgraded STC ratings have been recommended at some dwellings. See Section 5.2.6 below.

### 4.3.2 Ventilation Requirements

Blocks 1 to 4 and 13 to 17 require central air conditioning.

All other Blocks (Blocks 5 to 12 and 18) as well as the single family and semi-detached dwellings require the provision to allow the future installation of air conditioning by the occupant. For low-density developments, this normally takes the form of a ducted ventilation system suitably sized to accommodate the addition of central air conditioning.

Note, in addition to the above, due to the proximity of the Queensgate Plaza, central air conditioning is recommended for Blocks 8, 9 and 12. See Section 5.2.6 below.

### 4.3.3 Outdoors

4.3.3.1 Local Sound Barriers at Dwellings

The sound levels at the OLAs of Blocks 6 and 18, the semi-detached dwellings and the single-family dwellings are below 55 dBA. Thus, sound barriers are not required at these dwellings.

At all other blocks, the outdoor amenity areas are in the form of second storey raised decks (balconies) above the garage. The decks will be less than 4 m in depth. As such, the noise guideline limits would not apply, as per NPC-300, and sound barriers would not be required.

4.3.3.2 Continuous Acoustic Fence Atop Railway Safety Berm

The FCM/RAC recommends a standard mitigation package, including a minimum 2.5 m high berm with a 3.0 m high acoustic fence atop, for residential sites adjacent to Principal Main lines.

A sound barrier is typically constructed to mitigate noise in outdoor amenity spaces and is not normally used to mitigated noise transfer to the interior of a dwelling.

In this case the predicted sound levels in the OLAs comply with the applicable sound level limits without the need for the acoustic fence. Sound transmission to the interior of the dwellings will be mitigated through the use of upgraded building components, such as exterior wall construction and upgraded windows.

Thus, since the sound level limits in the interior and exterior spaces will be met by other means, the acoustic fence atop the berm is not required as part of this development for noise attenuation purposes.

### 4.3.4 Warning Clauses

Warning clauses are a tool to inform prospective owners/occupants of potential annoyance due to existing noise sources. Where the guideline sound level limits are exceeded, appropriate warning clauses should be registered on the title or included in the development agreement that is registered on title. The warning clauses should also be included in agreements of Offers of Purchase and Sale and lease/rental agreements to make future occupants aware of the potential noise situation.

Table 3 and the notes to Table 3 summarize the warning clauses for the site.

### 4.4 RAILWAY SAFETY BERM

The Preliminary Grading Plan prepared by Rand Engineering Corporation dated March 2017 shows a safety berm at the south end of the site adjacent to the railway. The berm is 2.5 m high above the top rail. This is expected to meet the requirements of the RAC/FCM. However, it should be noted that the berm is a railway safety feature and the requirements/acceptability for safety berms adjacent to railways will need to be confirmed by others.

## 5.0 STATIONARY NOISE IMPACT ASSESSMENT

### 5.1 MOE - STATIONARY NOISE SOUND LEVEL LIMITS

The applicable environmental noise guidelines for new residential developments are given in MOE Publication NPC-300 and are summarized in Appendix C.

The sound level limits under NPC-300 are expressed in terms of one-hour $L_{eq}$ (as opposed to a 16-hour day/8-hour night $L_{eq}$ which is used for ground transportation sources). The applicable sound levels at a receptor location are the higher of the ambient sound level due to road traffic noise or the minimum exclusion limits. For a Class 1 area, the exclusion limits are:

- 50 dBA during the daytime (0700-1900 hours) and evening (1900-2300 hours); and
- 45 dBA during the nighttime (2300-0700 hours).

The above sound level limits apply at the outdoor plane of window of a noise sensitive space such as a bedroom, living room, den, etc. at all time periods and at an outdoor point of reception during

the daytime and evening periods. The sound level limits do not apply to non-noise sensitive windows (at all times) or to outdoor points of reception during the nighttime.

### 5.1.1 Applicable Guideline Limits

Due to the proximity of Highway 50 to the proposed development, the ambient sound levels are dominated by road traffic during the day and evening. At night when road traffic volumes are less, and at locations which have less exposure to the roadways, the minimum exclusion limits would apply.

Hourly road traffic counts applicable to the year 2017 for Highway 50 were used to calculate the ambient sound levels. Appendix E shows the traffic count data and calculation procedure as well as the predicted ambient sound levels at locations on the site.

## 5.2 NOISE IMPACT FROM QUEENSGATE PLAZA

### 5.2.1 Analysis Method

The stationary noise impact analysis was done using CadnaA V4.6 environmental acoustics modelling software. The 3-D model follows the procedures of ISO 9613 Part 2, *"Acoustics – Attenuation of Sound During Propagation Outdoors".*

The sound level predictions were done using the building evaluation method in the CadnaA acoustic model. This method calculates sound levels on a grid of receivers over each facade at each storey of the building. The ambient sound levels were also predicted using this method.

Algorithms within the program were used to subtract the predicted stationary source sound level from the ambient sound level (or minimum exclusion limits, whichever was higher) to determine locations where sound level excesses occur.

On Figures 5 and 7, the octagons surrounding each building show the maximum predicted sound level excess at that location, at any storey. White octagons indicated that the predicted sound level is less than or equal to the applicable guideline limit. A coloured octagon with an integer number in the centre indicates a sound level excess over the applicable guideline limit.

The receptor heights used in the assessment are 1.5 m above grade for windows on the first storey, 4.5 m above grade for second storey windows and 7.5 m above grade for third storey windows.

### 5.2.2 Sources and Operating Scenarios

Figure 4 and Table 4 show the sources used in the assessment. The operating hours vary for different establishments at Queensgate Plaza, with Shoppers Drug Mart being open the longest (between 0800 and 0000 hours).

To be conservative, it was assumed that the rooftop mechanical units operate at full capacity during the daytime and evening, and at 50% capacity (30 minutes in an hour) during the nighttime.

At the receiving area of Shoppers Drug Mart, up to one heavy truck (50-ft trailer) can arrive during the daytime. The truck is not expected to idle; however noise from the engine running upon arrival

and just before departing has been included in the assessment. Only occasional deliveries with small cube vans occurs during the evening and nighttime hours.

Based on information provided by Shoppers Drug Mart, and observations made on site, the heavy truck (50-ft trailer) deliveries do not have trailer refrigeration units. Only smaller trucks have refrigeration units, and these are turned off when the truck is unloaded. Therefore, the worst-case scenario does not include any refrigeration units.

Large trucks are unloaded using manually operated dollies and thus, impulse noise generation of any significance does not occur and has not been considered in this assessment.

Appendix F contains additional calculation details for stationary noise sources at Queensgate Plaza.

### 5.2.3 Results

Figure 5 shows the predicted excesses at the proposed development due to sources at Queensgate Plaza. Excesses of up to 5 dBA over the guideline limits occur at Blocks 9 and 12 during the daytime due to the truck activity at the receiving area. During the evening period, excesses of up to 1 dBA over the guideline limits are predicted to occur at Block 9 due to some rooftop equipment. At night, the sound levels from Queensgate Plaza are predicted to meet the applicable guideline limits at all blocks.

Figure 6 shows a 3-D view, and the location of the excesses, during the daytime and evening periods.

### 5.2.4 Mitigation Requirements

To mitigate the noise excesses at Blocks 9 and 12, the intent is to use a sound barrier on the northern property line as well as site specific dwelling designs.

A 4.5 m high sound barrier on the northern property line will mitigate the sound levels to below the MOE limits at all locations, except those on the third storeys of Blocks 9 and 12. Figure 7 shows the excesses with the 4.5 m high sound barrier. Figure 8 shows a 3-D view of the excesses during the daytime and evening periods. As can be seen from Figure 8, with the sound barrier in place, compliance is shown at all locations, except a few at the third floors of Blocks 9 and 12.

To address the potential excesses at the third floor windows, the intent is to design Blocks 9 and 12 such that there will be no noise-sensitive windows at locations where the sound level excesses are predicted. That is, where the excesses are predicted to occur, there will either be no windows or if windows are used, then the windows will only be to non noise-sensitive spaces (such as washrooms, closets, etc.). With no windows or at non noise-sensitive windows, the guideline limits would not apply. Thus, with the 4.5 m high sound barrier mentioned above and the site specific designs, compliance with the MOE sound level limits can be achieved at all locations.

Figure 3 shows the locations on Blocks 9 and 12 where the restriction on third floor noise-sensitive windows is required.

### 5.2.5 Note on Required Sound Barrier

The proposed 4.5 m high sound barrier will likely need to be constructed entirely as a sound wall. This is due to space limitations at the north end of the site. The 4.5 m height exceeds the maximum allowable sound wall height (2.4 m high) under the Town of Caledon noise policies. However, since there is not enough space to accommodate a 2.1 m high berm (which at a 3:1 slope would require approximately 12.6 m of space), an exception to this policy will be required from the Town.

### 5.2.6 Mitigation Recommendations

Further to the above, some additional measures are recommended at Blocks 8, 9 and 12 to help further promote land use compatibility. These measures are not required by the MOE guidelines, but are recommended as they will provide a more suitable indoor acoustical environment within the dwellings. The recommended measures include:

- Mandatory air conditioning to allow windows to be kept closed at Blocks 8, 9 and 12;
- Upgraded exterior wall construction to brick veneer at Blocks 8, 9 and 12; and
- Upgraded windows, to STC 35, at third storey locations of Blocks 9 and 12, where the limitation on noise sensitive windows exists.

## 5.3 NOISE IMPACT FROM HUSKY INJECTION MOLDING SYSTEMS

The potentially significant noise sources at Husky that could impact the proposed development appear to be the rooftop mechanical equipment. There is likely also truck activity at the facility, although the location of loading docks or truck paths is not clear.

Information regarding the noise sources and operating scenarios for the Husky facility have not been provided, as discussed in Section 3.2.3 above.

In order to determine the potential for noise impact, VCL did continuous unattended sound level measurements on the subject site between January 18, 2017 and January 23, 2017. Sound level meters set to record sound level time histories as well as audio files were placed at three locations on site, as shown on Figure 9. The measurement microphones were each 4.5 m above grade. The three locations were chosen to better determine the source of the measured noise levels (road or rail traffic, the commercial plaza to the north, Monterra Lumber Mills to the south, the Husky facility to the west or other). In addition, a camera was set up at Location 3 and was focussed on the loading area at Shoppers Drug Mart. This was done since it was expected that there would be greater activity at that location that would affect the measurements.

Sound levels on the site are dominated by road traffic on Highway 50. Thus, in addition to the sound level monitoring, traffic counts on Highway 50 were done during the monitoring period. The traffic data was used to determine periods when noise due to road traffic would be minimal, and noise from the neighbouring industries might be more apparent. The traffic data was also used to determine the significance of road traffic in the measured sound level data.

### 5.3.1 Subjective Observations

Several site visits were done to subjectively observe noise emissions from the Husky facility. The dates and times of these site visits were: 2016-05-16 between 1100 and 1300; 2016-06-16 between 1500 and 1600; 2016-11-29 between 1100 and 1300; and 2017-01-22 between 2300 and 0100. On all occasions, noise from Husky (or any other industry) was not audible on the site, over the background noise levels (due to road traffic on Highway 50).

### 5.3.2 Results of Long Term Monitoring

The upper pane of Figure 10 shows the sound levels (in terms of hourly $L_{eq}$) over the entire measurement period at each of the three measurement locations. The lower pane of Figure 10 shows the measured hourly traffic volumes.

In general, the measured sound levels follow the traffic patterns on the road. That is, in the daytime when traffic volumes are higher, sound levels are higher; and at night, when traffic volumes are less, sound levels are less.

Noise from railway pass-bys is most apparent at Location 1, which was set up closest to the tracks. The train pass-bys can be seen as sharp peaks in the sound level time history. At Locations 2 and 3, which were further away from the tracks, the impact from rail traffic was less significant.

Figure 11 shows a sample 30 minute time history period (in terms of 1-second $L_{eq}$) during the daytime hours (0700 to 0730 on January 21, 2017) at Location 2. During this period, there are frequent vehicle pass-bys with few lulls between. Even during the lulls, the sound levels appear to be due to road traffic (likely occurring farther from the measurement location). This was confirmed by listening to the audio recordings. Where these lulls occur (in between vehicle pass-bys), the sound level is just below 50 dBA. Noise from sources other than road or rail traffic was not audible in the recordings during this period. This meets the daytime minimum exclusion limit of 50 dBA for stationary noise sources.

At night, the measured sound levels were dominated by road and rail traffic. However, as the traffic volumes were less, there were more periods between vehicle pass-bys where the background sound level could be examined. Figure 12 shows a sample 30 minute time history period (in terms of one-second $L_{eq}$) during the nighttime hours (0200 to 0230 on January 19, 2017) at Location 2. The peaks in the sound level time history are due to vehicle pass-bys. This was confirmed using the recorded audio files. During the traffic lulls, the background sound level was about 40 dBA. This is below the nighttime minimum exclusion limit of 45 dBA for stationary noise sources.

Sample time histories throughout the monitoring period are included in Appendix G.

### 5.3.3 Conclusions From Long Term Monitoring

At all times, the measurement data indicates the sound levels were dominated by road and rail traffic. Noise emissions associated with the nearby industries were not obvious in any of the time history data and were not audible in any of the sound recordings.

Notwithstanding the above, it is expected that noise from the Husky facility, experienced on the subject site, would be relatively constant. This is because the noise sources in proximity appear to be mostly rooftop mechanical equipment, which would likely operate more or less continuously.

Fluctuating sound levels at industries are typically due to truck activities. However, there does not appear to be a significant amount of truck activity that would occur at the south end of the Husky facility, which is closest to the subject site. This is based on the absence of loading docks in the area. There are two silos at the south end of the facility that may occasionally require transport trucks for filling. However, this activity would be expected to occur infrequently (at most once a day). In addition, the silos are located on the shielded (west) side of the building and so any associated noise emissions would also likely be acoustically screened. As such, noise emissions from truck activity would not be expected to be significant at the subject site.

In the worst case, during periods of reduced road activity (and no rail activity), the background sound levels could be attributed entirely to noise emissions from the Husky facility. The measurement data indicates that during these periods of minimal road and rail activity, the background sound levels are less than the minimum exclusion limits of 50 dBA daytime and evening and 45 dBA at night. Thus, conservatively assuming that these background sound levels were entirely due to operations at the Husky facility would result in noise emissions from Husky being in compliance with the MOE guidelines.

### 5.3.4 Influence of Road Traffic on the Sound Measurement Data

As mentioned above, sound levels on the site are dominated by road traffic on Highway 50. Thus, an assessment was also done to determine the degree of impact of road traffic on the sound measurement data.

The traffic counts were used to predict the sound levels due to road traffic on Highway 50 measurement location 2. The ORNAMENT method was used for this purpose. Figure 13 shows the measured 1 hour $L_{eq}$ sound levels as well as the predicted sound level at Location 2 using the hourly road traffic data during the same time period. The figure also shows the measured hourly sound levels at Location 1, which can be used to identify the train-pass-bys (shown by the sound level peaks).

At Location 2, closest to Highway 50, the predicted sound levels are approximately the same as or exceed the measured sound levels at all times, except for a few occasions where other sources such as trains, snow removal equipment, emergency vehicles with auditory warning devices, etc. impacted the measurement data. It can therefore be concluded that the measurement data at Location 2 was entirely due to road traffic at most times (except for the few periods where the other non-industrial sources noted above were present) and there was no significant influence from the Husky facility.

## 5.4 NOISE IMPACT FROM MONTERRA LUMBER MILLS

The noise impact from Monterra was assessed using the information presented in the AAR, which was used to reconstruct a predictive acoustic model. The reconstructed acoustic model was calibrated using the sound level contour plots and point receptor sound levels presented in the AAR.

Note, the original contour plots from the AAR were overlaid onto current aerial imagery and redrawn for clarity. See Figure H-1 in Appendix H.

Sound level contours from the reconstructed model were predicted at a height of 4.5 m to compare to the results from the contour plots in the AAR. This was done to “calibrate” the reconstructed model. See Figure H-2 in Appendix H.

The contour plots from the reconstructed model extent farther than those from the AAR. That is, the reconstructed model predicts sound levels that are higher than those from the AAR. This is likely because the reconstructed model does not account for the same degree of acoustical screening and the sound power level data used was not spectral (Note, spectral sound data was not provided in the AAR so all sound power levels were modelled at 500 Hz). Thus, the reconstructed model is considered a more conservative assessment than what was presented in the AAR.

Using the reconstructed acoustic model, sound levels, due to operations at Monterra, were predicted at the subject site. This was done in terms of sound level contours (See Figure H-3 in Appendix H) as well as maximum sound level at the building facades using the Building Evaluation Feature (see Figure H-4 in Appendix H). The sound level contours were done at a height of 7.5 m above grade. The predictions indicate that the noise impact from Monterra is below the applicable guideline limits at all locations on the site. Thus, compliance with the applicable guideline limits is concluded.

## 6.0 CONCLUSIONS

An assessment of noise impact on the proposed site due to the near-by road, rail and stationary noise sources has been done.

- To meet the transportation source sound level limits, mitigation measures including ventilation and upgraded facade construction are required at some dwellings. See Figure 3.

- Sound levels from the adjacent Queensgate plaza have the potential to exceed the MOE sound level limits. To address the potential noise issues, a sound barrier on the northern properly line as well as site specific dwelling designs (no noise-sensitive windows at certain locations at the third storeys) are proposed for Blocks 9 and 12. See Figure 3.

- Significant noise impact from the Monterra Mill is not anticipated. This conclusion is based on the assessment done in the AAR prepared for that facility as part of their C of A application, the existence of closer residential dwellings and sound level predictions using a predictive model.

- Husky has not provided information about their activities, operations or noise emissions. Thus, to assess the impact from this facility, sound level measurements were done on the subject site. The measurement data indicates that sound levels on site are entirely due to road or rail traffic. Noise from the Husky facility was not significant (evident or audible) relative to road and rail traffic noise.

- The assessment of the Husky operations and noise emissions should be reviewed, if the acoustical model from the Husky facility can be obtained.

- With appropriate design of the development, a suitable acoustical environment can be provided and the applicable MOE noise guideline requirements met. Thus, the proposed development is considered feasible with respect to transportation and stationary noise, by means of proper design, and will implement the development objectives outlined in the South Hill Land Use Plan of the Town of Caledon.

## 7.0 REFERENCES

1. PC STAMSON 5.04, “Computer Program for Road Traffic Noise Assessment", Ontario Ministry of the Environment.

2. Building Practice Note No. 56: “Controlling Sound Transmission into Buildings”, by J. D. Quirt, Division of Building Research, National Council of Canada, September 1985.

3. “Environmental Noise Guideline, Stationary and Transportation Sources - Approval and Planning”, Ontario Ministry of the Environment, Publication NPC-300, October 21, 2013.

4. “Environmental Acoustical Assessment Report – Monterra Lumber Mills Limited”, Kana A. Ganesh, HGC Engineering, June 17, 2005.

AA/ML\tk
J:\2016\1160170\000\Reports\2 - Environmental Noise\Villalago Residences - Environmental Noise V2_0.wpd

## TABLE 1A

## ROAD TRAFFIC DATA

| Roadway | AADT[1] | % Trucks | | Day/Night Split (%) | Speed Limit (kph)[2] |
|---|---|---|---|---|---|
| | | Medium | Heavy | | |
| Highway 50 | 32 400 | Day: 1.3<br>Night: 2.2 | Day: 1.4<br>Night: 1.5 | 72/28 | 80 (90) |

Notes:

(1) AADT – Annual Average Daily Traffic, applicable to the Ultimate condition. Data obtained from the Region of Peel Transportation System Planning department.

(2) Speed shown is the posted speed in the area of the road. For future road traffic noise analysis, the speed was increased by 10 km/hr (as shown in parentheses) as per the Town of Caledon policies.

## TABLE 1B

## RAIL TRAFFIC DATA – CPR MACTIER SUBDIVISION

| Period | Train Type | # of Trains[1] | # of Cars per Train | # of Locomotives per Train | Maximum Speed (kph) |
|---|---|---|---|---|---|
| Daytime (0700-2300 Hours) | Freight | 9 (15.1) | 188 | 4 | 88 |
| Nighttime (2300-0700 Hours) | Freight | 5 (8.4) | 188 | 4 | 88 |

Note:

(1) Data obtained from CP for the year 2016. Values shown in brackets has been extrapolated to the Year 2037 design condition using a 2.5 % growth rate, compounded annually.

## TABLE 2

## PREDICTED OUTDOOR SOUND LEVELS – NO MITIGATION

| Location | Source | Distance (m)[1] | $L_{eq\ Day}$ (dBA) | $L_{eq\ Night}$ (dBA) |
|---|---|---|---|---|
| Block 1 South Facade | Highway 50 | 75 | 62 | 62 |
| | Canadian Pacific Railway | 46 | 66 | 66 |
| | TOTAL | – | 67 | 68 |
| Block 2 Southwest Facade | Highway 50 | 73 | 62 | 62 |
| | Canadian Pacific Railway | 51 | 64 | 65 |
| | TOTAL | – | 66 | 67 |
| Block 3 Southwest Facade | Highway 50 | 71 | 62 | 61 |
| | Canadian Pacific Railway | 70 | 60 | 60 |
| | TOTAL | | 64 | 64 |
| Block 4 Southwest Facade | Highway 50 | 68 | 57 | 56 |
| | Canadian Pacific Railway | 86 | 57 | 58 |
| | TOTAL | – | 60 | 60 |
| Block 5 Southwest Facade | Highway 50 | 64 | 57 | 56 |
| | Canadian Pacific Railway | 105 | 55 | 56 |
| | TOTAL | – | 59 | 59 |
| Block 17 Southwest Facade | Highway 50 | 40 | 67 | 66 |
| | Canadian Pacific Railway | 41 | 67 | 67 |
| | TOTAL | – | 70 | 69 |
| Block 11 Southwest Facade | Highway 50 | 58 | 56 | 55 |
| | Canadian Pacific Railway | 140 | 52 | 52 |
| | TOTAL | – | 57 | 57 |
| Block 10 Northwest Facade | Highway 50 | 58 | 52 | 52 |
| Single-Family Dwelling Southwest Facade | Highway 50 | 116 | 51 | 52 |
| | Canadian Pacific Railway | 88 | 53 | 53 |
| | TOTAL | – | 55 | 56 |
| Block 1 Front Yard | Highway 50 | 115 | 45 | – |
| | Canadian Pacific Railway | 64 | 50 | – |
| | TOTAL | – | 51 | – |
| Single Detached Dwelling Rear Yard | Highway 50 | 118 | 49 | – |
| | Canadian Pacific Railway | 92 | 44 | – |
| | TOTAL | – | 50 | – |

Notes:

(1) Distance to centreline of roadway. The indicated distances apply to a receptor at the indicated building facade.
(2) Daytime and nighttime sound levels taken at a height of 7.5 m for the townhouses and 4.5 m for the semi-detached and single family dwellings, corresponding to a top storey bedroom window. For the outdoor amenity space, the calculation was done at a height of 1.5 m.

## TABLE 3

## MINIMUM NOISE ABATEMENT MEASURES

| Location | Air Conditioning[1] | Exterior Wall[2] | Window STC Rating[3] | Sound Barrier[4] | Warning Clauses[5] |
|---|---|---|---|---|---|
| Blocks 1 to 4 | Mandatory | Brick Veneer | up to STC 38 | none | A + C + E + F + G + H |
| Blocks 14 to 17 | Mandatory | Brick Veneer | up to STC 38 | none | A + C + E + F + G +H + I |
| Block 13 | Mandatory | Brick Veneer | up to STC 38 | none | A + C + E + F + G + H+ I |
| Blocks 8, 9 and 12 | Minimum Requirement: Provision for Adding<br><br>Recommended Upgrade: Mandatory Air conditioning | Minimum Requirement: OBC (STC-41)<br><br>Recommended Upgrade: Brick Veneer | Minimum Requirement: OBC (STC-28)<br><br>Recommended Upgrade: STC 35 at third storey of Blocks 9 and 12 (see Figure 3) | 4.5 m high sound barrier on north property line for stationary sources (Blocks 9 and 12) | A + D (Minimum Requirement) + C (Recommended Upgrade) + E + F + G + H |
| Blocks 5, 6, 11, 18, semi-detached dwellings and single-family dwelling | Provision for Adding | OBC (STC-41) | OBC (STC-28) | none | A + D + E + F + G + H |
| Blocks 7 and 10 | Provision for Adding | OBC (STC-41) | OBC (STC-28) | none | B + D + E + F + G + H |

For notes to this table, see the following page.

## NOTES TO TABLE 3

(1) Where means must be provided to allow windows to remain closed for road noise control purposes, a commonly used technique is that of air central conditioning.

(2) STC - Sound Transmission Class Rating (Reference ASTM-E413).

Brick veneer or masonry equivalent construction. OBC denotes any construction meeting the minimum non-acoustical requirements of the Ontario Building Code.

The requirements are based on assumed percentages of wall and window area to associated floor area and should be checked once building plans are finalized.

(3) Upgraded windows have been recommended to provide a suitable indoor acoustical environment.

OBC means any construction complying with the minimum non-acoustical requirements of the OBC (typically about STC 24 to 28). A sliding glass walkout door should be considered as a window and be included in the percentage of glazing. Window requirements were based on standard assumptions and should be reviewed once building (floor) plans are finalized.

The window STC rating applies to the entire window assembly and not just the glazing. The window supplier should provide acoustical laboratory test data (following a recognized test standard) for the intended windows indicated the STC ratings can be met.

The requirements are based on assumed percentages of wall and window area to associated floor area and should be checked once building plans are finalized.

(4) Sound barriers must be of solid construction having a minimum face density of 20 kg/m2 with no gaps, cracks or holes.

(5) Warning clauses to be included in Occupancy Agreements:

A. "Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road or rail traffic will continue to be of concern, occasionally interfering with some activities of the dwelling occupants as the noise level exceeds the sound level limits of the Municipality and the Ministry of the Environment."

B. "Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road or rail traffic may continue to be of concern, occasionally interfering with some activities of the dwelling occupants as the noise level exceeds the sound level limits of the Municipality and the Ministry of the Environment."

C. "This dwelling unit was fitted with a central air conditioning system in order to permit closing of the windows for noise control, (Note: locate the air cooled condenser unit in a noise insensitive area and ensure that unit has a maximum ARI rating of 7.6 Bels for 3.5 tons or less.)"

D. "This dwelling unit was fitted with a forced air heating system and the ducting, etc. sized to accommodate a central air conditioning unit. Air conditioning may be installed at the owner's option and cost."

E. "Purchasers/occupants are advised that due to the proximity to the adjacent commercial facilities (Queensgate Plaza), noise from these facilities may at times be audible."

F. "Purchasers/occupants are advised that due to the proximity to the Monterra Lumber Mill, noise from this facility may at times be audible."

G. "Purchasers/occupants are advised that due to the proximity to the Husky Injection Molding Systems Ltd., noise from this facility may at times be audible."

H. "Warning: Canadian Pacific Railway has a right-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CP will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way."

I. "Purchasers/tenants are advised that the front yard area of this dwelling has not been designed for the quiet enjoyment of the outdoor environment and does not meet the sound level limits of the Municipality and the Ministry of the Environment. Sound levels due to road traffic will interfere with activities occurring at this outdoor space."

(6) Conventional ventilated attic roof construction meeting OBC requirements is satisfactory in all cases.

(7) All exterior doors shall be fully weatherstripped.

# TABLE 4

## STATIONARY SOURCES – QUEENSGATE PLAZA

| Source ID[(1)] | Description | Sound Power Level (dBA re 10-12 W) | Source Operating Conditions | | |
|---|---|---|---|---|---|
| ***POINT SOURCES*** | | | ***Operating Time (minutes/hour)*** | | |
| | | | ***Day*** | ***Eve*** | ***Night*** |
| EF1 | Carnes VEBK10 exhaust fan | 76 | 60 | 60 | 30 |
| EF2 | Carnes VEBK10 exhaust fan | 77 | 60 | 60 | 30 |
| CC1 | Cancoil condensing unit | 79 | 60 | 60 | 30 |
| RTU01 | Carrier 48TFE008 | 76 | 60 | 60 | 30 |
| RTU02 | Carrier 48TFE008 | 76 | 60 | 60 | 30 |
| RTU03 | Carrier 48TFE008 | 76 | 60 | 60 | 30 |
| RTU04 | Carrier 48TFE008 | 76 | 60 | 60 | 30 |
| RTU05 | Carrier 48TFE008 | 76 | 60 | 60 | 30 |
| KR | Keeprite REZA 045L6 condenser | 84 | 60 | 60 | 30 |
| CC2 | Cancoil DCU | 79 | 60 | 60 | 30 |
| RS | Russel Scottsboro RLH21544-E condenser | 73 | 60 | 60 | 30 |
| RTU06 | Carrier 48TCEA06A | 76 | 60 | 60 | 30 |
| RTU07 | Carrier 48TCEA07A | 78 | 60 | 60 | 30 |
| RTU08 | Carrier 48TFE006 | 80 | 60 | 60 | 30 |
| RTU09 | Carrier 48TME008 | 76 | 60 | 60 | 30 |
| RTU10 | Carrier 48TCEA06A | 76 | 60 | 60 | 30 |
| RTU11 | Carrier 48TFE006 | 80 | 60 | 60 | 30 |
| RTU12 | Carrier 48TCEA06A | 76 | 60 | 60 | 30 |
| RTU13 | Carrier 48TCEA06A | 76 | 60 | 60 | 30 |
| KEF1 | Kitchen exhaust fan | 87 | 60 | 60 | 0 |
| RTU14 | Carrier 48TFE008 | 76 | 60 | 60 | 30 |
| RTU15 | Carrier 48TCEA06A | 77 | 60 | 60 | 30 |
| RTU16 | Carrier 48TCEA06A | 77 | 60 | 60 | 30 |
| RTU17 | Lennox KGA036S4 | 75 | 60 | 60 | 30 |
| RTU18 | Carrier 48TCEA06A | 77 | 60 | 60 | 30 |
| RTU19 | Lennox KGA060S4 | 80 | 60 | 60 | 30 |
| RTU20 | Carrier 48TFE006 | 83 | 60 | 60 | 30 |
| RTU21 | Carrier 48TCEA07A | 80 | 60 | 60 | 30 |
| EF3 | Greenheck CUBE-180HP | 86 | 60 | 60 | 0 |
| EF4 | Carnes VRBK18 exhaust fan | 80 | 60 | 60 | 0 |
| KEF2 | Delhi BI-20RM exhaust fan | 87 | 60 | 60 | 0 |
| EF5 | Carnes VUBK08 exhaust fan | 76 | 60 | 60 | 0 |
| EF6 | Carnes VUBK08 exhaust fan | 76 | 60 | 60 | 0 |
| CND1 | Hill condensing unit | 84 | 60 | 60 | 30 |

.../cont'd

## TABLE 4 (continued)

## STATIONARY SOURCES – QUEENSGATE PLAZA

| Source ID | Description | Sound Power Level (dBA re 10-12 W) | Source Operating Conditions | | |
|---|---|---|---|---|---|
| ***POINT SOURCES*** | | | ***Operating Time (minutes/hour)*** | | |
| | | | ***Day*** | ***Eve*** | ***Night*** |
| CND2 | Larkin condensing unit | 79 | 60 | 60 | 30 |
| CND3 | Tecumseh AGA4563EXTHL condenser | 84 | 60 | 60 | 30 |
| EF7 | Carnes VEBK06 exhaust fan | 76 | 60 | 60 | 30 |
| RTU22 | Carrier 48TCEA06 | 73 | 60 | 60 | 30 |
| RTU23 | Carrier 48TCEA06 | 73 | 60 | 60 | 30 |
| RTU24 | Carrier 48TFE008 | 76 | 60 | 60 | 30 |
| RTU25 | Carrier 48TFE006 | 73 | 60 | 60 | 30 |
| RTU26 | Carrier 48TCEA06 | 73 | 60 | 60 | 30 |
| RTU27 | Carrier 48TCEA06 | 73 | 60 | 60 | 30 |
| RTU28 | Carrier 48TFE006 | 73 | 60 | 60 | 30 |
| RTU29 | Carrier 48TFE006 | 73 | 60 | 60 | 30 |
| RTU30 | Carrier 48TFE006 | 73 | 60 | 60 | 30 |
| RTU31 | Carrier 48TFE008 | 76 | 60 | 60 | 30 |
| RTU32 | Air Wise CHA16-120-2J | 76 | 60 | 60 | 30 |
| EF8 | Carnes VRBK15 exhaust fan | 80 | 60 | 60 | 30 |
| EF9 | Carnes VRBK15 exhaust fan | 80 | 60 | 60 | 30 |
| EF10 | Carnes VUBK08 exhaust fan | 76 | 60 | 60 | 30 |
| TRK | Idling truck | 100 | 2 | 0 | 0 |
| ***LINE SOURCES*** | | | ***Movements Per Hour*** | | |
| | | | ***Day*** | ***Eve*** | ***Night*** |
| TRKmove | Truck movement @ 20 kph | 106 | 2 | 0 | 0 |

Note:

(1) See Figure 4 for source locations.


| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. consulting acoustical engineers | Title: **Key Plan** | Date: **2017-04-03** | Figure: **1** |
| | Project Name: **Villalago Residences/Bolton** | Project No.: **116-0170** | |

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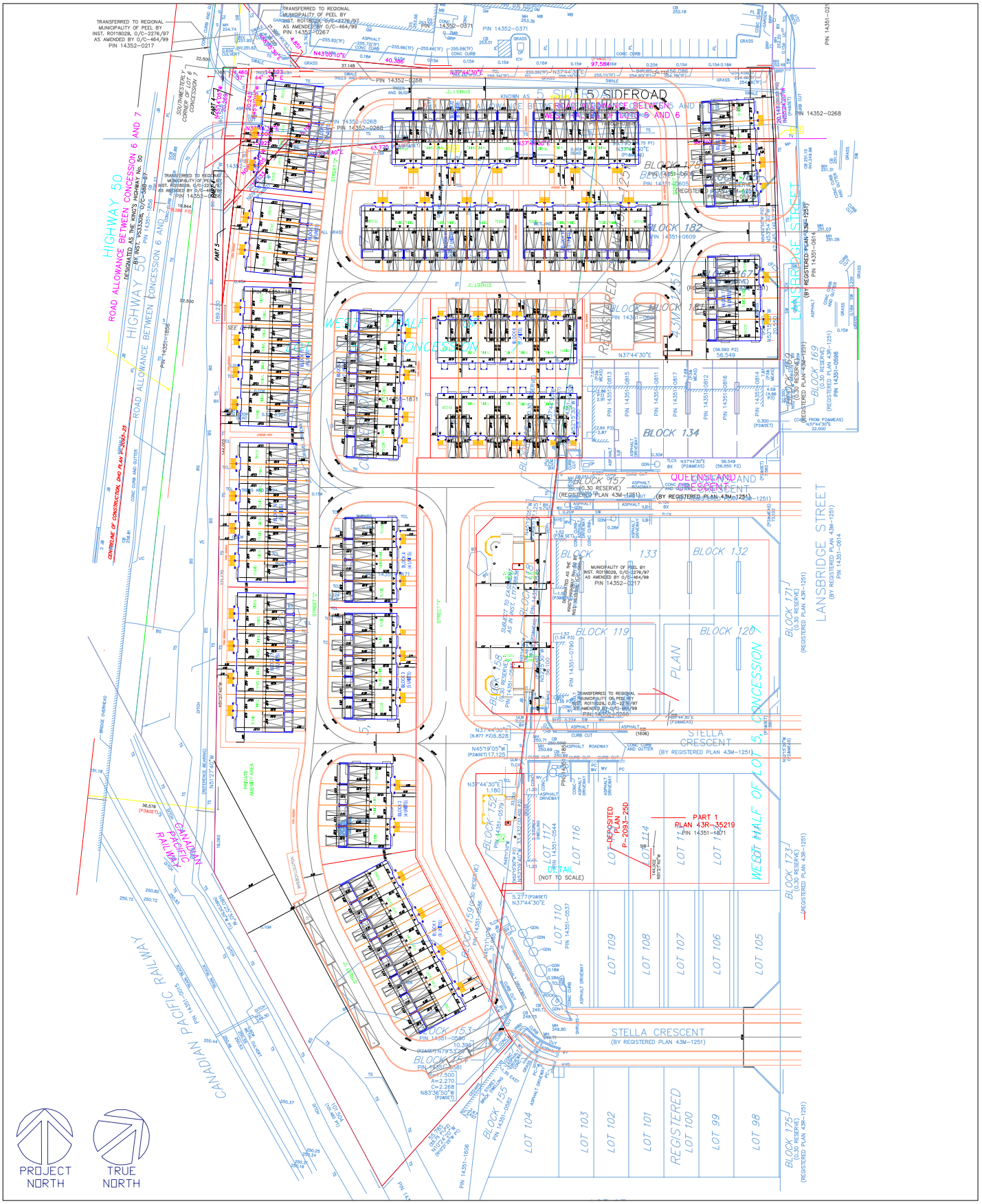
Date Plotted: 01.04.17




| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | Title: Site Plan | Date: 2017-04-03 | Figure: 2 |
| | Project Name: Villalago Residences/Bolton | Project No.: 116-0170 | |


VALCOUSTICS
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| Title | Date | Figure |
|---|---|---|
| **Noise Mitigation Requirements** | **2017-04-03** | **3** |
| Project Name | Project No. | |
| **Villalago Residences/Bolton** | **116-0170** | |

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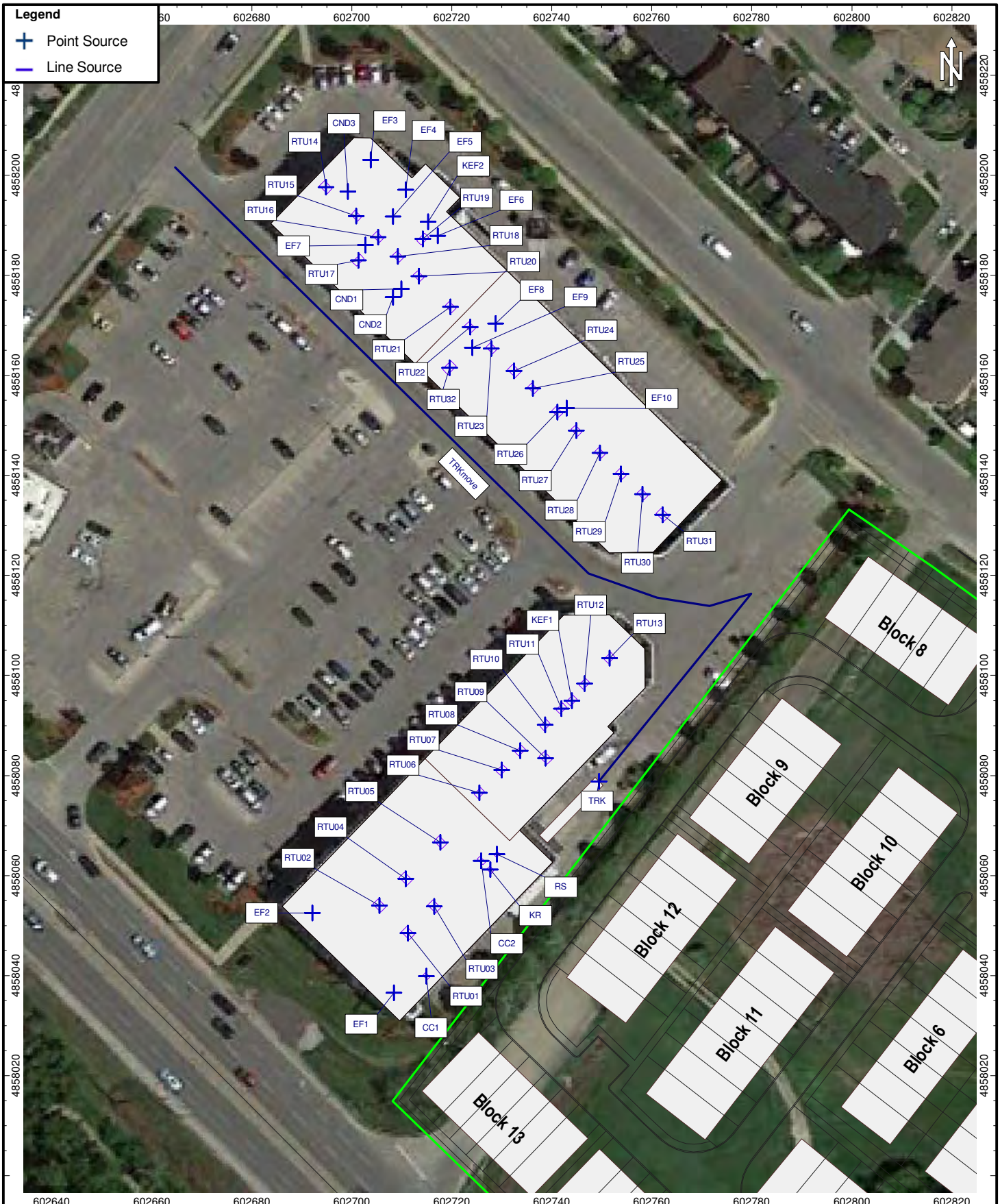
Date Plotted: 01.04.17

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| Title | Date | Figure |
|---|---|---|
| **Stationary Noise Source IDs and Locations** | **2017-04-03** | **4** |
| Project Name | Project No. | |
| **Villalago Residences/Bolton** | **116-0170** | |

G:\AA\1160170\Cadna\2017-03-31 Villalago.cna

Date Plotted: 01.04.17

**Excesses:**

- No Excess
- 1 dBA
- 2 dBA
- 3 dBA
- 4 dBA
- 5 dBA
- > 5 dBA

602750 602800 602850 602900 602950

4858200 4858150 4858100 4858050 4858000 4857950 4857900 4857850 4857800

Block 1 Block 2 Block 3 Block 4 Block 5 Block 6 Block 7 Block 8 Block 9 Block 10 Block 11 Block 12 Block 13 Block 14 Block 15 Block 16 Block 17

**Daytime (0700-1900 Hours)** | **Evening (1900-2300 Hours)** | **Nighttime (2300-0700 Hours)**

VALCOUSTICS Canada Ltd. consulting acoustical engineers

| Title | Date | Figure |
|---|---|---|
| **Predicted Excesses (dBA) due to Queensgate Plaza** | **2017-04-06** | **5** |
| Project Name: **Villalago Residences/Bolton** | Project No.: **116-0170** | |

G:\AA\1160170\Cadna\2017-04-06 Villalago.cna

Date Plotted: 05.04.17

**Excesses:**

- No Excess
- 1 dBA
- 2 dBA
- 3 dBA
- 4 dBA
- 5 dBA
- > 5 dBA

**Daytime (0700-1900 Hours)**

**Evening (1900-2300 Hours)**

VALCOUSTICS
Canada Ltd.
consulting acoustical engineers

Title
**3-D View from Northwest - Predicted Excesses (dBA) due to Queensgate Plaza**

Date
**2017-04-06**

Figure
**6**

Project Name
**Villalago Residences/Bolton**

Project No.
**116-0170**

E:\AA\1160170\Cadna\2017-04-06 Villalago.cna

Date Plotted: 06.04.17

**Excesses:**

- No Excess
- 1 dBA
- 2 dBA
- 3 dBA
- 4 dBA
- 5 dBA
- > 5 dBA

602750 602800 602850 602900 602950

4858200 4858150 4858100 4858050 4858000 4857950 4857900 4857850 4857800

Block 1 Block 2 Block 3 Block 4 Block 5 Block 6 Block 7 Block 8 Block 9 Block 10 Block 11 Block 12 Block 13 Block 14 Block 15 Block 16 Block 17

**Daytime (0700-1900 Hours)** | **Evening (1900-2300 Hours)** | **Nighttime (2300-0700 Hours)**

VALCOUSTICS Canada Ltd. consulting acoustical engineers

Title
**Predicted Excesses (dBA) with 4.5 m High Sound Barrier**

Date
**2017-04-06**

Figure
**7**

Project Name
**Villalago Residences/Bolton**

Project No.
**116-0170**

G:\AA\1160170\Cadna\2017-04-06 Villalago.cna

Date Plotted: 05.04.17


Daytime (0700-1900 Hours)

Evening (1900-2300 Hours)

VALCOUSTICS
Canada Ltd.
consulting acoustical engineers

Title
**3-D View from Northwest - Predicted Excesses (dBA) with 4.5 m High Sound Barrier**

Date
**2017-04-06**

Figure
**8**

Project Name
**Villalago Residences/Bolton**

Project No.
**116-0170**

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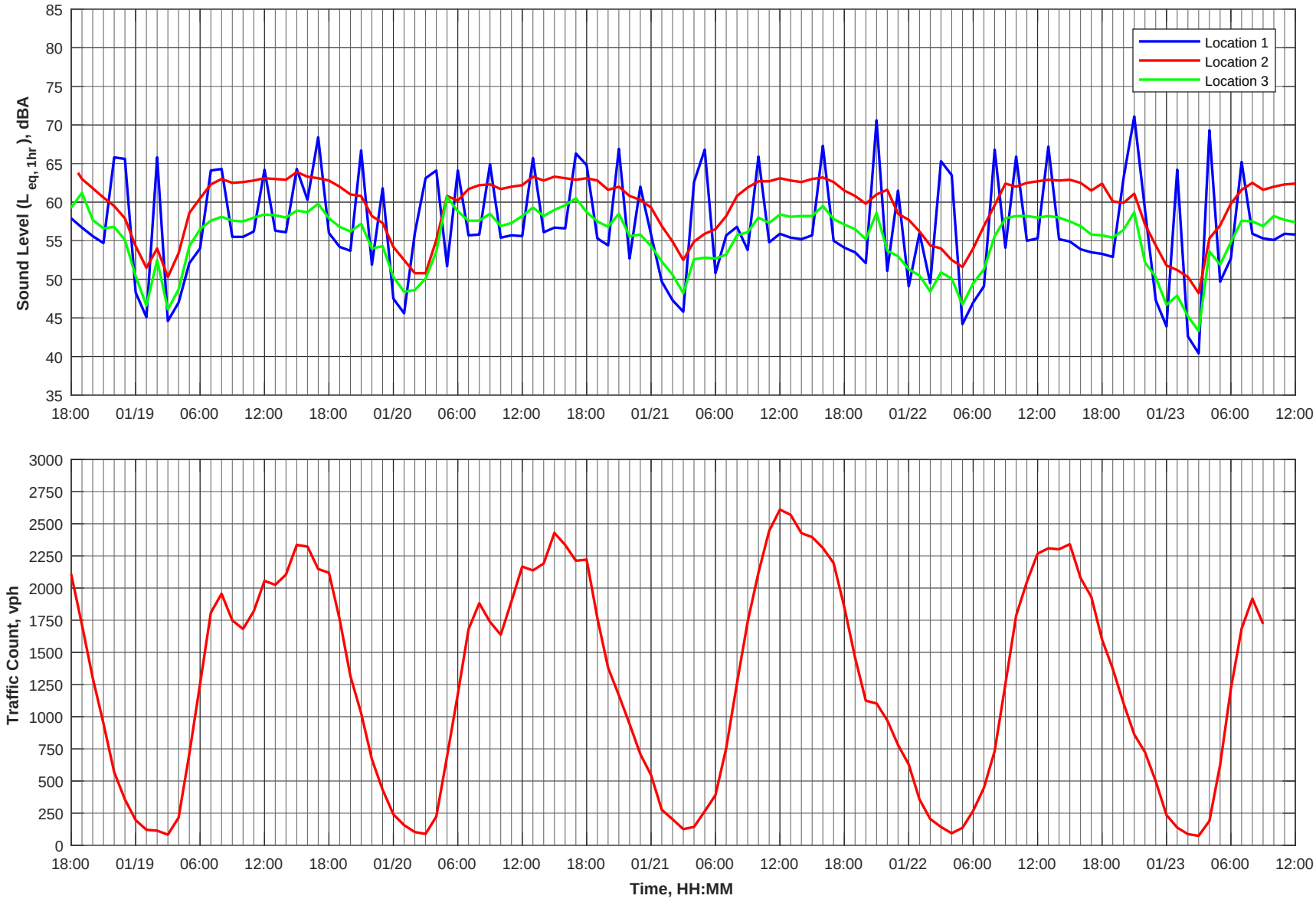
Date Plotted: 06.04.17

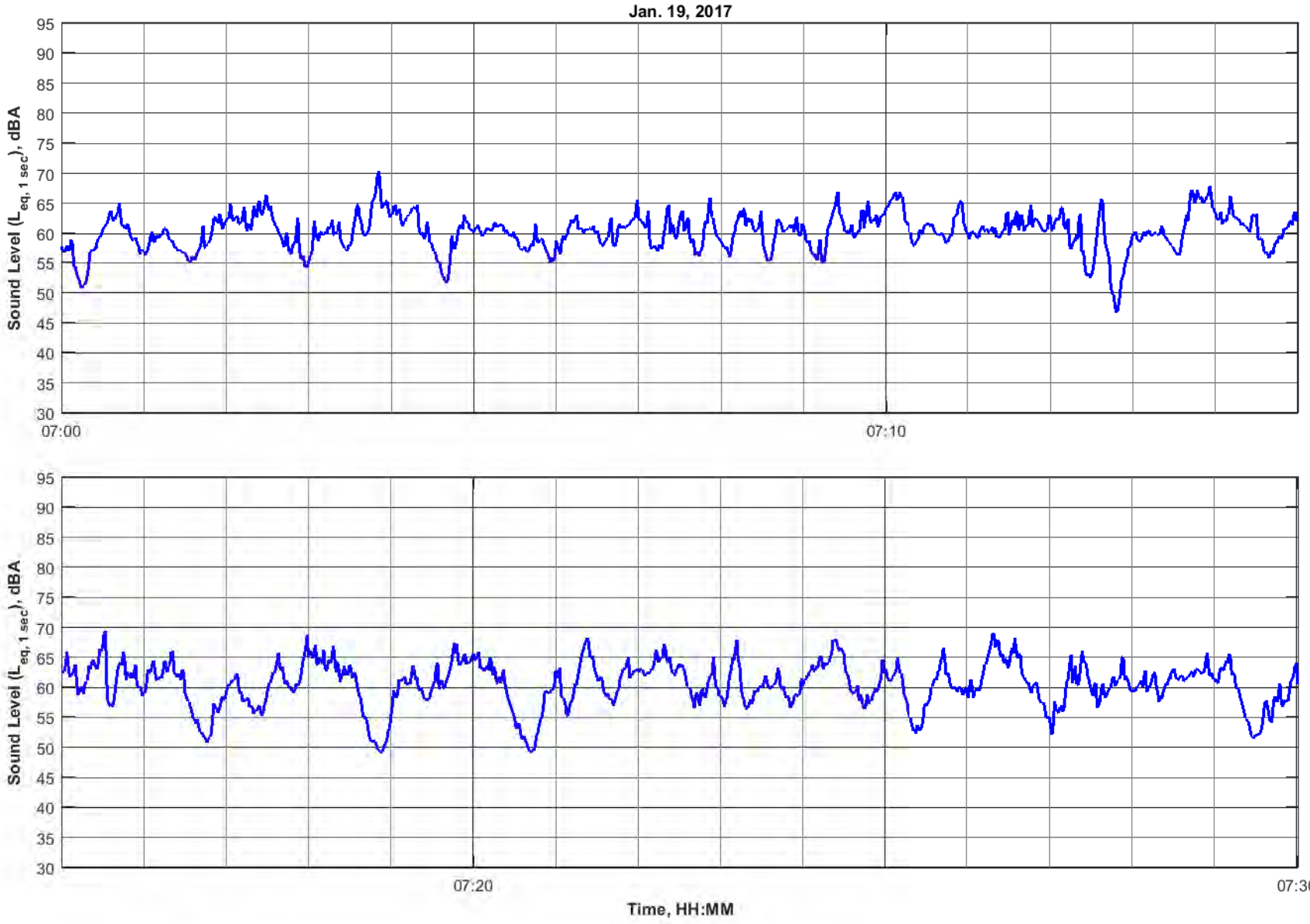

| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. consulting acoustical engineers | Title: **Long-Term Measurement Locations** | Date: **2017-04-06** | Figure: **9** |
| | Project Name: **Villalago Residences/Bolton** | Project No.: **116-0170** | |

G:\AA\1160170\Cadna\Measurement Locations.cna

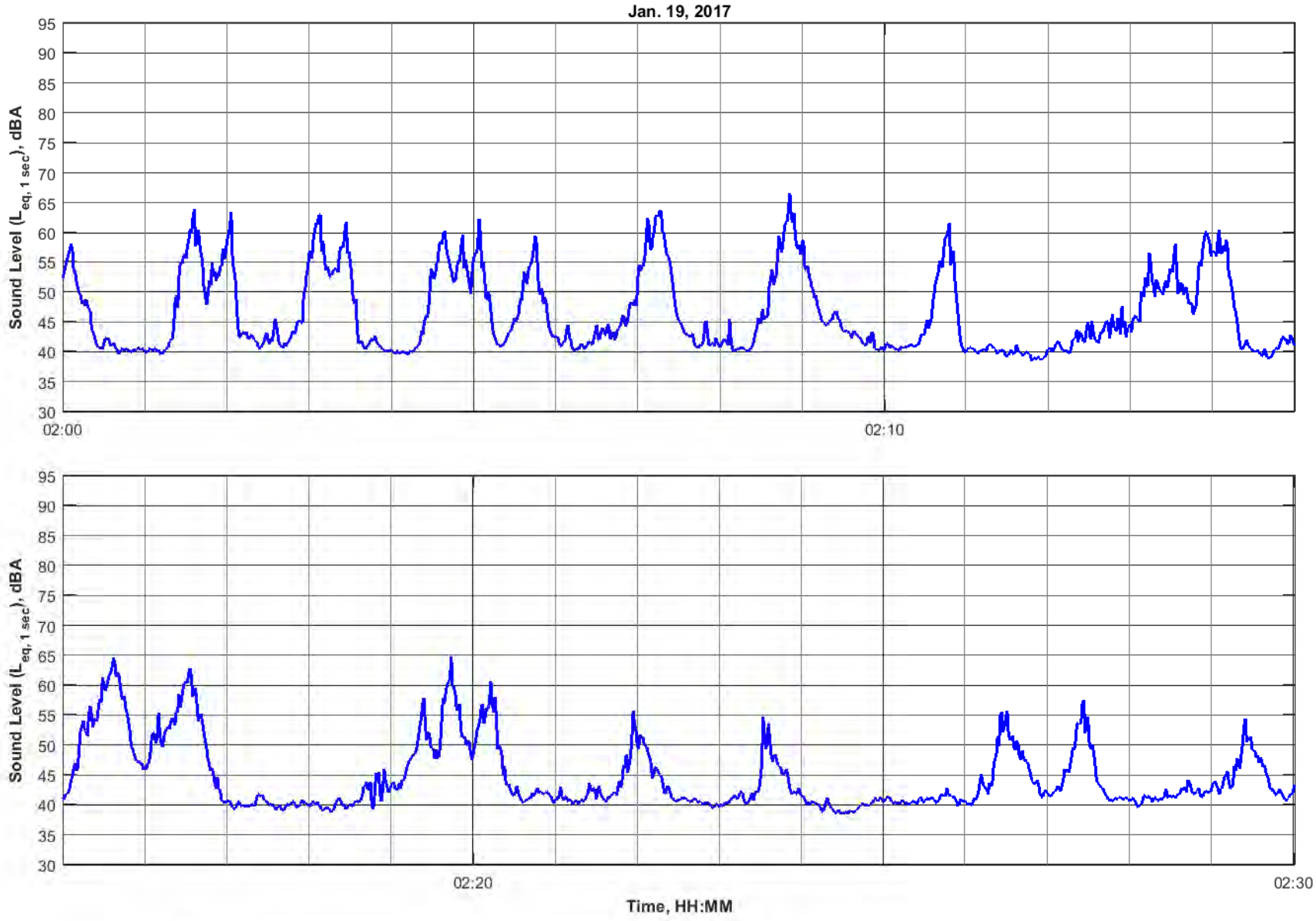
Date Plotted: 05.04.17



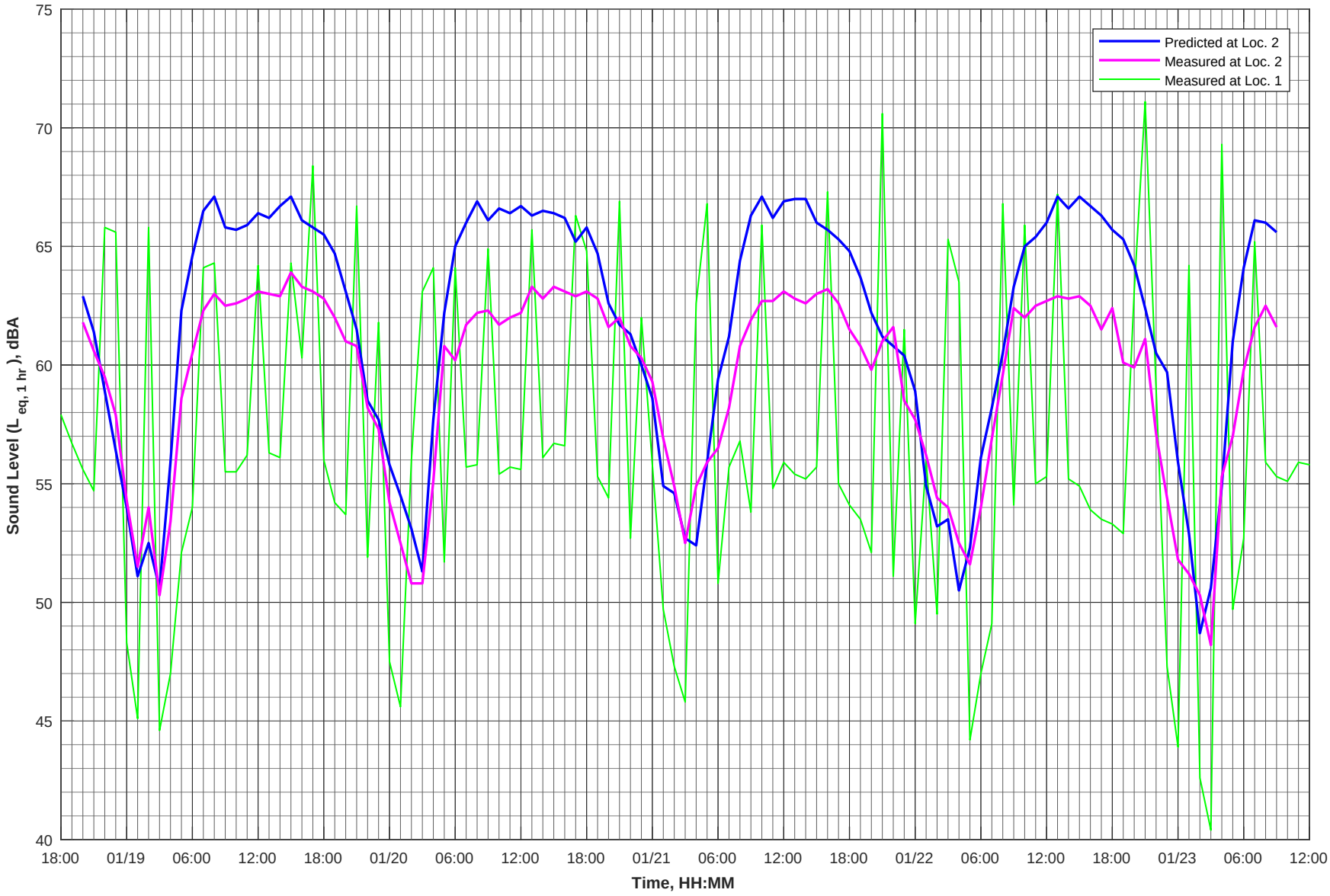

| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | **Title**<br>**Time History - Sound Levels and Traffic Counts** | **Date**<br>**2017-04-03** | **Figure**<br>**10** |
| | **Project Name**<br>**Villalago Residences/Bolton** | **Project Number**<br>**116-0170** | |




| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | **Title**<br>**Sample Time History - Location 2 (Daytime)** | **Date**<br>**2017-04-03** | **Figure**<br>**11** |
| | **Project Name**<br>**Villalago Residences/Bolton** | **Project Number**<br>**116-0170** | |




| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | **Title**<br>**Sample Time History - Location 2 (Nighttime)** | **Date**<br>**2017-04-03** | **Figure**<br>**12** |
| | **Project Name**<br>**Villalago Residences/Bolton** | **Project Number**<br>**116-0170** | |




VALCOUSTICS Canada Ltd.

**Title**
**Measured Sound Levels and Predicted Sound Levels from Road Traffic**

**Date**
**2017-04-04**

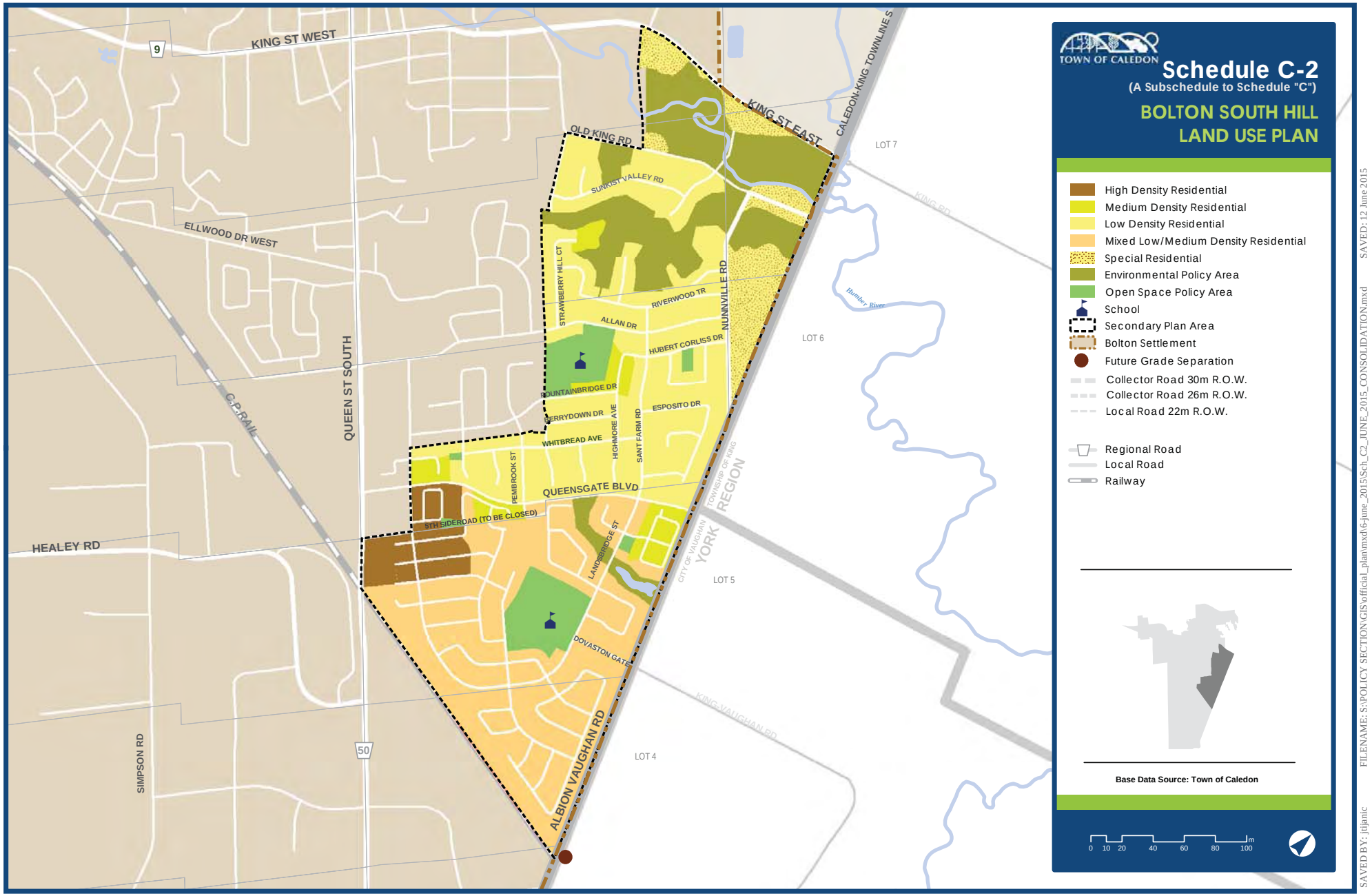
**Figure**
**13**

**Project Name**
**Villalago Residences/Bolton**

**Project Number**
**116-0170**

# APPENDIX A

## LAND USE SCHEDULE




TOWN OF CALEDON

# Schedule C-2

(A Subschedule to Schedule "C")

## BOLTON SOUTH HILL LAND USE PLAN

- High Density Residential
- Medium Density Residential
- Low Density Residential
- Mixed Low/Medium Density Residential
- Special Residential
- Environmental Policy Area
- Open Space Policy Area
- School
- Secondary Plan Area
- Bolton Settlement
- Future Grade Separation
- Collector Road 30m R.O.W.
- Collector Road 26m R.O.W.
- Local Road 22m R.O.W.
- Regional Road
- Local Road
- Railway



Base Data Source: Town of Caledon

0 10 20 40 60 80 100 m

June 2015 Office Consolidation

SAVED BY: jtijanic FILENAME: S:\POLICY SECTION\GIS\official_plan\mxd\6-june_2015\Sch_C2_JUNE_2015_CONSOLIDATION.mxd SAVED: 12 June 2015

# APPENDIX B

## TRAFFIC DATA

March 13, 2015

Seema Nagaraj
Valcoustics Canada Ltd.
Re: Traffic Data Request – Acoustical Study
Highway 50 1.0 km North of Mayfield Road
Town of Caledon

Seema:

Per your request, we are providing the following traffic data.

| | Existing | Planned |
|---|---|---|
| 24 Hour Traffic Volume | 24,226 | 32,400 |
| # of Lanes | 4 | 4 |
| Day/Night Split | 72/28 | 72/28 |
| Day Trucks<br>(% of Total Volume) | 1.3% Medium<br>1.4% Heavy | 1.3% Medium<br>1.4% Heavy |
| Night Trucks<br>(% of Total Volume) | 2.2% Medium<br>1.5% Heavy | 2.2% Medium<br>1.5% Heavy |
| Right-of-Way Width | 45 metres | |
| Posted Speed Limit | 80 km/h | |

If you require further assistance, please contact me at (905) 791-7800 ext. 4420.

Regards,

Alejandro Cifuentes, MCIP, RPP
Principal Planner | Transportation System Planning
Region of Peel
10 Peel Centre Drive, Suite B - 4th Floor
Brampton ON, L6T 4B9
(905) 791-7800 x 4420
alejandro.cifuentes@peelregion.ca

Real Estate and Facility Management
800 – 1290 Central Parkway West
Mississauga, ON, L5C 4R3
www.cpr.ca

April 22, 2016

Via e-mail: Anthony@valcoustics.com

Valcoustics Canada Ltd.
30 Wertheim Court, Unit 25
Richmond Hill, Ontario L4B 1B9

Dear Sir/Madam:

***Re: Rail Traffic Volumes, CP Mileage 20.48, Mactier Subdivision***
***Highway 50/Queen Street, Town of Caledon (Bolton), ON***

This is in reference to your request for rail traffic data for a noise study in the vicinity of where Highway 50 intersects with the CP Rail corridor, being mile 20.48 of our Mactier Subdivision. The Mactier Subdivision is classified as a Principal Main Line.

The information requested is as follows:

1. Number of freight trains 0700 to 2300: 9
   Number of freight trains 2300 to 0700: 5

2. Average number of cars per train freight: 80
   Maximum cars per train freight: 188

3. Number of Locomotives per train: 2 (4 max)

4. Maximum permissible speed: 55 mph (88 kph)

5. The whistle signal is not routinely through the study area. Please note that the whistle may be sounded if deemed necessary by the train crew for safety reasons at any location.

6. There is one main line track with welded joints in the vicinity of the study area and one passing track with bolted joints along with an additional siding track north of the study area. Due to the additional tracks, trains will meet numerous times a day at in this area which may cause longer than usual train idling time while awaiting other trains to pass by.

The information provided is based on rail traffic over the past month to date. Variations of the above may exist on a day-to-day basis. Specific measurements may also vary significantly depending on customer needs.

Yours truly,

J Tomei

Josie Tomei
Specialist Real Estate Sales
& Acquisitions – Ontario
905-803-3429. josie_tomei@cpr.ca

# APPENDIX C

## ENVIRONMENTAL NOISE GUIDELINES

# APPENDIX C

## ENVIRONMENTAL NOISE GUIDELINES

## MINISTRY OF THE ENVIRONMENT (MOE)

Reference: MOE Publication NPC-300, October 2013: "Environmental Noise Guideline, Stationary and Transportation Source - Approval and Planning".

| SPACE | SOURCE | TIME PERIOD | CRITERION |
|---|---|---|---|
| Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc. | Road | 07:00 to 23:00 | 45 dBA |
| | Rail | 07:00 to 23:00 | 40 dBA |
| | Aircraft | 24-hour period | NEF/NEP 5 |
| Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres) | Road | 23:00 to 07:00 | 45 dBA |
| | Rail | 23:00 to 07:00 | 40 dBA |
| | Aircraft | 24-hour period | NEF/NEP 5 |
| Sleeping quarters | Road | 07:00 to 23:00 | 45 dBA |
| | Rail | 07:00 to 23:00 | 40 dBA |
| | Aircraft | 24-hour period | NEF/NEP 0 |
| Sleeping quarters | Road | 23:00 to 07:00 | 40 dBA |
| | Rail | 23:00 to 07:00 | 35 dBA |
| | Aircraft | 24-hour period | NEF/NEP 0 |
| Outdoor Living Areas | Road and Rail | 07:00 to 23:00 | 55 dBA up to 60 dBA allowed in some cases |
| Outdoor Point of Reception | Aircraft | 24-hour period | NEF/NEP 30# |
| | Stationary Source | | |
| | Class 1 Area | 07:00 to 19:00(1) | 50* dBA |
| | | 19:00 to 23:00(1) | 50* dBA |
| | Class 2 Area | 07:00 to 19:00(2) | 50* dBA |
| | | 19:00 to 23:00(2) | 45* dBA |
| | Class 3 Area | 07:00 to 19:00(3) | 45* dBA |
| | | 19:00 to 23:00(3) | 40* dBA |
| | Class 4 Area | 07:00 to 19:00(4) | 55* dBA |
| | | 19:00 to 23:00(4) | 55* dBA |

...../cont'd

| SPACE | SOURCE | TIME PERIOD | CRITERION |
|---|---|---|---|
| Plane of a Window of Noise Sensitive Spaces | Stationary Source | | |
| | Class 1 Area | 07:00 to 19:00(1) | 50* dBA |
| | | 19:00 to 23:00(1) | 50* dBA |
| | | 23:00 to 07:00(1) | 45* dBA |
| | Class 2 Area | 07:00 to 19:00(2) | 50* dBA |
| | | 19:00 to 23:00(2) | 50* dBA |
| | | 23:00 to 07:00(2) | 45* dBA |
| | Class 3 Area | 07:00 to 19:00(3) | 45* dBA |
| | | 19:00 to 23:00(3) | 45* dBA |
| | | 23:00 to 07:00(3) | 40* dBA |
| | Class 4 Area | 07:00 to 19:00(4) | 60* dBA |
| | | 19:00 to 23:00(4) | 60* dBA |
| | | 23:00 to 07:00(4) | 55* dBA |

\# may not apply to in-fill or re-development.
* or the minimum hourly background sound exposure $L_{eq}(1)$, due to road traffic, if higher.
(1) Class 1 Area : Urban
(2) Class 2 Area : Urban during day; rural-like evening and night
(3) Class 3 Area : Rural
(4) Class 4 Area: Subject to land use planning authority's approval

Reference: MOE Publication ISBN 0-7729-2804-5, 1987: "Environmental Noise Assessment in Land-Use Planning".

| EXCESS ABOVE RECOMMENDED SOUND LEVEL LIMITS (dBA) | CHANGE IN SUBJECTIVE LOUDNESS ABOVE | MAGNITUDE OF THE NOISE PROBLEM | NOISE CONTROL MEASURES (OR ACTION TO BE TAKEN) |
|---|---|---|---|
| No excess (<55 dBA) | — | No expected noise problem | None |
| 1 to 5 inclusive (56 to 60 dBA) | Noticeably louder | Slight noise impact | If no physical measures are taken, then prospective purchasers or tenants should be made aware by suitable warning clauses. |
| 6 to 10 inclusive (61 - 65 dBA) | Almost twice as loud | Definite noise impact | Recommended. |
| 11 to 15 inclusive (66 - 70 dBA) | Almost three times as loud | Serious noise impact | Strongly Recommended. |
| 16 and over (>70 dBA) | Almost four times as loud | Very serious noise impact | Strongly Recommended (may be mandatory). |

# APPENDIX D

## TRANSPORTATION SOURCE
## SAMPLE SOUND LEVEL CALCULATION

```
STAMSON 5.04       NORMAL REPORT       Date: 12-04-2017 20:04:31
MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE / NOISE ASSESSMENT

Filename: b17_sw.te            Time Period: Day/Night 16/8 hours
Description: Block 17 Southwest Facade

Rail data, segment # 1: CP (day/night)
-------------------------------------
Train            ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             !             !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------+------+------+------+----
  1.             !  15.1/8.4   !  88.0 !  2.0 ! 80.0 !Diesel! Yes

Data for Segment # 1: CP (day/night)
-----------------------------------
Angle1   Angle2           : -90.00 deg   77.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  40.75 / 40.75  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
No Whistle
Reference angle           :   0.00

Results segment # 1: CP (day)
-----------------------------

LOCOMOTIVE (0.00 + 65.77 + 0.00) = 65.77 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     77   0.41  73.01  -6.10  -1.15   0.00   0.00   0.00  65.77
-------------------------------------------------------------------------

WHEEL (0.00 + 58.44 + 0.00) = 58.44 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     77   0.51  66.32  -6.55  -1.32   0.00   0.00   0.00  58.44
-------------------------------------------------------------------------

Segment Leq : 66.51 dBA

Total Leq All Segments: 66.51 dBA

Results segment # 1: CP (night)
-------------------------------

LOCOMOTIVE (0.00 + 66.23 + 0.00) = 66.23 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     77   0.41  73.47  -6.10  -1.15   0.00   0.00   0.00  66.23
-------------------------------------------------------------------------

WHEEL (0.00 + 58.90 + 0.00) = 58.90 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     77   0.51  66.78  -6.55  -1.32   0.00   0.00   0.00  58.90
-------------------------------------------------------------------------

Segment Leq : 66.97 dBA

Total Leq All Segments: 66.97 dBA
```

```
Road data, segment # 1: Hwy 50 (day/night)
------------------------------------------
Car traffic volume  : 22698/8736  veh/TimePeriod
Medium truck volume :   303/200   veh/TimePeriod
Heavy truck volume  :   327/136   veh/TimePeriod
Posted speed limit  :    90 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy 50 (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  40.10 / 40.10  m
Receiver height           :   7.50 / 7.50   m
Topography                :      4       (Elevated; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Elevation                 :   7.00 m
Barrier receiver distance :  27.24 / 27.24  m
Source elevation          :   7.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   7.00 m
Reference angle           :   0.00

Results segment # 1: Hwy 50 (day)
---------------------------------

Source height = 1.09 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.09 !        7.50 !        0.90 !         7.90

ROAD (0.00 + 66.52 + 0.00) = 66.52 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.28  72.73   0.00  -5.48  -0.73   0.00   0.00  -3.03  63.49*
   -90     90   0.28  72.73   0.00  -5.48  -0.73   0.00   0.00   0.00  66.52
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 66.52 dBA

Total Leq All Segments: 66.52 dBA
```

```
Results segment # 1: Hwy 50 (night)
-----------------------------------

Source height = 1.11 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.11 !        7.50 !        0.91 !         7.91

ROAD (0.00 + 65.77 + 0.00) = 65.77 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.28  71.97   0.00  -5.47  -0.73   0.00   0.00  -2.96  62.81*
   -90     90   0.28  71.97   0.00  -5.47  -0.73   0.00   0.00   0.00  65.77
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 65.77 dBA

Total Leq All Segments: 65.77 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.53
                           (NIGHT): 69.42
```

# APPENDIX E

## STATIONARY SOURCE ASSESSMENT AMBIENT SOUND LEVEL ANALYSIS

## E AMBIENT SOUND LEVEL ANALYSIS

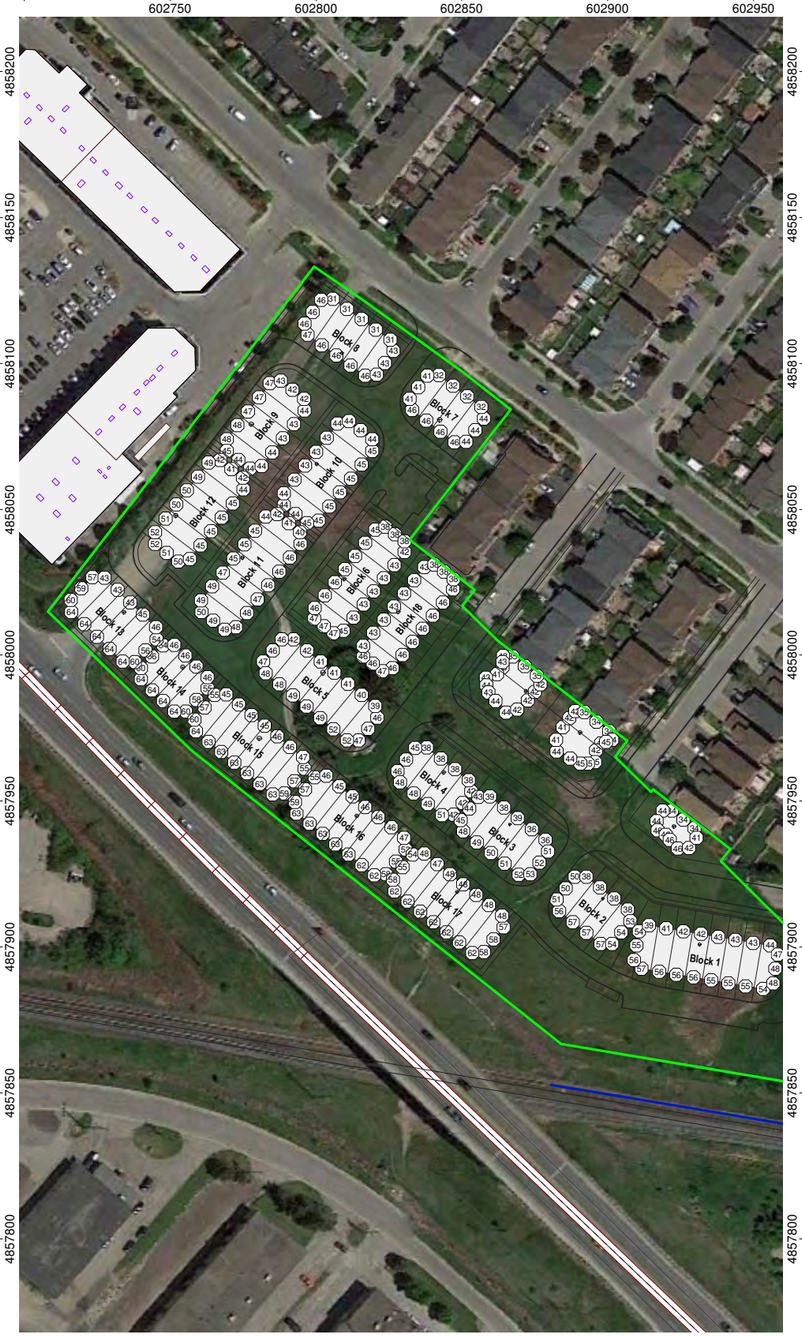
The minimum ambient sound levels due to Highway 50 were predicted at the proposed residential buildings using the CadnaA implementation of the RLS-90 traffic model. This is considered conservative as RLS-90 predicts sound levels that are typically lower than those predicted using the MOE ORNAMENT/STAMSON method.

The minimum hourly traffic volumes for the daytime, evening and nighttime periods were taken from the hourly traffic counts done by Ontario Traffic, Inc. from January 18, 2017 to January 23, 2017 (see attached traffic counts). The minimum volumes are:

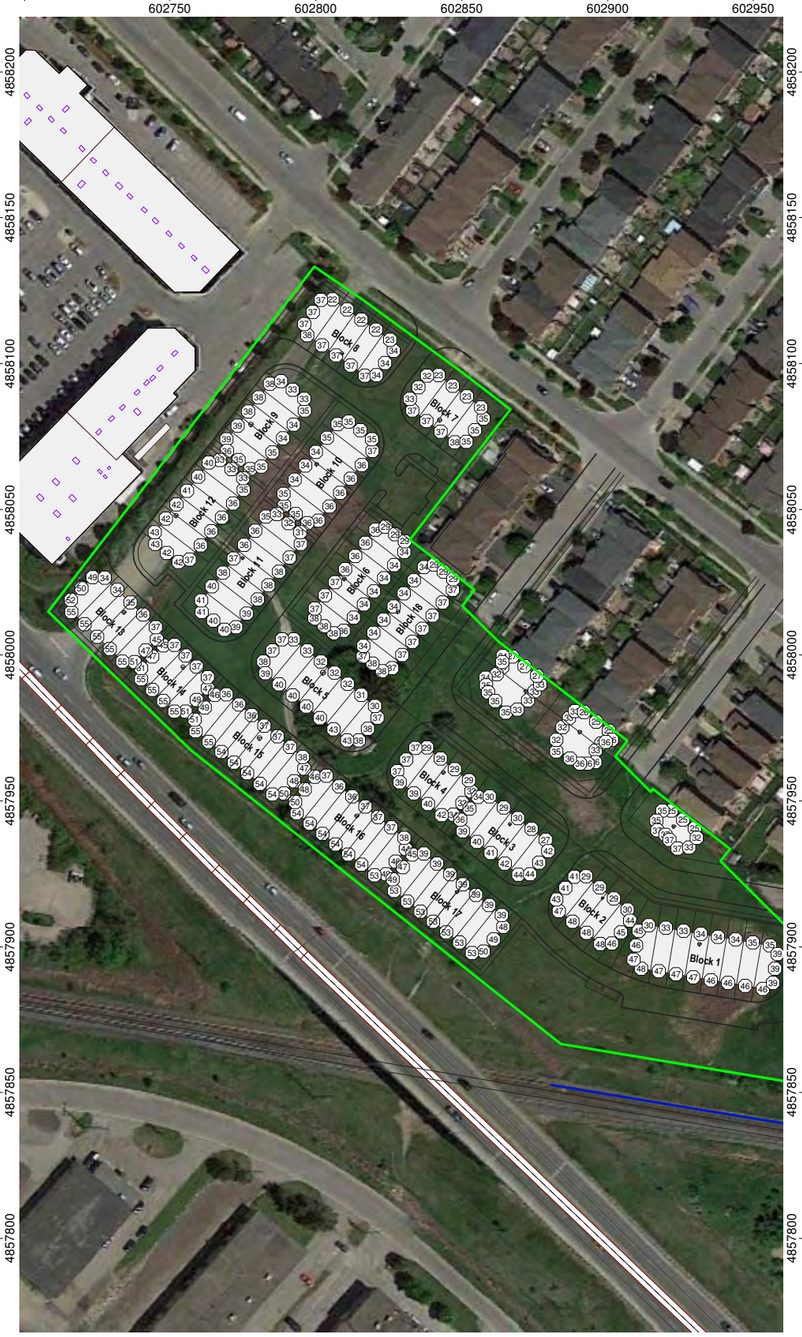
- Daytime – 447 vehicles per hour;
- Evening – 569 vehicles per hour; and
- Nighttime – 74 vehicles per hour.

These volumes were then entered into the RLS-90 model to determine the applicable ambient sound levels. Figure E-1 shows the predicted sound levels due to road traffic at all dwellings for the daytime, evening and nighttime scenarios.


Daytime (0700-1900 Hours)




Evening (1900-2300 Hours)




Nighttime (2300-0700 Hours)

VALCOUSTICS
Canada Ltd.
consulting acoustical engineers

Title
**Predicted Ambient Sound Levels (dBA) due to Road Traffic**

Project Name
**Villalago Residences/Bolton**

Date
**2017-04-06**

Project No.
**116-0170**

Figure
**E-1**

G:\AA\1160170\Cadna\2017-04-06 Villalago.cna

Date Plotted: 12.04.17

# APPENDIX F

## STATIONARY NOISE SOURCE ASSESSMENT QUEENSGATE PLAZA

# 116-0170 Villalago Residences/Bolton

## Point Source Table

| Name | M. | ID | Result. PWL | | | Lw / Li | | | Correction | | | Sound Reduction | | Attenuation | Operating Time | | | K0 | Freq. | Direct. | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Evening | Night | Type | Value | norm. | Day | Evening | Night | R | Area | | Day | Special | Night | | | | | | X | Y | Z |
| | | | (dBA) | (dBA) | (dBA) | | | dB(A) | dB(A) | dB(A) | dB(A) | | (m²) | | (min) | (min) | (min) | (dB) | (Hz) | | (m) | | (m) | (m) | (m) |
| EF-1 (Carnes VEBK10) | | EF1 | 75.9 | 75.9 | 75.9 | Lw | EF01 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 0.90 | g | 602708.43 | 4858036.60 | 261.82 |
| EF-2 (Carnes VEBK10) | | EF2 | 77.0 | 77.0 | 77.0 | Lw | EF02 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 0.90 | g | 602692.11 | 4858052.51 | 261.82 |
| CC1 (Cancoil unit) | | CC1 | 79.2 | 79.2 | 79.2 | Lw | CC | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 0.80 | g | 602714.92 | 4858039.89 | 261.72 |
| RTU-1 (Carrier 48TFE008) | | RTU01 | 76.1 | 76.1 | 76.1 | Lw | RTU_01 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.15 | g | 602711.24 | 4858048.52 | 262.07 |
| RTU-2 (Carrier 48TFE008) | | RTU02 | 76.1 | 76.1 | 76.1 | Lw | RTU_01 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.15 | g | 602705.53 | 4858054.00 | 262.07 |
| RTU-3 (Carrier 48TFE008) | | RTU03 | 76.1 | 76.1 | 76.1 | Lw | RTU_01 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.15 | g | 602716.50 | 4858053.87 | 262.07 |
| RTU-4 (Carrier 48TFE008) | | RTU04 | 76.1 | 76.1 | 76.1 | Lw | RTU_01 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.15 | g | 602710.82 | 4858059.34 | 262.07 |
| RTU-5 (Carrier 48TFE008) | | RTU05 | 76.1 | 76.1 | 76.1 | Lw | RTU_01 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.15 | g | 602717.76 | 4858066.64 | 262.07 |
| KR (Keeprite REZA 045L6) | | KR | 83.8 | 83.8 | 83.8 | Lw | KR | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602727.73 | 4858061.17 | 261.92 |
| CC2 (Cancoil DCU) | | CC2 | 79.2 | 79.2 | 79.2 | Lw | CC | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 0.90 | g | 602725.91 | 4858062.98 | 261.82 |
| RS (Russel Scottsboro RLH21544-E) | | RS | 73.4 | 73.4 | 73.4 | Lw | RS | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 0.60 | g | 602729.05 | 4858064.23 | 261.52 |
| RTU-6 (Carrier 48TCEA06A) | | RTU06 | 75.6 | 75.6 | 75.6 | Lw | RTU_06 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602725.52 | 4858076.50 | 260.72 |
| RTU-7 (Carrier 48TCEA07A) | | RTU07 | 78.2 | 78.2 | 78.2 | Lw | RTU_07 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.20 | g | 602729.96 | 4858081.10 | 260.92 |
| RTU-8 (Carrier 48TFE006) | | RTU08 | 79.9 | 79.9 | 79.9 | Lw | RTU_08 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602733.69 | 4858084.99 | 260.72 |
| RTU-9 (Carrier 48TME008) | | RTU09 | 76.5 | 76.5 | 76.5 | Lw | RTU_09 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.20 | g | 602738.74 | 4858083.52 | 260.92 |
| RTU-10 (Carrier 48TCEA06A) | | RTU10 | 75.6 | 75.6 | 75.6 | Lw | RTU_06 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602738.68 | 4858090.09 | 260.72 |
| RTU-11 (Carrier 48TFE006) | | RTU11 | 79.9 | 79.9 | 79.9 | Lw | RTU_08 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602741.89 | 4858093.42 | 260.72 |
| RTU-12 (Carrier 48TCEA06A) | | RTU12 | 75.6 | 75.6 | 75.6 | Lw | RTU_06 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602746.53 | 4858098.34 | 260.72 |
| RTU-13 (Carrier 48TCEA06A) | | RTU13 | 75.6 | 75.6 | 75.6 | Lw | RTU_06 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602751.53 | 4858103.49 | 260.72 |
| KEF1 (No tag) | | KEF1 | 86.7 | 86.7 | 86.7 | Lw | KEF | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 0.00 | 0.0 | | (none) | 1.70 | g | 602743.98 | 4858095.00 | 261.42 |
| RTU-14 (Carrier 48TFE008) | | RTU14 | 76.1 | 76.1 | 76.1 | Lw | RTU_14 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.20 | g | 602694.80 | 4858197.62 | 263.30 |
| RTU-15 (Carrier 48TCEA06A) | | RTU15 | 77.1 | 77.1 | 77.1 | Lw | RTU_15 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602700.90 | 4858191.87 | 263.10 |
| RTU-16 (Carrier 48TCEA06A) | | RTU16 | 77.1 | 77.1 | 77.1 | Lw | RTU_15 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602705.26 | 4858187.63 | 263.10 |
| RTU-17 (Lennox KGA036S4) | | RTU17 | 74.5 | 74.5 | 74.5 | Lw | RTU_17 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.10 | g | 602701.30 | 4858183.00 | 263.20 |
| RTU-18 (Carrier 48TCEA06A) | | RTU18 | 77.1 | 77.1 | 77.1 | Lw | RTU_15 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602709.25 | 4858183.75 | 263.10 |
| RTU-19 (Lennox KGA060S4) | | RTU19 | 80.1 | 80.1 | 80.1 | Lw | RTU_19 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.10 | g | 602714.18 | 4858187.26 | 263.20 |
| RTU-20 (Carrier 48TFE006) | | RTU20 | 82.5 | 82.5 | 82.5 | Lw | RTU_20 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602713.38 | 4858179.84 | 263.10 |
| RTU-21 (Carrier 48TCEA07A) | | RTU21 | 79.8 | 79.8 | 79.8 | Lw | RTU_21 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.20 | g | 602719.76 | 4858173.66 | 263.30 |
| EF-3 (Greenheck CUBE-180HP) | | EF3 | 85.6 | 85.6 | 85.6 | Lw | EF03 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 0.00 | 0.0 | | (none) | 0.90 | g | 602703.75 | 4858203.04 | 263.00 |
| EF-4 (Carnes VRBK18) | | EF4 | 79.9 | 79.9 | 79.9 | Lw | EF08 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 0.00 | 0.0 | | (none) | 1.40 | g | 602710.76 | 4858197.08 | 263.50 |
| KEF2 (Delhi BI-20RM) | | KEF2 | 86.7 | 86.7 | 86.7 | Lw | KEF | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 0.00 | 0.0 | | (none) | 2.20 | g | 602715.26 | 4858190.72 | 264.30 |
| EF-5 (Carnes VUBK08) | | EF5 | 76.5 | 76.5 | 76.5 | Lw | EF07 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 0.00 | 0.0 | | (none) | 0.90 | g | 602708.24 | 4858191.70 | 263.00 |
| EF-6 (Carnes VUBK08) | | EF6 | 76.5 | 76.5 | 76.5 | Lw | EF07 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 0.00 | 0.0 | | (none) | 0.90 | g | 602717.17 | 4858187.92 | 263.00 |
| CND-1 (Hill unit) | | CND1 | 84.2 | 84.2 | 84.2 | Lw | CND1 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.60 | g | 602709.89 | 4858177.26 | 263.70 |
| CND-2 (Larkin unit) | | CND2 | 78.6 | 78.6 | 78.6 | Lw | LK | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 0.70 | g | 602708.29 | 4858175.63 | 262.80 |
| CND-3 (Tecumseh AGA4563EXTHL) | | CND3 | 83.9 | 83.9 | 83.9 | Lw | CND3 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602699.18 | 4858196.74 | 263.10 |
| EF-7 (Carnes VEBK06) | | EF7 | 76.5 | 76.5 | 76.5 | Lw | EF07 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 0.90 | g | 602702.73 | 4858186.03 | 263.00 |
| RTU-22 (Carrier 48TCEA06) | | RTU22 | 73.3 | 73.3 | 73.3 | Lw | RTU_22 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602723.67 | 4858169.65 | 261.28 |
| RTU-23 (Carrier 48TCEA06) | | RTU23 | 73.3 | 73.3 | 73.3 | Lw | RTU_22 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602727.92 | 4858165.39 | 261.28 |
| RTU-24 (Carrier 48TFE008) | | RTU24 | 76.1 | 76.1 | 76.1 | Lw | RTU_14 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.20 | g | 602732.45 | 4858160.89 | 261.48 |
| RTU-25 (Carrier 48TFE006) | | RTU25 | 72.6 | 72.6 | 72.6 | Lw | RTU_25 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602736.21 | 4858157.38 | 261.28 |
| RTU-26 (Carrier 48TCEA06) | | RTU26 | 73.3 | 73.3 | 73.3 | Lw | RTU_22 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602741.10 | 4858152.65 | 261.28 |
| RTU-27 (Carrier 48TCEA06) | | RTU27 | 73.3 | 73.3 | 73.3 | Lw | RTU_22 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602744.94 | 4858148.95 | 261.28 |
| RTU-28 (Carrier 48TFE006) | | RTU28 | 72.6 | 72.6 | 72.6 | Lw | RTU_25 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602749.61 | 4858144.46 | 261.28 |
| RTU-29 (Carrier 48TFE006) | | RTU29 | 72.6 | 72.6 | 72.6 | Lw | RTU_25 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602753.86 | 4858140.31 | 261.28 |
| RTU-30 (Carrier 48TFE006) | | RTU30 | 72.6 | 72.6 | 72.6 | Lw | RTU_25 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.00 | g | 602758.18 | 4858136.21 | 261.28 |
| RTU-31 (Carrier 48TFE008) | | RTU31 | 76.1 | 76.1 | 76.1 | Lw | RTU_14 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.20 | g | 602762.19 | 4858132.16 | 261.48 |
| RTU-32 (Air Wise CHA16-120-2J) | | RTU32 | 76.3 | 76.3 | 76.3 | Lw | RTU_32 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.40 | g | 602719.54 | 4858161.52 | 261.68 |
| EF-8 (Carnes VRBK15) | | EF8 | 79.9 | 79.9 | 79.9 | Lw | EF08 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 0.90 | g | 602728.78 | 4858170.31 | 261.18 |
| EF-9 (Carnes VRBK15) | | EF9 | 79.9 | 79.9 | 79.9 | Lw | EF08 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 1.20 | g | 602724.13 | 4858165.56 | 261.48 |
| EF-10 (Carnes VUBK08) | | EF10 | 76.5 | 76.5 | 76.5 | Lw | EF07 | | 0.0 | 0.0 | 0.0 | | | | 60.00 | 60.00 | 30.00 | 0.0 | | (none) | 0.90 | g | 602743.00 | 4858153.43 | 261.18 |
| Idling truck | | TRK | 99.6 | 99.6 | 99.6 | Lw | HvyTrkIdle | | 0.0 | 0.0 | 0.0 | | | | 2.00 | 0.00 | 0.00 | 0.0 | | (none) | 3.50 | g | 602749.45 | 4858078.87 | 256.65 |

# 116-0170 Villalago Residences/Bolton

## Line Source Table

| Name | M. | ID | Result. PWL | | | Result. PWL' | | | Lw / Li | | | Correction | | | Sound Reduction | | Attenuation | Operating Time | | | K0 | Freq. | Direct. | Moving Pt. Src | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Evening | Night | Day | Evening | Night | Type | Value | norm. | Day | Evening | Night | R | Area | | Day | Special | Night | | | | Number | | | Speed |
| | | | (dBA) | (dBA) | (dBA) | (dBA) | (dBA) | (dBA) | | | dB(A) | dB(A) | dB(A) | dB(A) | | (m²) | | (min) | (min) | (min) | (dB) | (Hz) | | Day | Evening | Night | (km/h) |
| Truck movement | | TRKmove | 89.1 | -14.0 | -14.0 | 66.1 | -36.9 | -36.9 | PWL-Pt | TRKmove | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 2.0 | 0.0 | 0.0 | 20.0 |

## Sound Level Library

| Name | ID | Type | Oktave Spectrum (dB) | | | | | | | | | | | | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Weight. | 31.5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | A | lin | |
| Carnes VEBK10 | EF01 | Lw | | 74.2 | 76.6 | 80.5 | 79.4 | 72.9 | 69.6 | 65.6 | 57.4 | 49.9 | 75.9 | 84.9 | 2016-07-20 VCL Measurements |
| Carnes VEBK10 | EF02 | Lw | | 73.0 | 74.8 | 79.3 | 80.7 | 75.4 | 69.2 | 66.0 | 59.9 | 55.0 | 77.0 | 84.8 | 2016-07-20 VCL Measurements |
| Carrier 48TFE008 | RTU_01 | Lw | | 80.0 | 83.2 | 81.2 | 76.7 | 74.7 | 70.4 | 65.2 | 60.4 | 54.4 | 76.1 | 87.3 | 2016-07-20 VCL Measurements |
| Cancoil DCU | CC | Lw | | 74.3 | 85.3 | 83.6 | 79.3 | 76.3 | 75.1 | 69.0 | 62.4 | 57.0 | 79.2 | 88.8 | 2016-07-20 VCL Measurements |
| Russel Scottsboro RLH21544-E | RS | Lw | | 68.8 | 73.1 | 73.3 | 69.0 | 70.6 | 65.9 | 68.4 | 60.5 | 54.9 | 73.4 | 79.1 | 2016-07-20 VCL Measurements |
| Carrier 48TCEA06A | RTU_06 | Lw | | 76.3 | 81.9 | 81.3 | 77.3 | 73.0 | 70.4 | 64.0 | 57.7 | 52.5 | 75.6 | 86.3 | 2016-07-20 VCL Measurements |
| Carrier 48TCEA07A | RTU_07 | Lw | | 0.0 | 88.8 | 81.8 | 76.9 | 74.4 | 73.3 | 69.8 | 66.3 | 62.7 | 78.2 | 90.1 | Manufacturer's data |
| Carrier 48TFE006 | RTU_08 | Lw | | 75.8 | 84.0 | 82.3 | 78.6 | 76.9 | 75.1 | 72.1 | 67.0 | 60.4 | 79.9 | 88.0 | 2016-07-20 VCL Measurements |
| Carrier 48TME008 | RTU_09 | Lw | | 80.5 | 86.1 | 80.3 | 79.4 | 74.4 | 70.2 | 64.4 | 60.2 | 54.5 | 76.5 | 88.8 | 2016-07-20 VCL Measurements |
| Carrier 48TFE008 | RTU_14 | Lw | | 75.4 | 81.3 | 81.2 | 77.4 | 73.1 | 71.1 | 65.9 | 60.9 | 57.4 | 76.1 | 86.0 | 2016-07-20 VCL Measurements |
| Carrier 48TCEA06A | RTU_15 | Lw | | 77.6 | 83.3 | 83.8 | 77.5 | 74.5 | 72.3 | 65.9 | 59.6 | 54.5 | 77.1 | 87.9 | 2016-07-20 VCL Measurements |
| Lennox KGA036S4 | RTU_17 | Lw | | 0.0 | 0.0 | 63.0 | 66.0 | 70.0 | 71.0 | 68.0 | 62.0 | 53.0 | 74.5 | 75.6 | Manufacturer's data |
| Lennox KGA060S4 | RTU_19 | Lw | | 0.0 | 0.0 | 67.0 | 72.0 | 77.0 | 76.0 | 73.0 | 68.0 | 61.0 | 80.1 | 81.4 | Manufacturer's data |
| Carrier 48TFE006 | RTU_20 | Lw | | 76.5 | 85.5 | 84.1 | 80.6 | 79.4 | 77.8 | 74.9 | 69.7 | 63.0 | 82.5 | 89.8 | 2016-07-20 VCL Measurements |
| Carrier 48TCEA07A | RTU_21 | Lw | | 70.5 | 82.6 | 80.1 | 82.0 | 78.1 | 73.7 | 68.8 | 65.2 | 62.5 | 79.8 | 87.4 | 2016-07-20 VCL Measurements |
| Carnes VRBK18 | EF03 | Lw | | 89.2 | 82.9 | 84.1 | 88.7 | 84.8 | 78.5 | 74.1 | 67.3 | 61.7 | 85.6 | 93.8 | 2016-07-20 VCL Measurements |
| Hill unit | CND1 | Lw | | 75.0 | 83.0 | 83.3 | 82.7 | 81.6 | 81.2 | 72.0 | 68.2 | 65.3 | 84.2 | 89.7 | 2016-07-20 VCL Measurements |
| Tecumseh AGA4563EXTHL | CND3 | Lw | | 82.3 | 86.1 | 87.4 | 83.8 | 82.6 | 78.1 | 74.5 | 67.9 | 60.1 | 83.9 | 92.2 | 2016-07-20 VCL Measurements |
| Carnes VEBK06 | EF07 | Lw | | 73.7 | 75.8 | 80.0 | 80.1 | 74.3 | 69.4 | 65.8 | 58.8 | 53.1 | 76.5 | 84.8 | 2016-07-20 VCL Measurements |
| Carrier 48TCEA06 | RTU_22 | Lw | | 74.5 | 79.8 | 75.3 | 77.1 | 70.9 | 67.0 | 60.8 | 54.4 | 48.7 | 73.3 | 83.6 | 2016-07-20 VCL Measurements |
| Carrier 48TFE006 | RTU_25 | Lw | | 74.9 | 81.7 | 79.0 | 74.9 | 70.0 | 66.1 | 61.6 | 58.1 | 52.6 | 72.6 | 84.9 | 2016-07-20 VCL Measurements |
| Air Wise CHA16-120-2J | RTU_32 | Lw | | 75.9 | 78.8 | 73.8 | 73.4 | 74.2 | 71.9 | 68.7 | 60.0 | 52.4 | 76.3 | 83.2 | 2016-07-20 VCL Measurements |
| Carnes VRBK15 | EF08 | Lw | | 80.0 | 79.4 | 78.2 | 85.1 | 77.2 | 71.9 | 67.6 | 62.4 | 55.4 | 79.9 | 88.1 | 2016-07-20 VCL Measurements |
| Keeprite Condenser | KR | Lw | | 84.1 | 84.7 | 86.5 | 81.8 | 77.5 | 77.8 | 75.1 | 77.1 | 72.4 | 83.8 | 91.4 | 2016-07-20 VCL Measurements |
| Larkin condenser | LK | Lw | | 87.5 | 89.6 | 86.8 | 81.0 | 76.9 | 70.5 | 65.3 | 58.9 | 53.9 | 78.6 | 93.3 | 2016-07-20 VCL Measurements |
| Kitchen Exhaust Fan | KEF | Lw | | 87.2 | 88.1 | 87.0 | 86.2 | 84.9 | 81.4 | 78.5 | 71.7 | 64.5 | 86.7 | 94.2 | VCL Database |
| Trailer refrigeration unit | TRU | Lw | | 0.0 | 111.2 | 104.4 | 100.2 | 96.5 | 97.1 | 93.7 | 88.5 | 81.3 | 101.4 | 112.6 | VCL Database |
| Heavy truck @ 20 kph | TRKmove | Lw | | 0.0 | 111.8 | 110.3 | 106.4 | 102.6 | 99.7 | 97.7 | 95.6 | 92.1 | 106.1 | 115.3 | VCL Database |
| Heavy truck idling (69 dBA @ 15m) | HvyTrkIdle | Lw | | 0.0 | 101.5 | 101.2 | 96.6 | 96.4 | 95.7 | 91.6 | 84.2 | 78.1 | 99.6 | 106.2 | VCL Database |

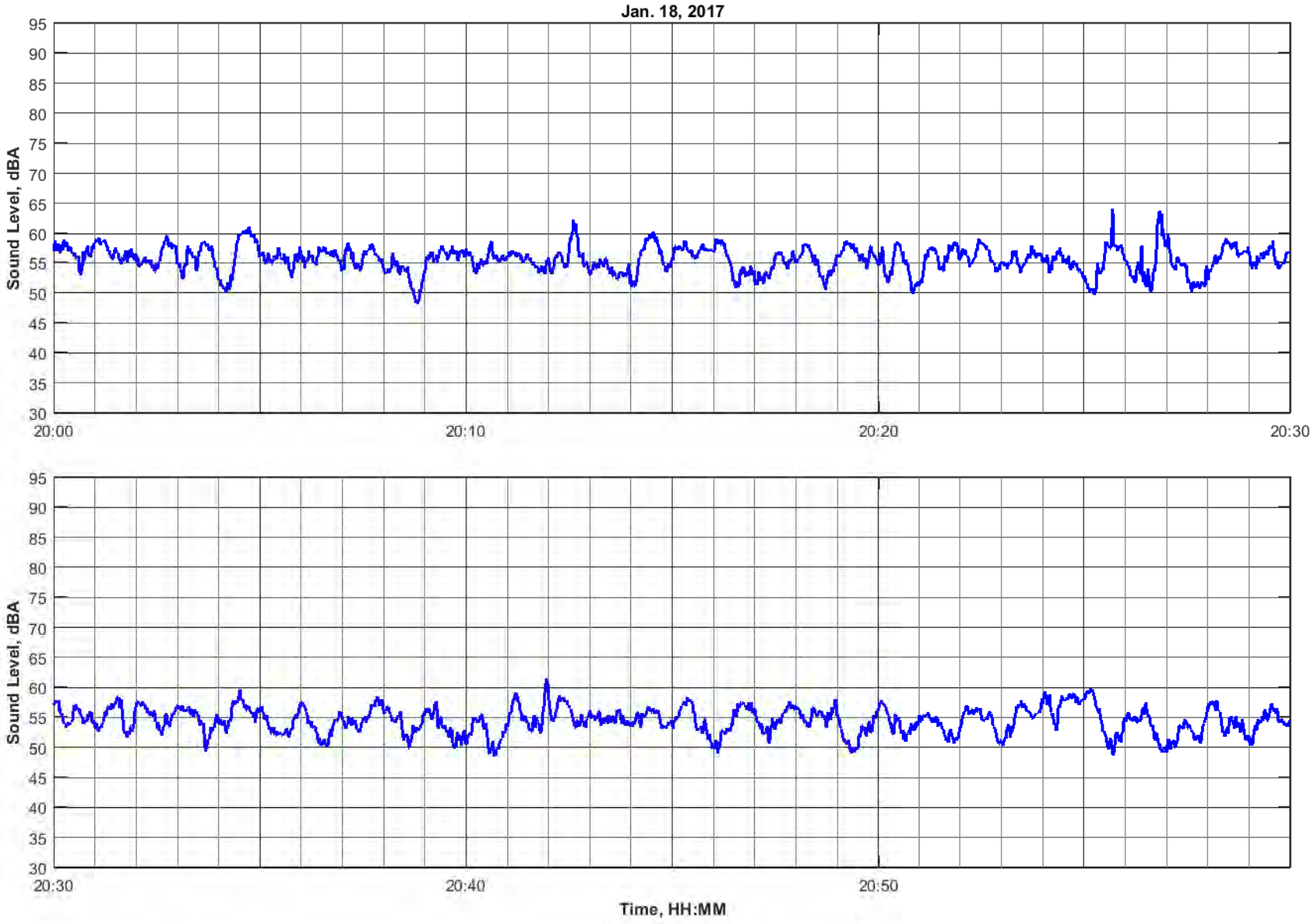
# 116-0170 Villalago Residences/Bolton

Calculation Configuration

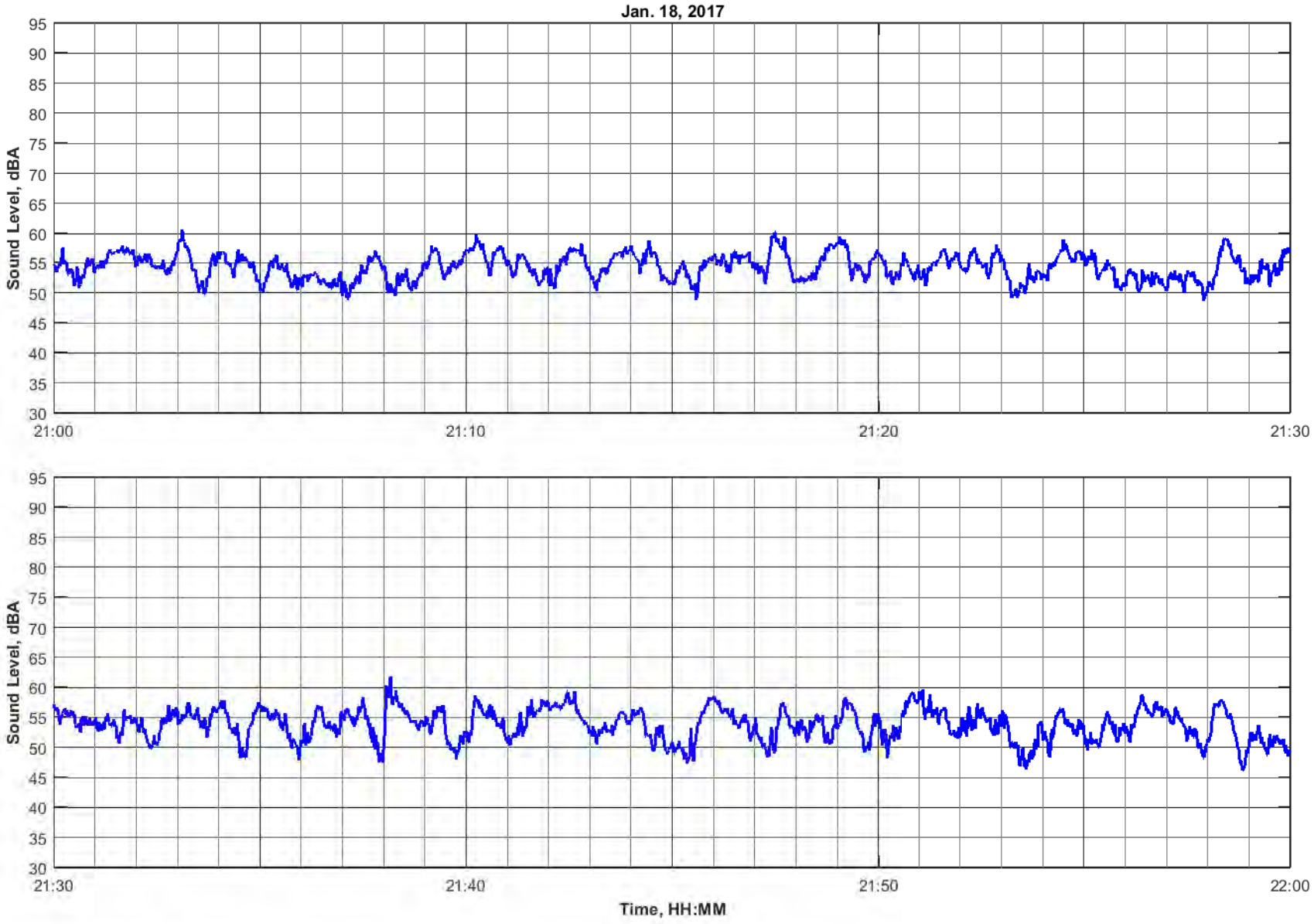
| Configuration | |
|---|---|
| Parameter | Value |
| General | |
| Country | International |
| Max. Error (dB) | 0.00 |
| Max. Search Radius (m) | 2000.00 |
| Min. Dist Src to Rcvr | 0.00 |
| Partition | |
| Raster Factor | 0.50 |
| Max. Length of Section (m) | 1000.00 |
| Min. Length of Section (m) | 1.00 |
| Min. Length of Section (%) | 0.00 |
| Proj. Line Sources | On |
| Proj. Area Sources | On |
| Ref. Time | |
| Reference Time Day (min) | 960.00 |
| Reference Time Night (min) | 480.00 |
| Daytime Penalty (dB) | 0.00 |
| Recr. Time Penalty (dB) | 6.00 |
| Night-time Penalty (dB) | 10.00 |
| DTM | |
| Standard Height (m) | 250.00 |
| Model of Terrain | Triangulation |
| Reflection | |
| max. Order of Reflection | 1 |
| Search Radius Src | 100.00 |
| Search Radius Rcvr | 100.00 |
| Max. Distance Source - Rcvr | 1000.00 1000.00 |
| Min. Distance Rvcr - Reflector | 1.00 1.00 |
| Min. Distance Source - Reflector | 0.10 |
| Industrial (ISO 9613) | |
| Lateral Diffraction | some Obj |
| Obst. within Area Src do not shield | On |
| Screening | Excl. Ground Att. over Barrier |
| | Dz with limit (20/25) |
| Barrier Coefficients C1,2,3 | 3.0 20.0 0.0 |
| Temperature (°C) | 10 |
| rel. Humidity (%) | 70 |
| Ground Absorption G | 0.00 |
| Wind Speed for Dir. (m/s) | 3.0 |
| Roads (RLS-90) | |
| Strictly acc. to RLS-90 | |
| Railways (Schall 03 (1990)) | |
| Strictly acc. to Schall 03 / Schall-Transrapid | |
| Aircraft (???) | |
| Strictly acc. to AzB | |

# APPENDIX G

## LONG-TERM MEASUREMENTS




| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | **Title**<br>**Time History - Location 1** | **Date**<br>**2017-04-18** | **Figure**<br>**G1** |
| | **Project Name**<br>**Villalago Residences/Bolton** | **Project Number**<br>**116-0170** | |

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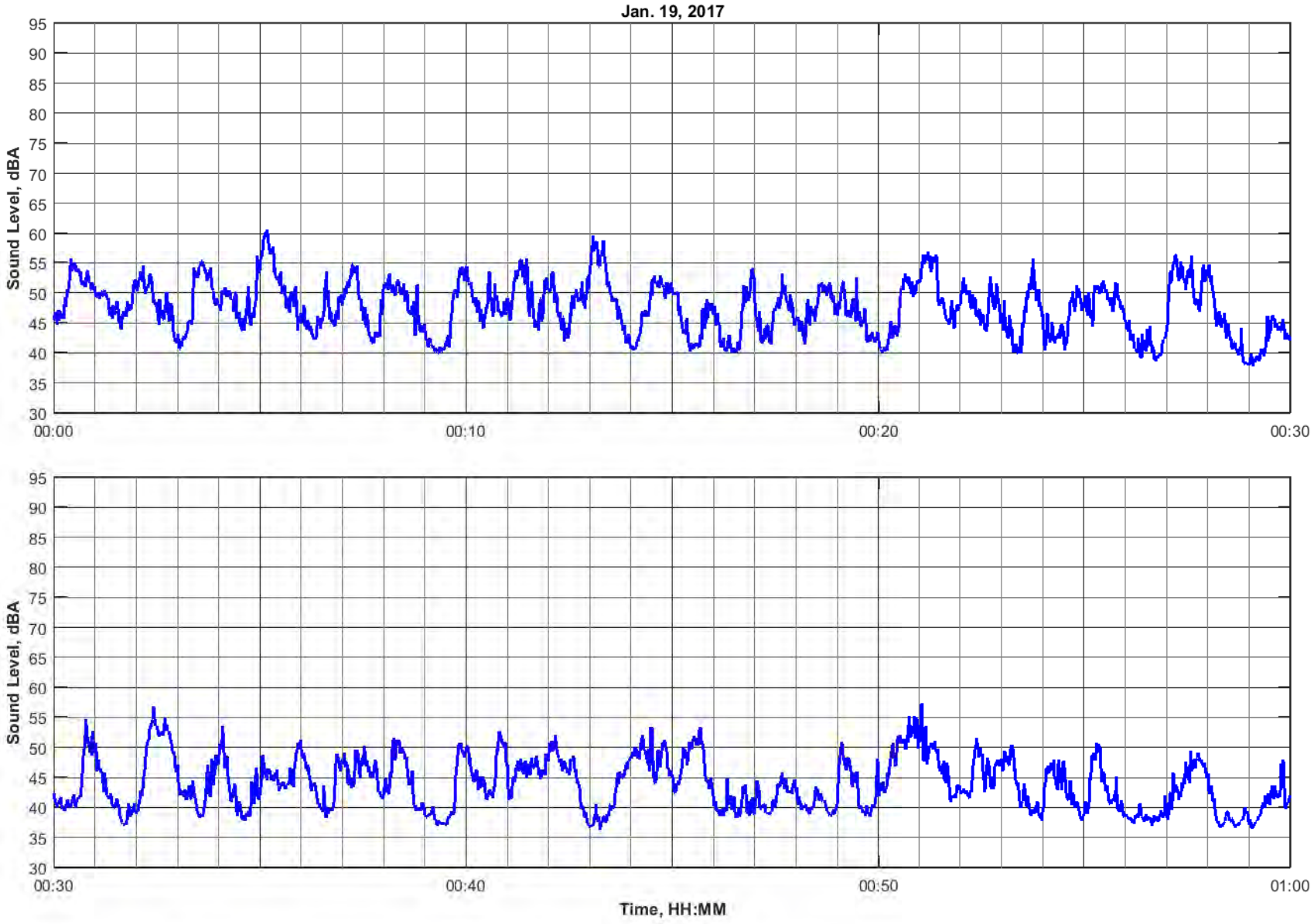
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 1** | Date<br>**2017-04-18** | Figure<br>**G2** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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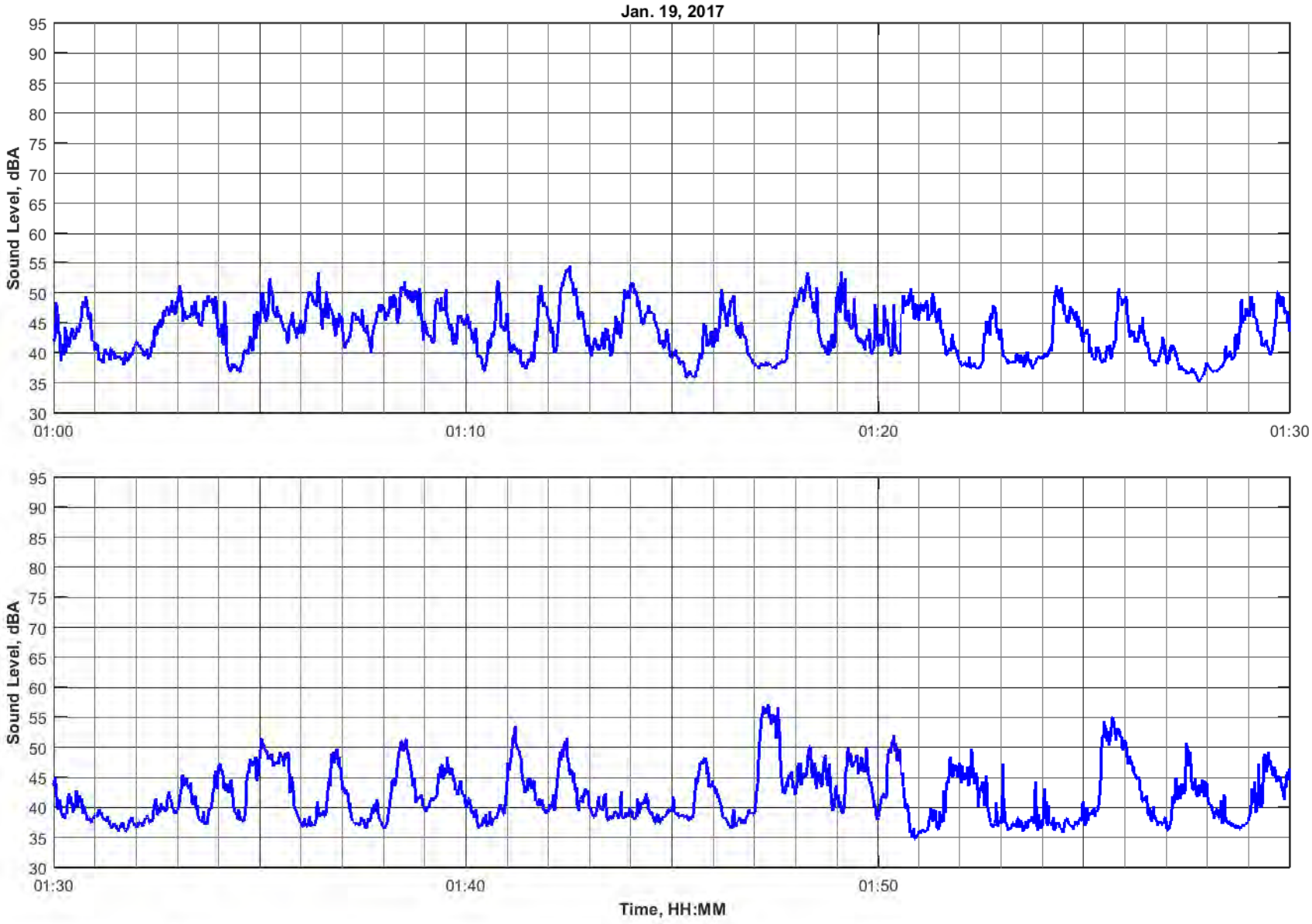
| VALCOUSTICS Canada Ltd. | **Title**<br>**Time History - Location 1** | **Date**<br>**2017-04-18** | **Figure**<br>**G3** |
| | **Project Name**<br>**Villalago Residences/Bolton** | **Project Number**<br>**116-0170** | |

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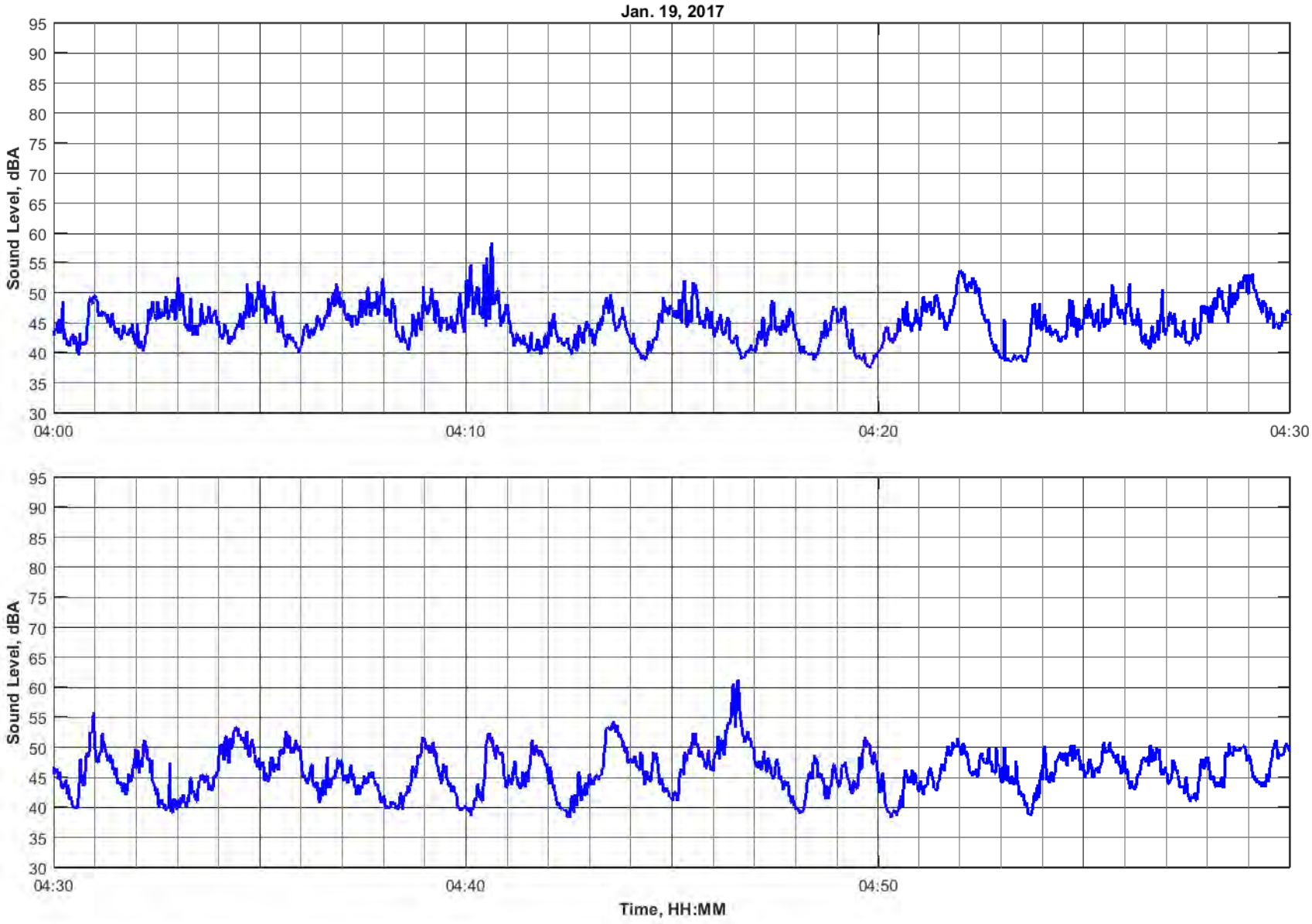
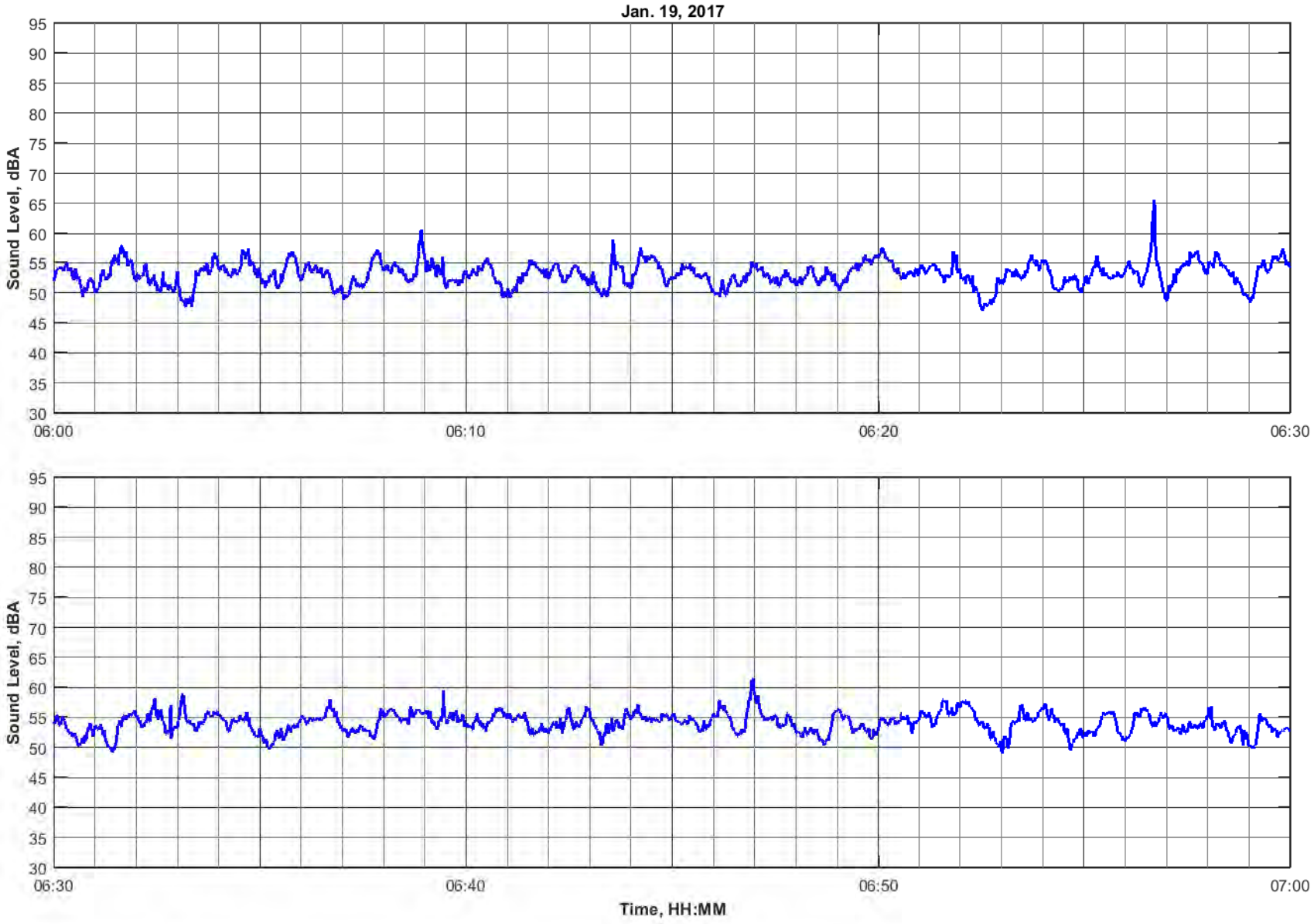
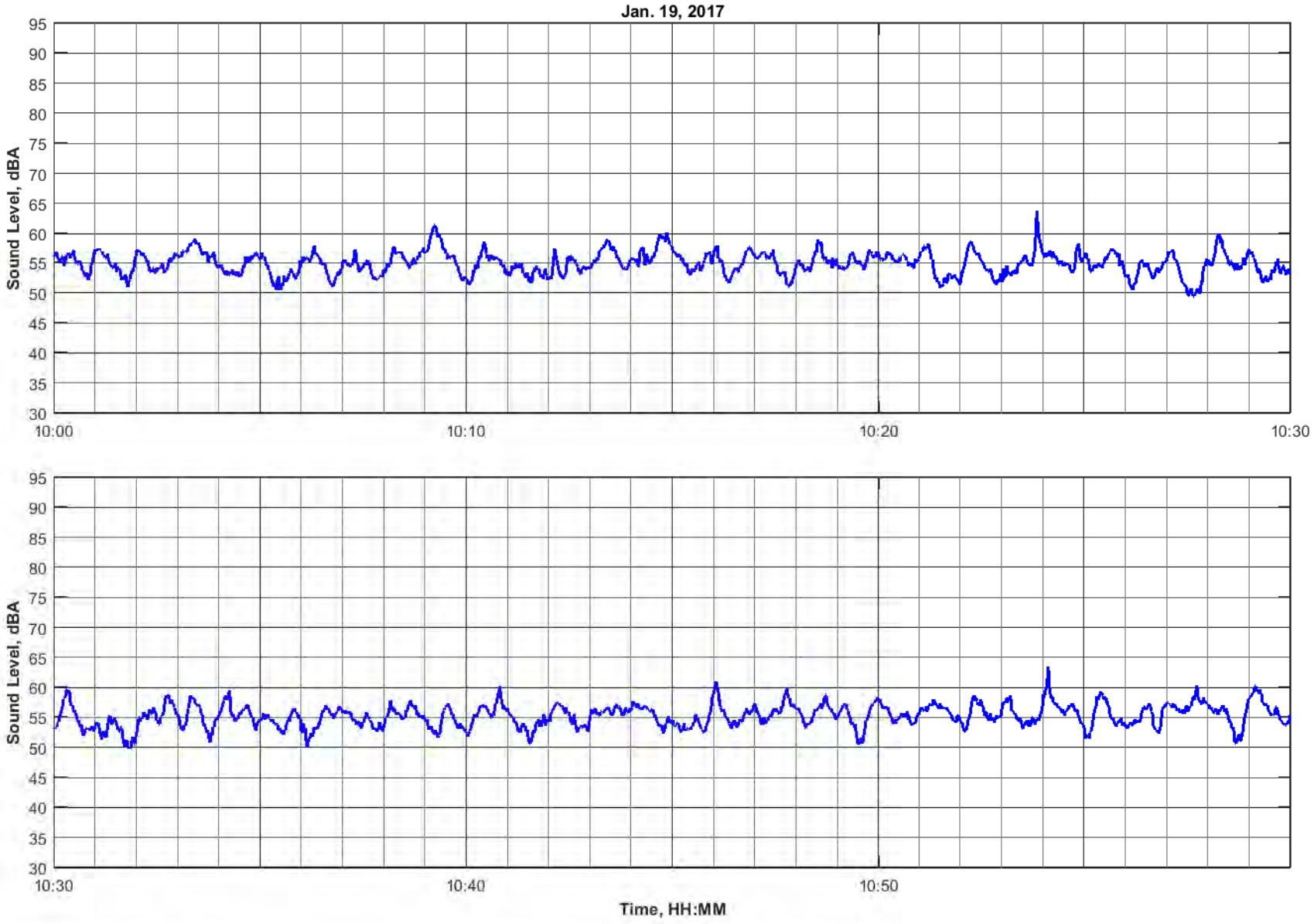
| VALCOUSTICS Canada Ltd. | **Title**<br>**Time History - Location 1** | **Date**<br>**2017-04-18** | **Figure**<br>**G4** |
| | **Project Name**<br>**Villalago Residences/Bolton** | **Project Number**<br>**116-0170** | |



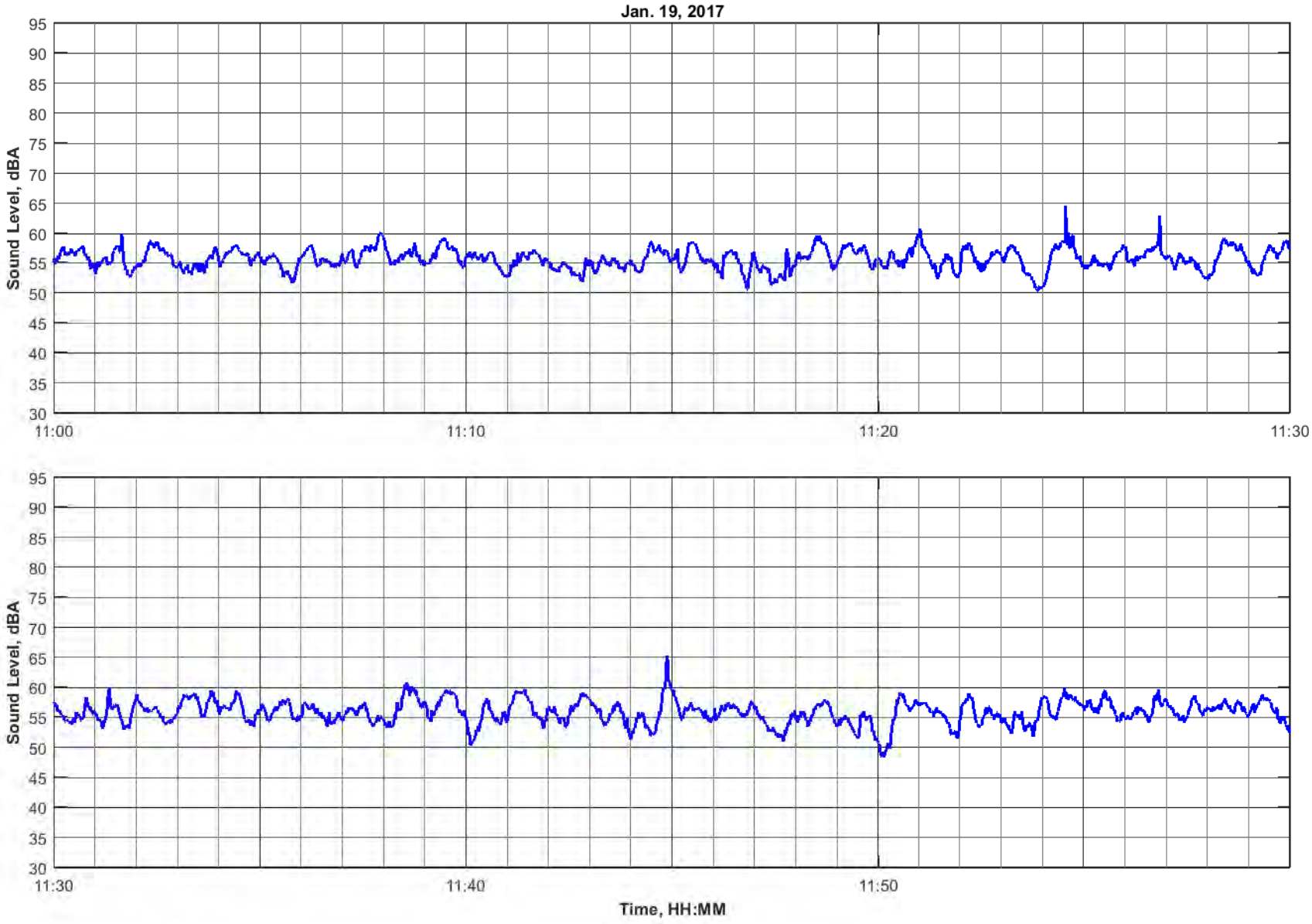

| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | **Title**<br>**Time History - Location 1** | **Date**<br>**2017-04-18** | **Figure**<br>**G5** |
| | **Project Name**<br>**Villalago Residences/Bolton** | **Project Number**<br>**116-0170** | |



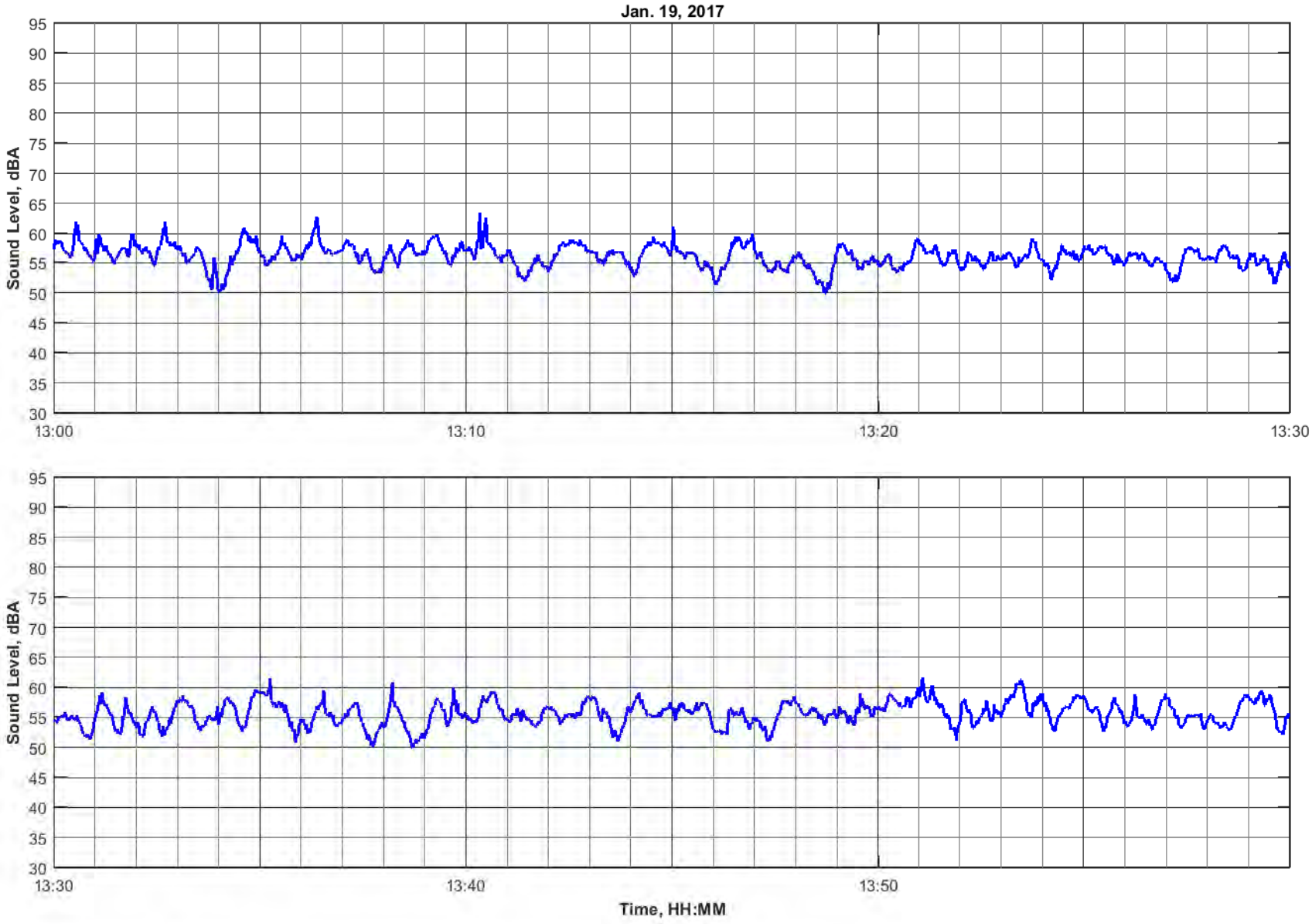

| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | **Title**<br>**Time History - Location 1** | **Date**<br>**2017-04-18** | **Figure**<br>**G6** |
| | **Project Name**<br>**Villalago Residences/Bolton** | **Project Number**<br>**116-0170** | |



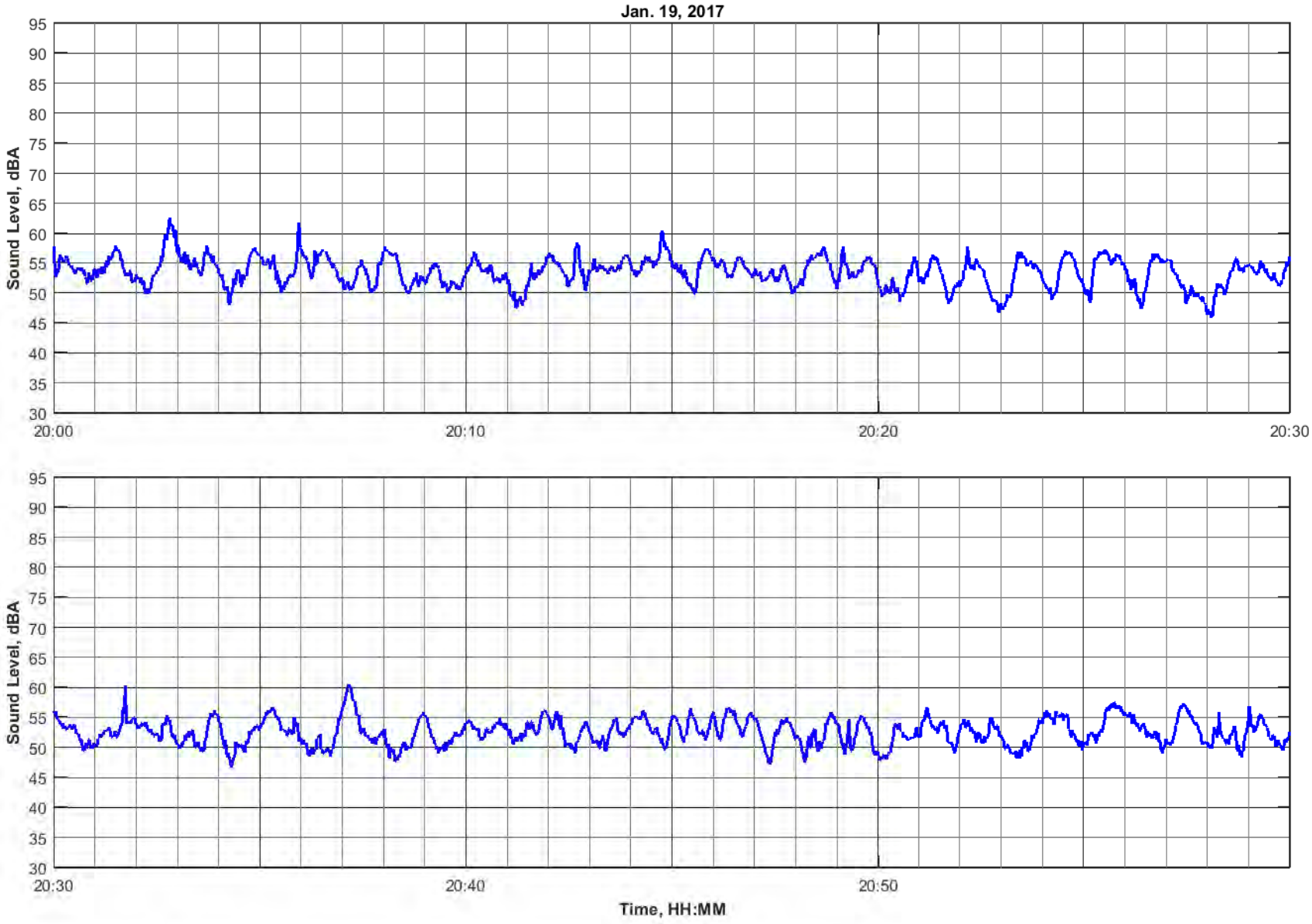

| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 1** | Date<br>**2017-04-18** | Figure<br>**G7** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |



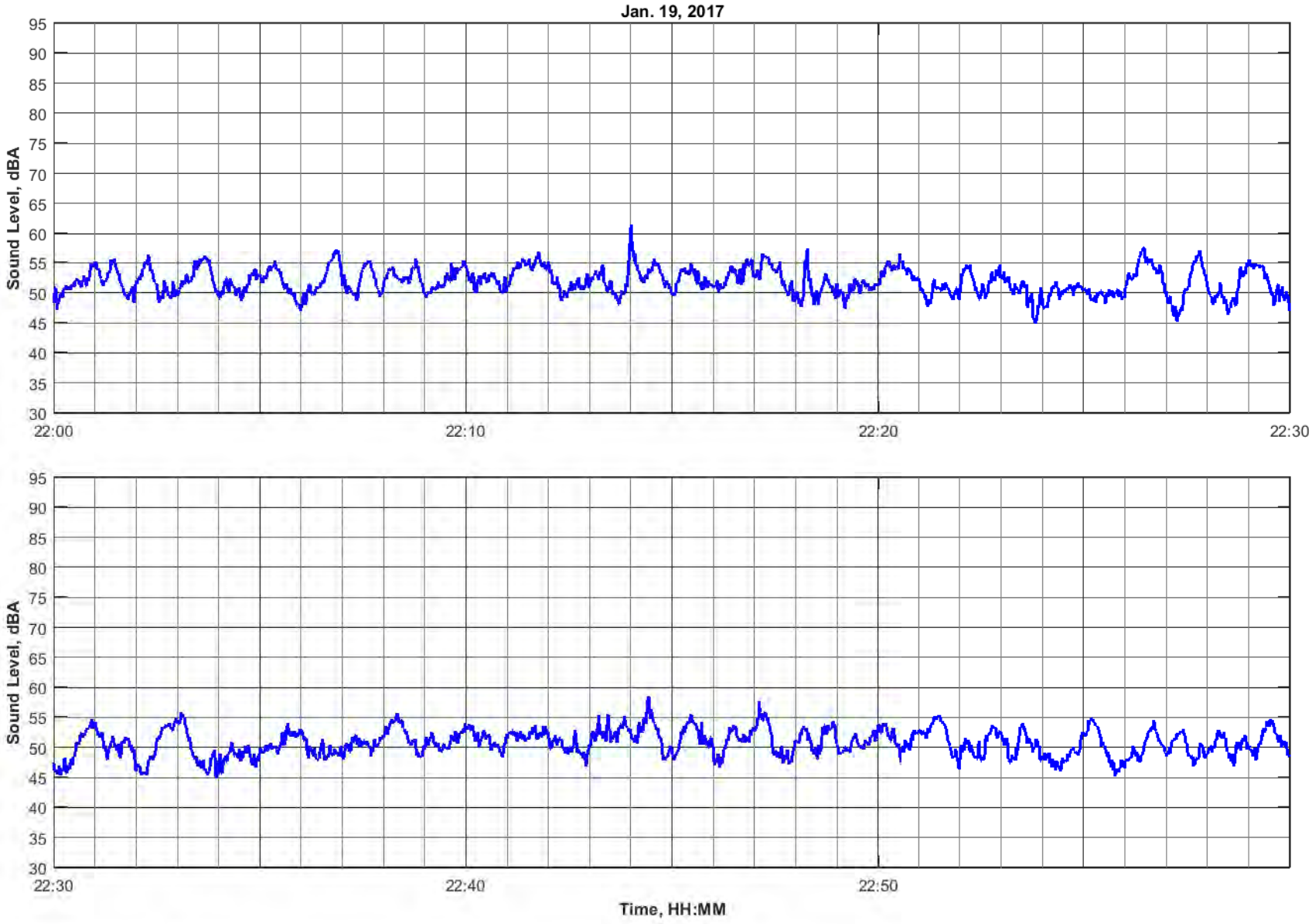

| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 1** | Date<br>**2017-04-18** | Figure<br>**G8** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |



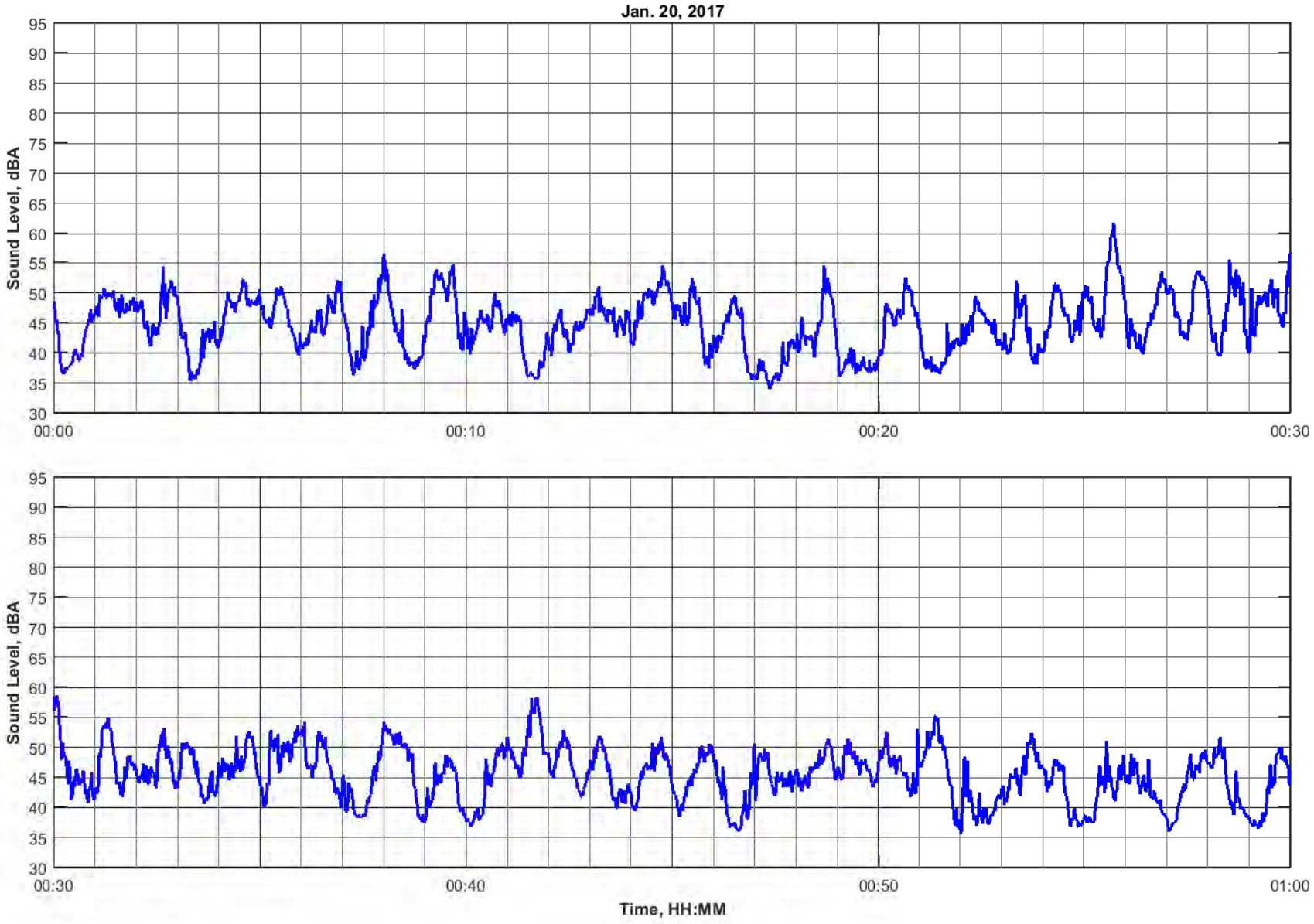

| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 1** | Date<br>**2017-04-18** | Figure<br>**G9** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |



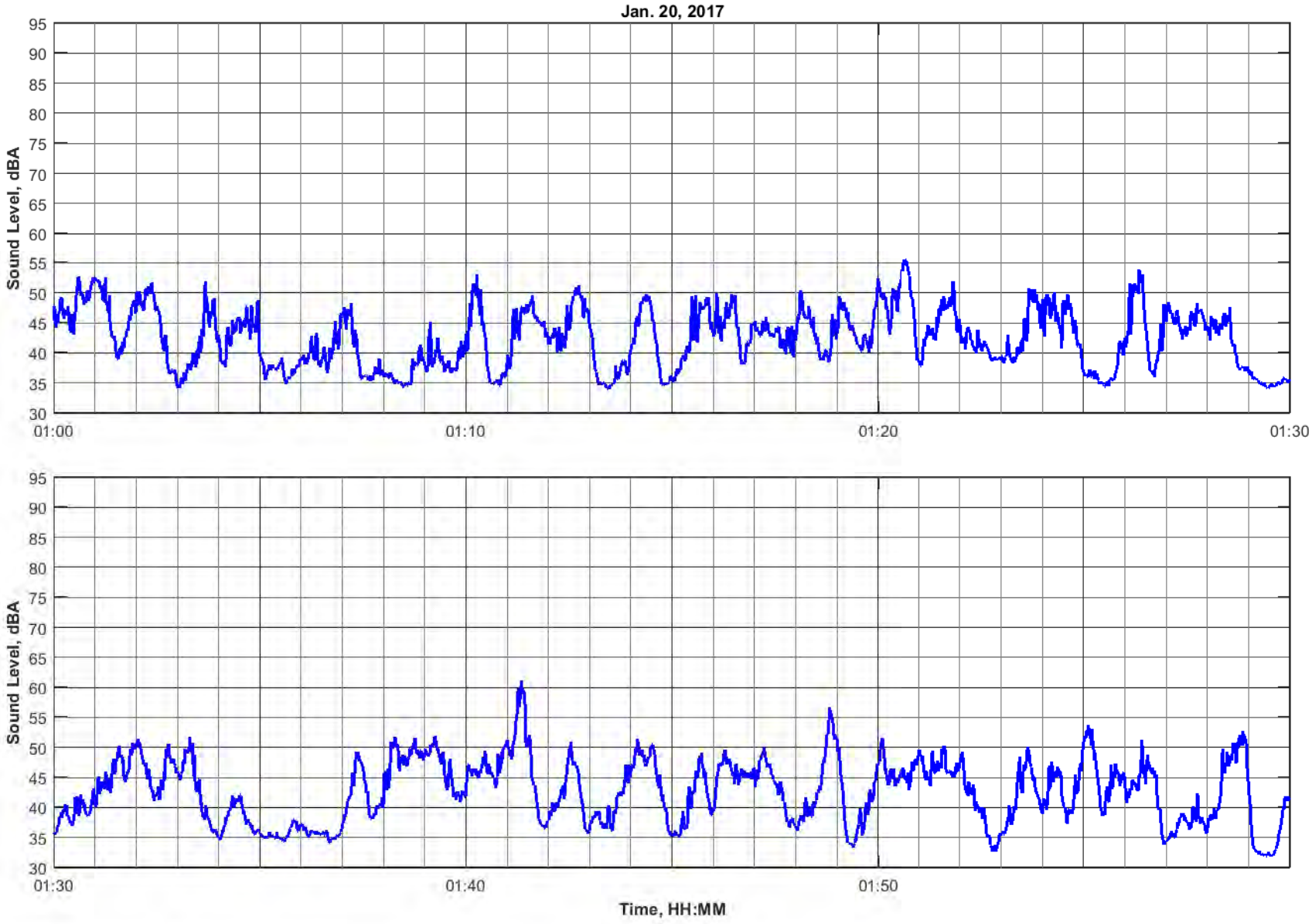

| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | **Title**<br>**Time History - Location 1** | **Date**<br>**2017-04-18** | **Figure**<br>**G10** |
| | **Project Name**<br>**Villalago Residences/Bolton** | **Project Number**<br>**116-0170** | |




| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 1** | Date<br>**2017-04-18** | Figure<br>**G11** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |




| | | | |
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 1** | Date<br>**2017-04-18** | Figure<br>**G12** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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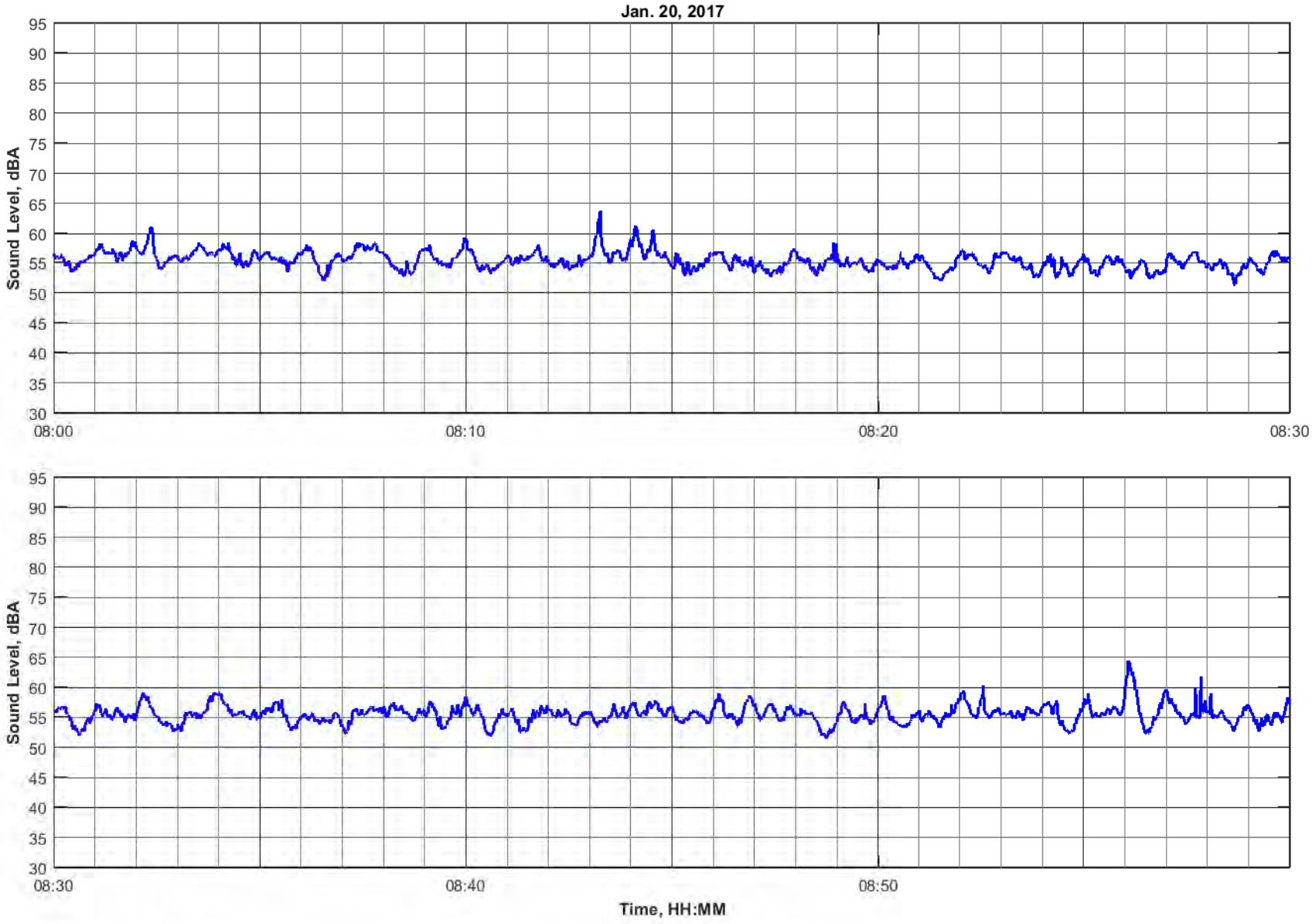
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 1** | Date<br>**2017-04-18** | Figure<br>**G13** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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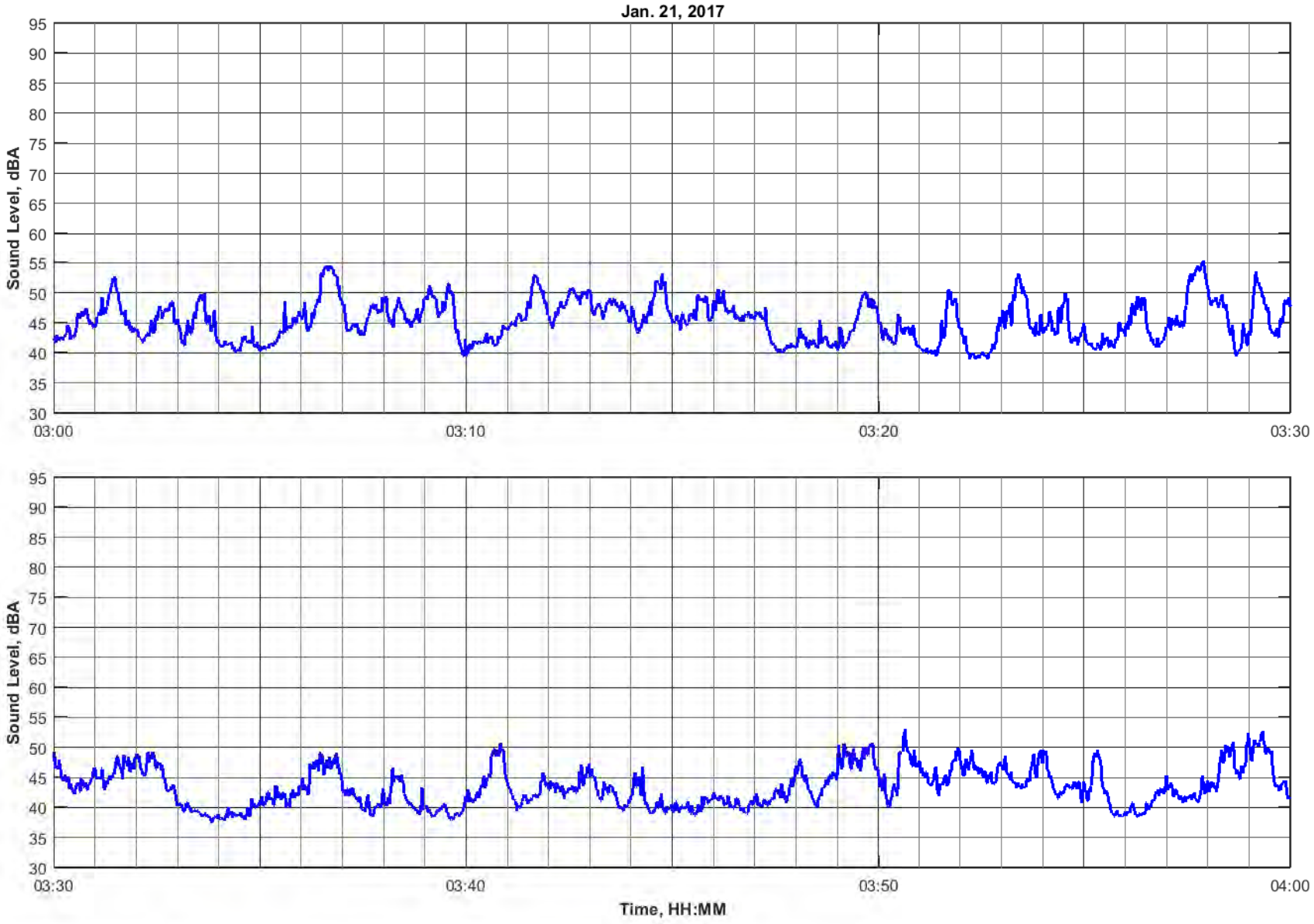
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 1** | Date<br>**2017-04-18** | Figure<br>**G14** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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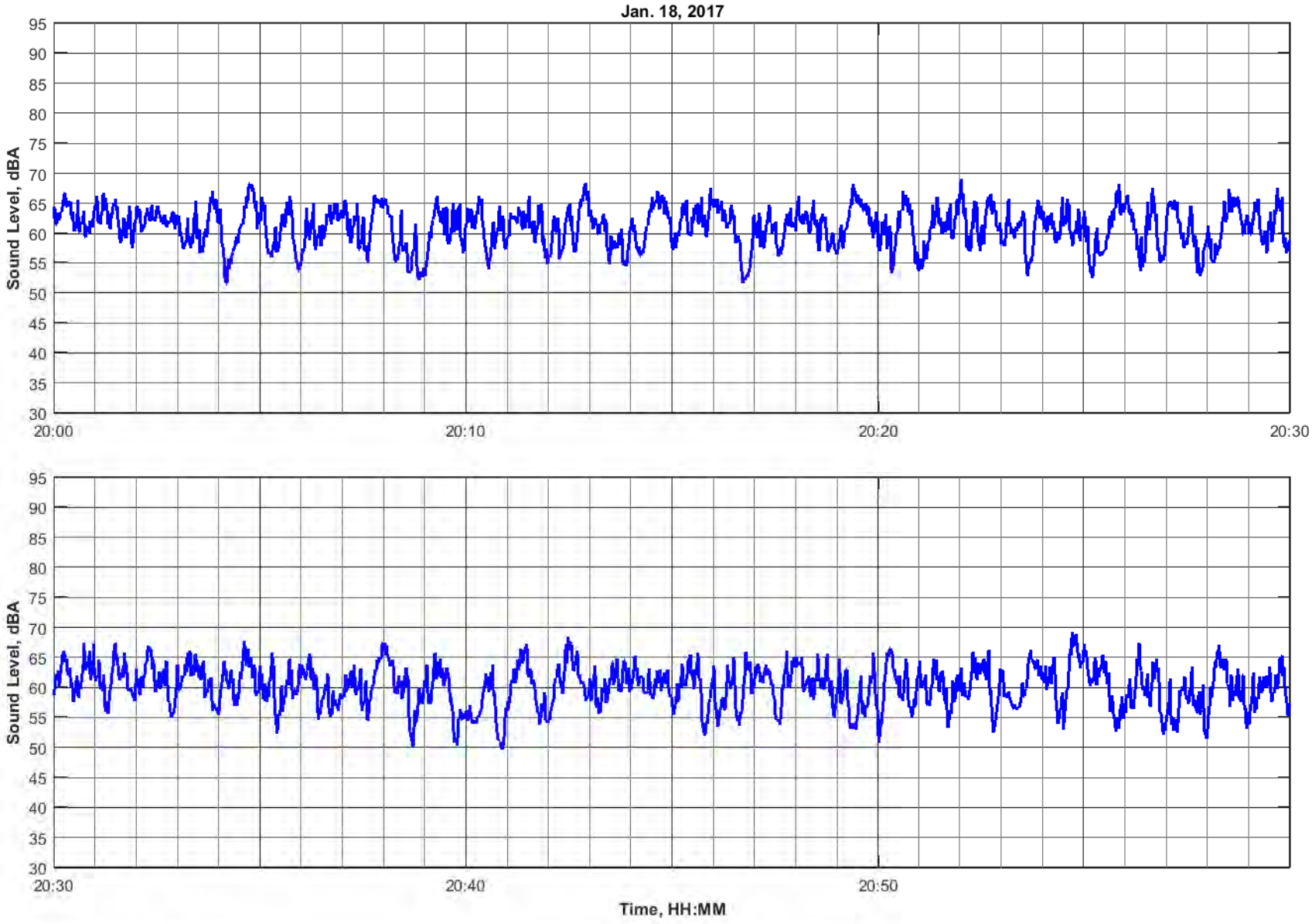
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 1** | Date<br>**2017-04-18** | Figure<br>**G15** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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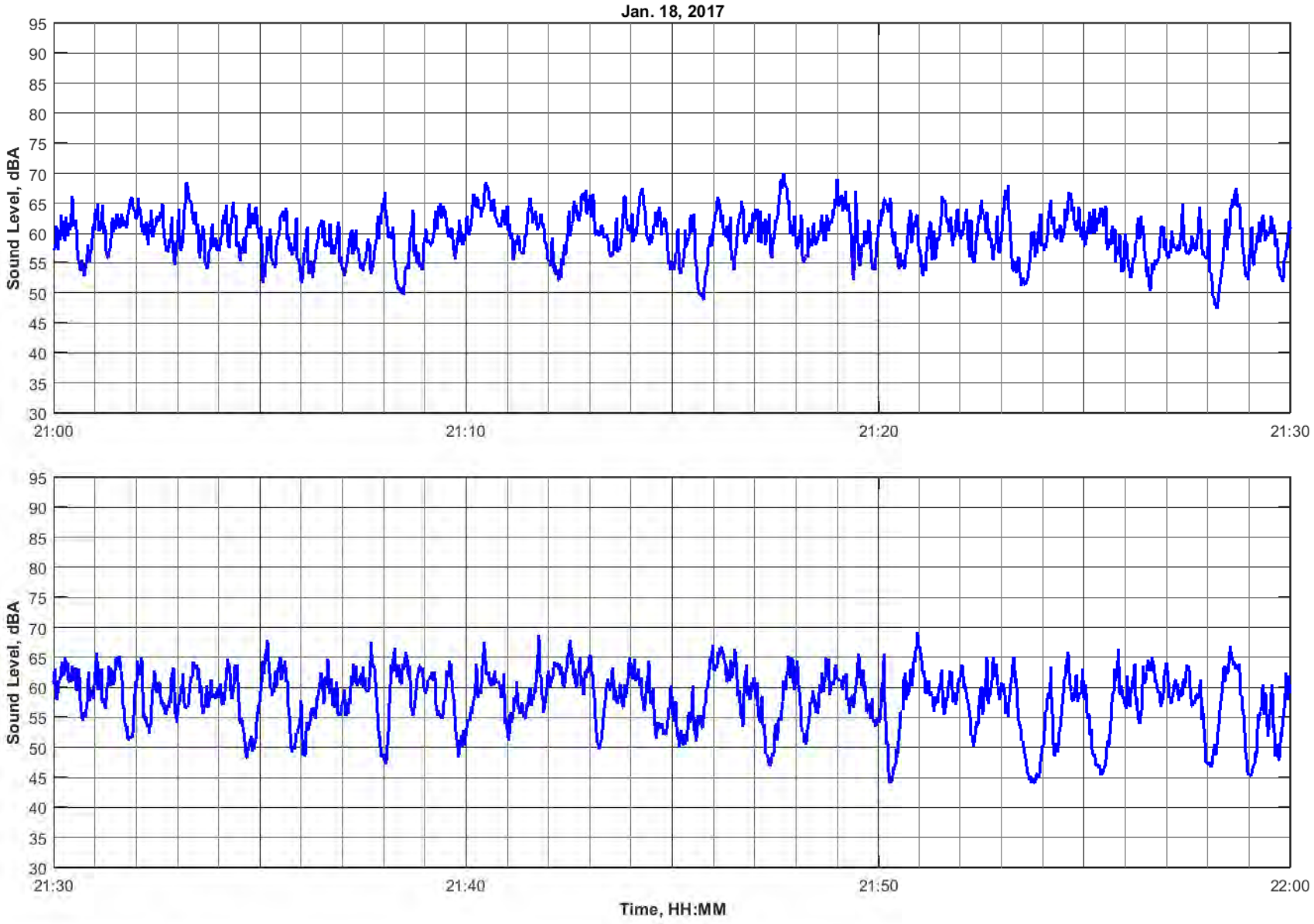
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 2** | Date<br>**2017-04-18** | Figure<br>**G16** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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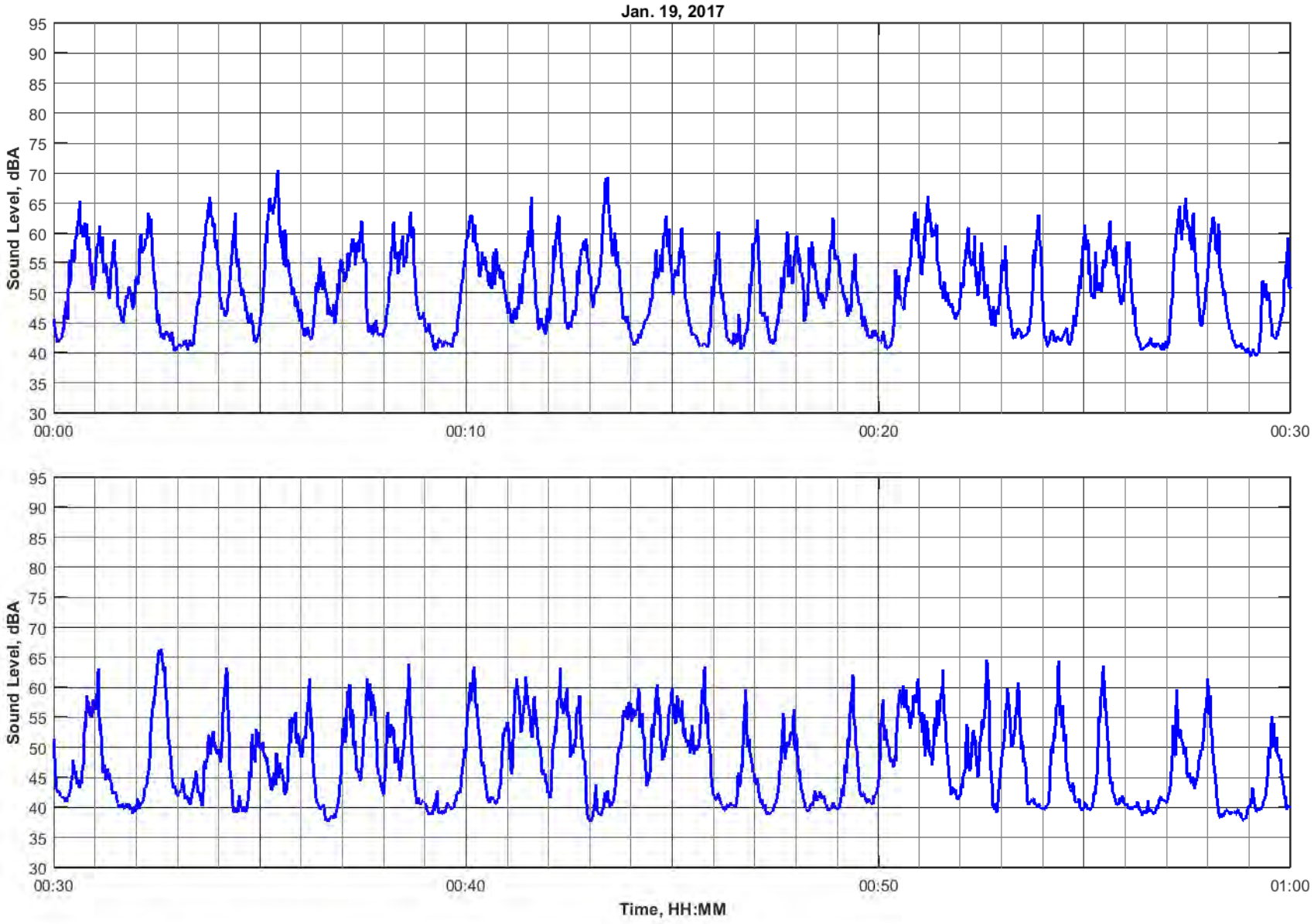
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 2** | Date<br>**2017-04-18** | Figure<br>**G17** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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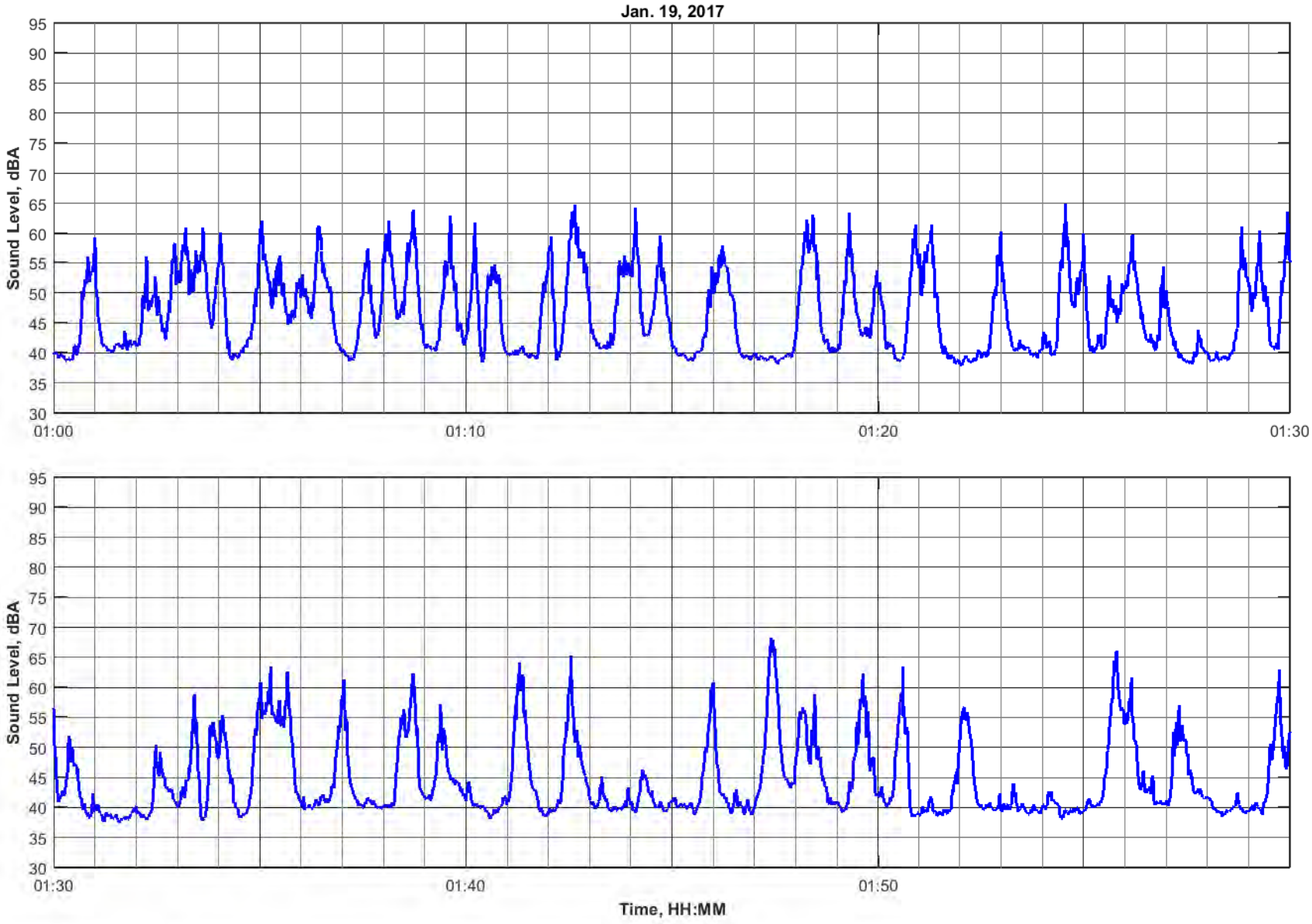
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 2** | Date<br>**2017-04-18** | Figure<br>**G18** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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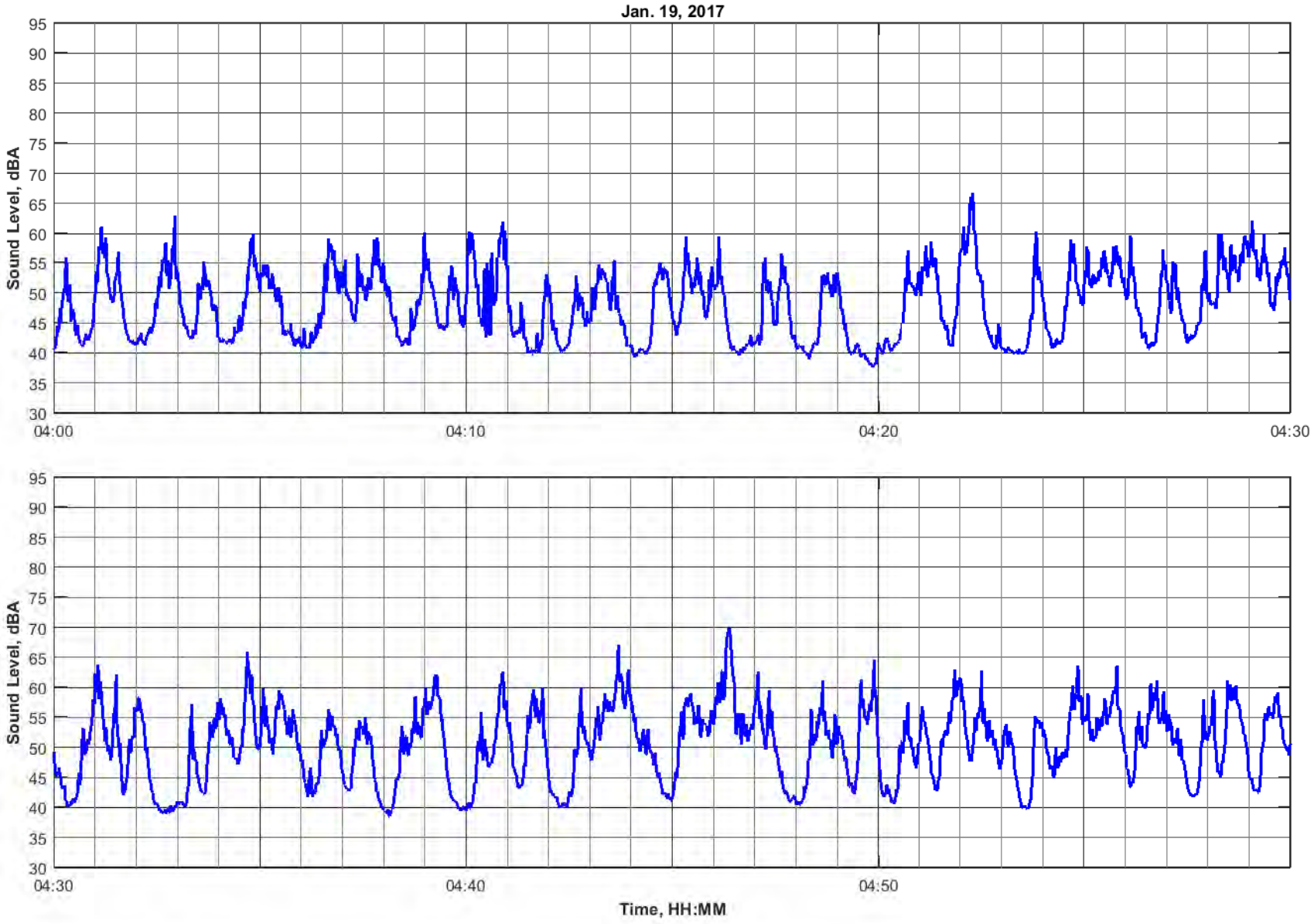
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 2** | Date<br>**2017-04-18** | Figure<br>**G19** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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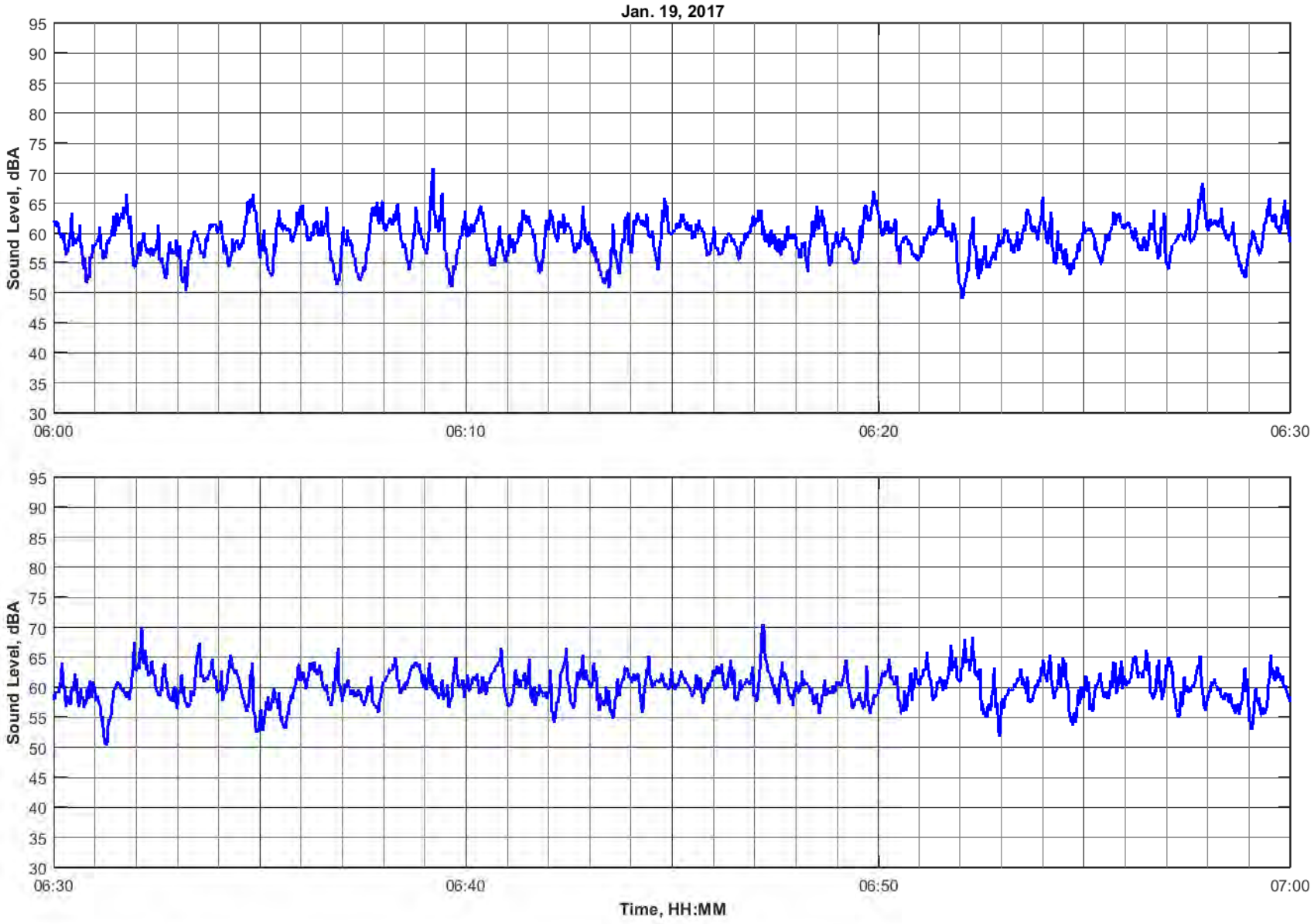
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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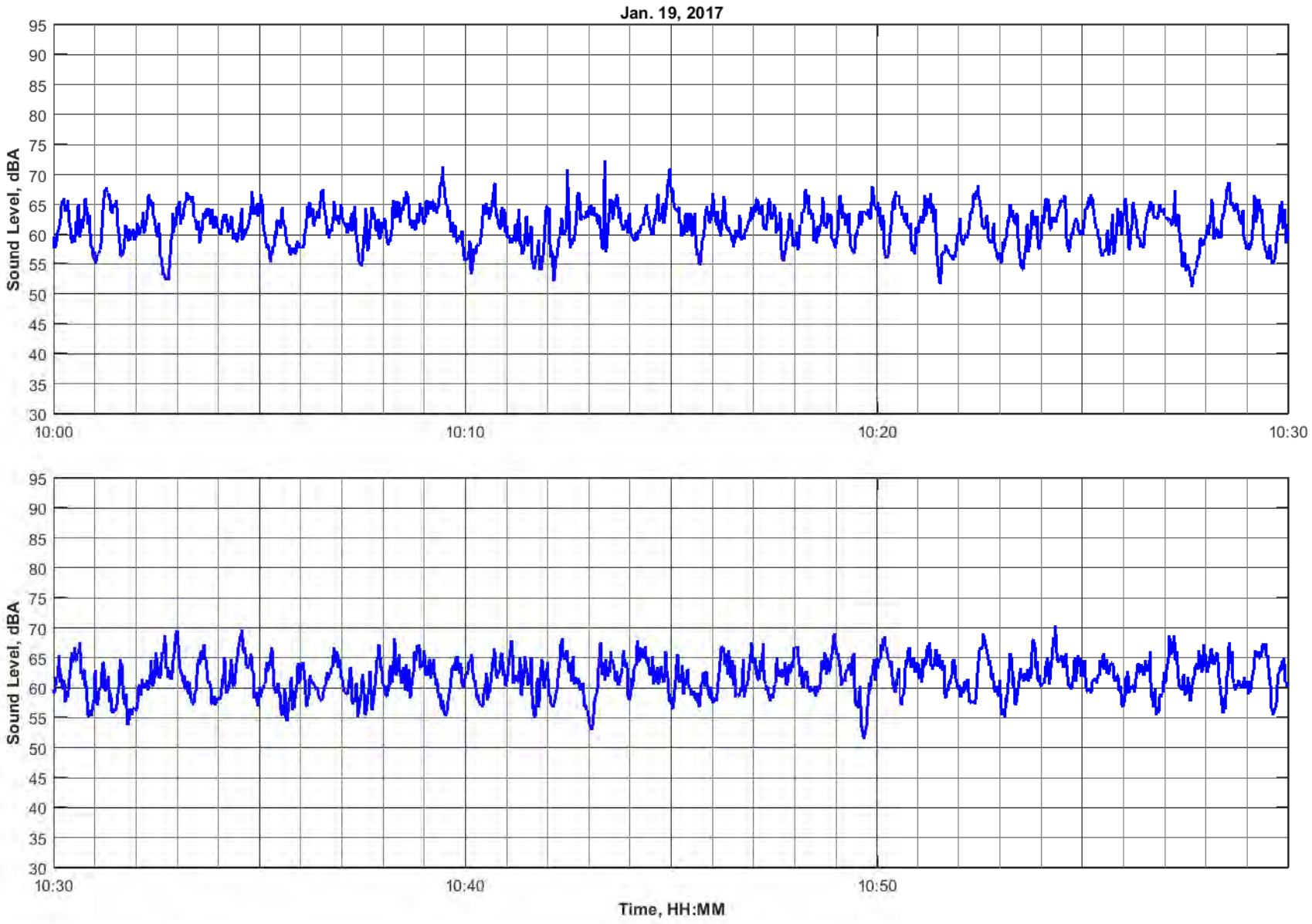
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 2** | Date<br>**2017-04-18** | Figure<br>**G21** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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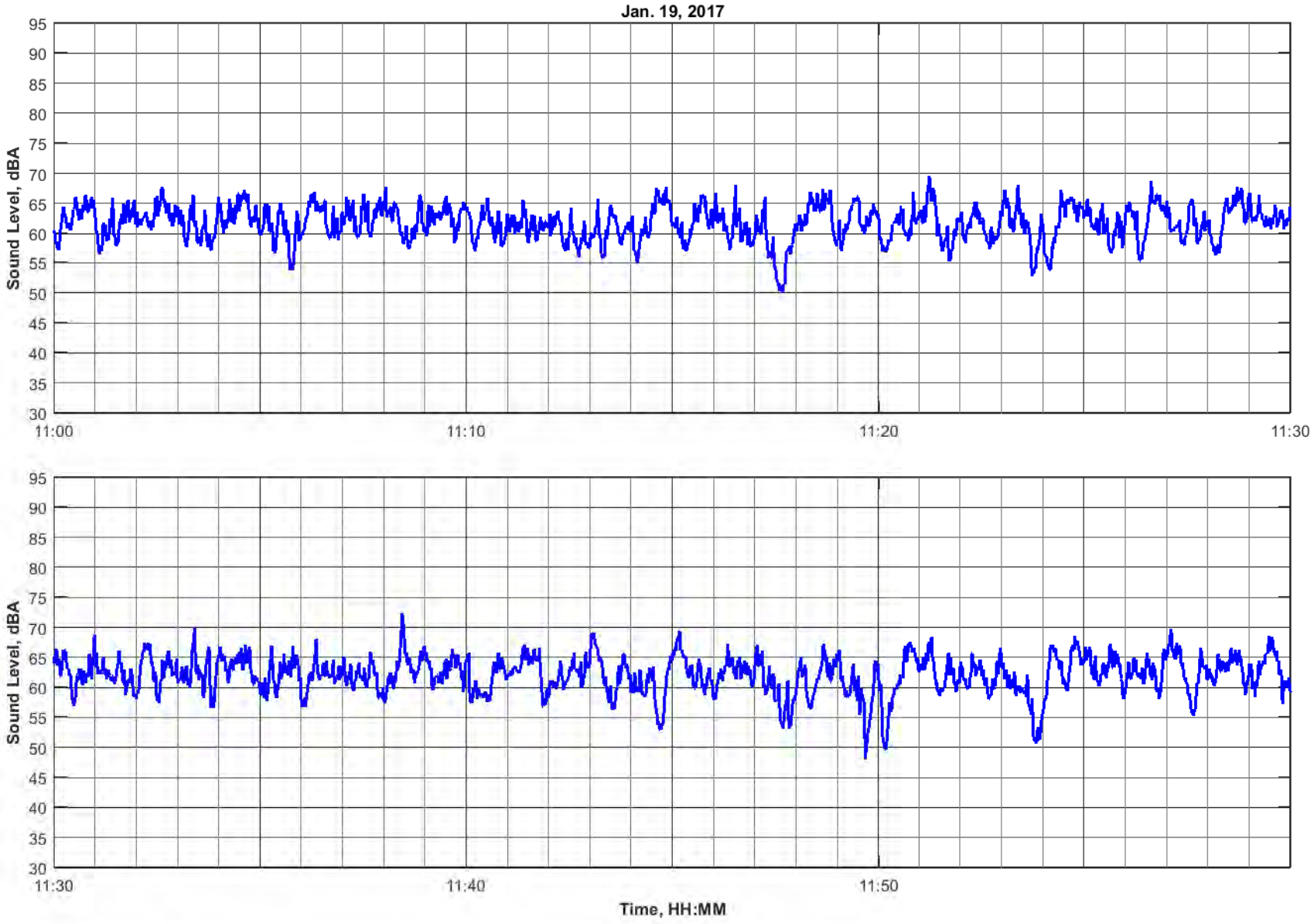
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 2** | Date<br>**2017-04-18** | Figure<br>**G22** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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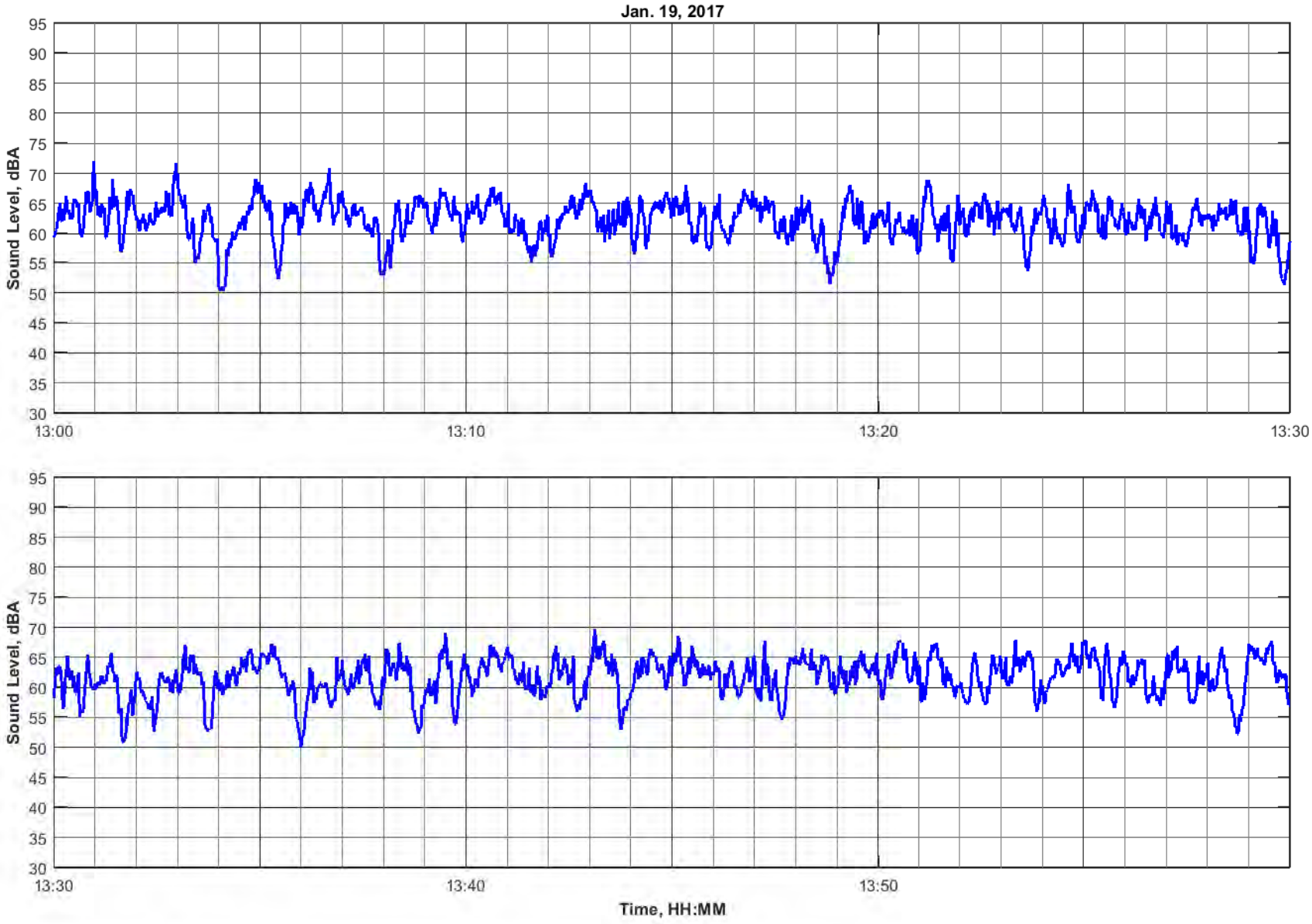
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 2** | Date<br>**2017-04-18** | Figure<br>**G23** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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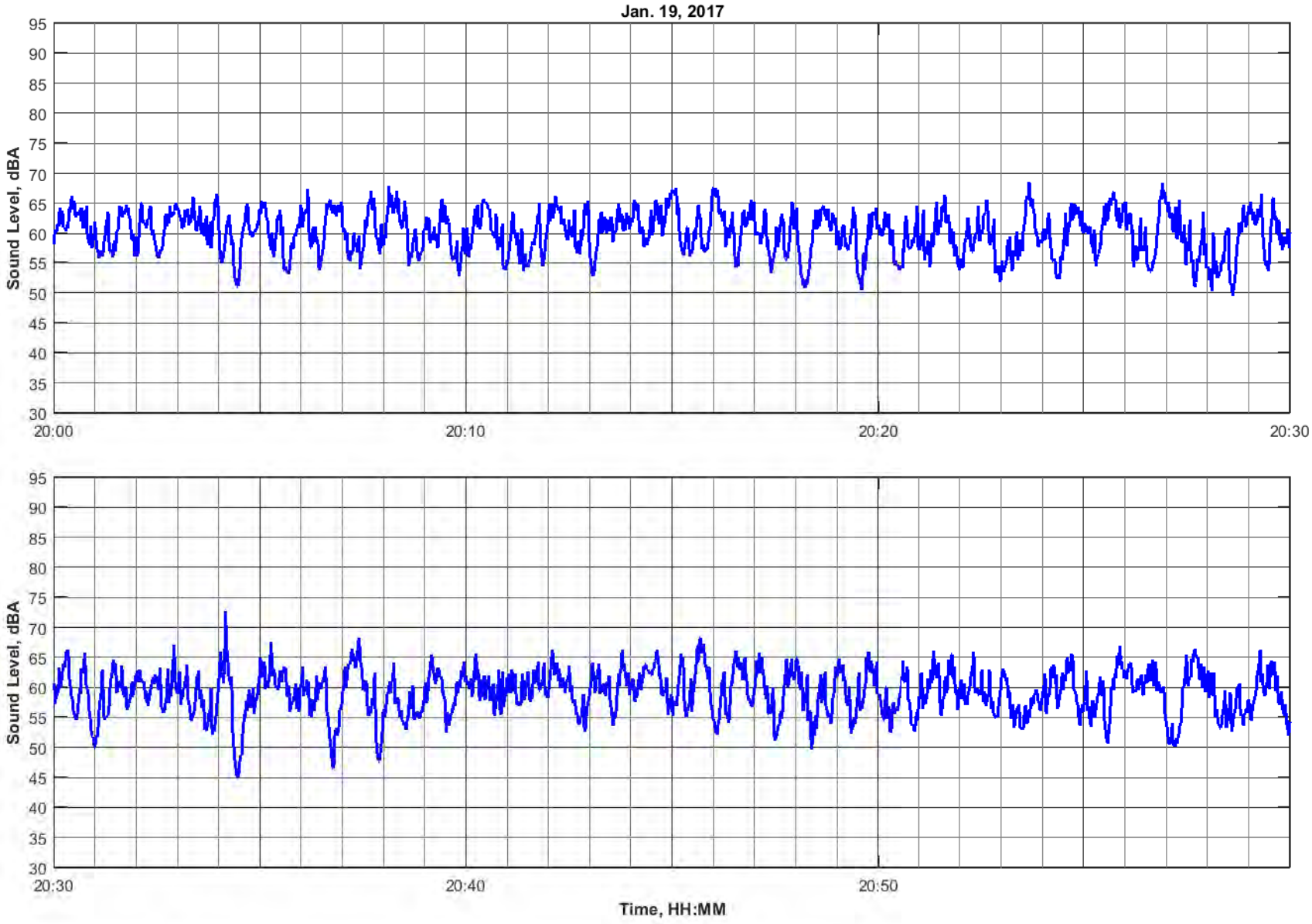
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 2** | Date<br>**2017-04-18** | Figure<br>**G24** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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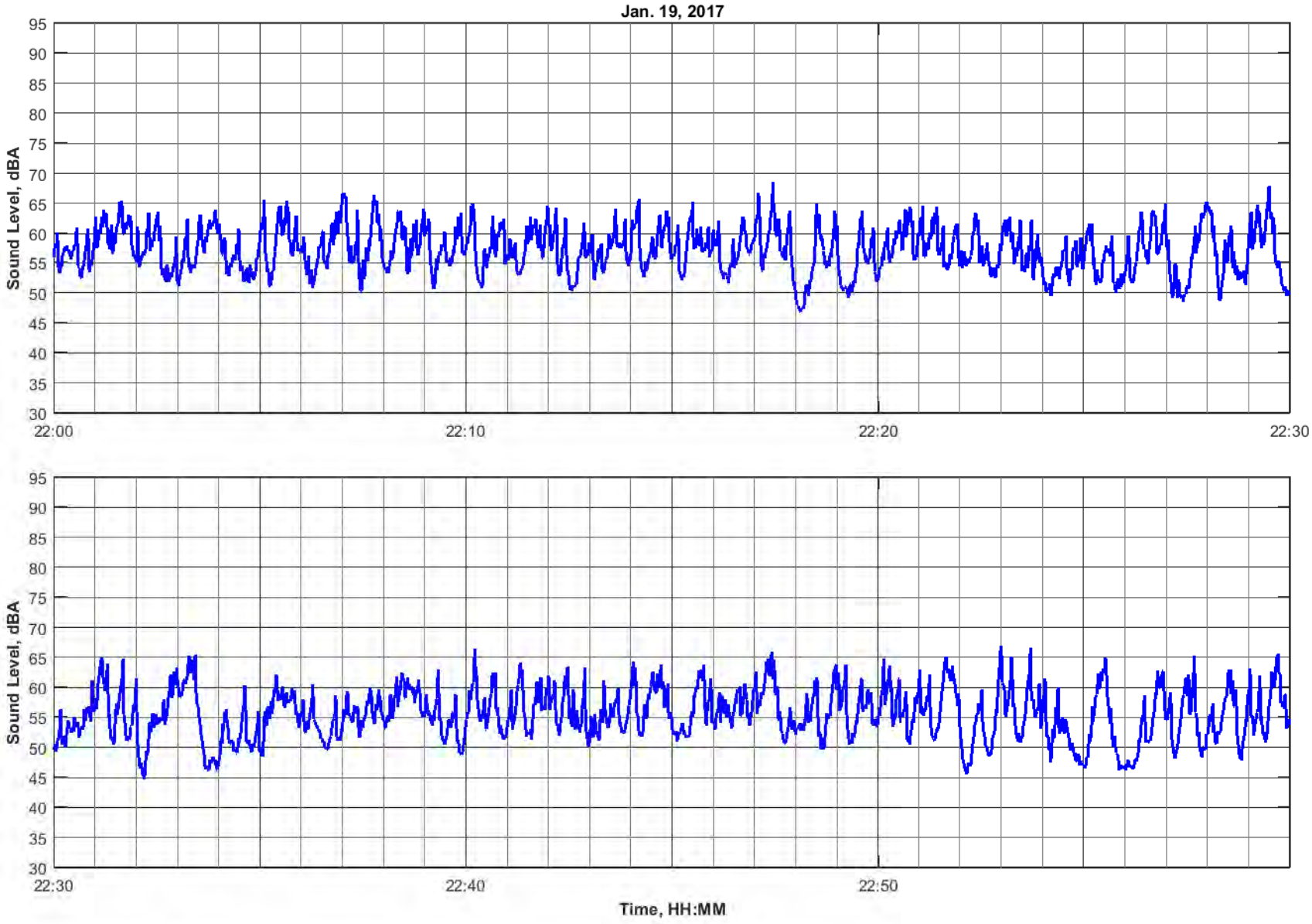


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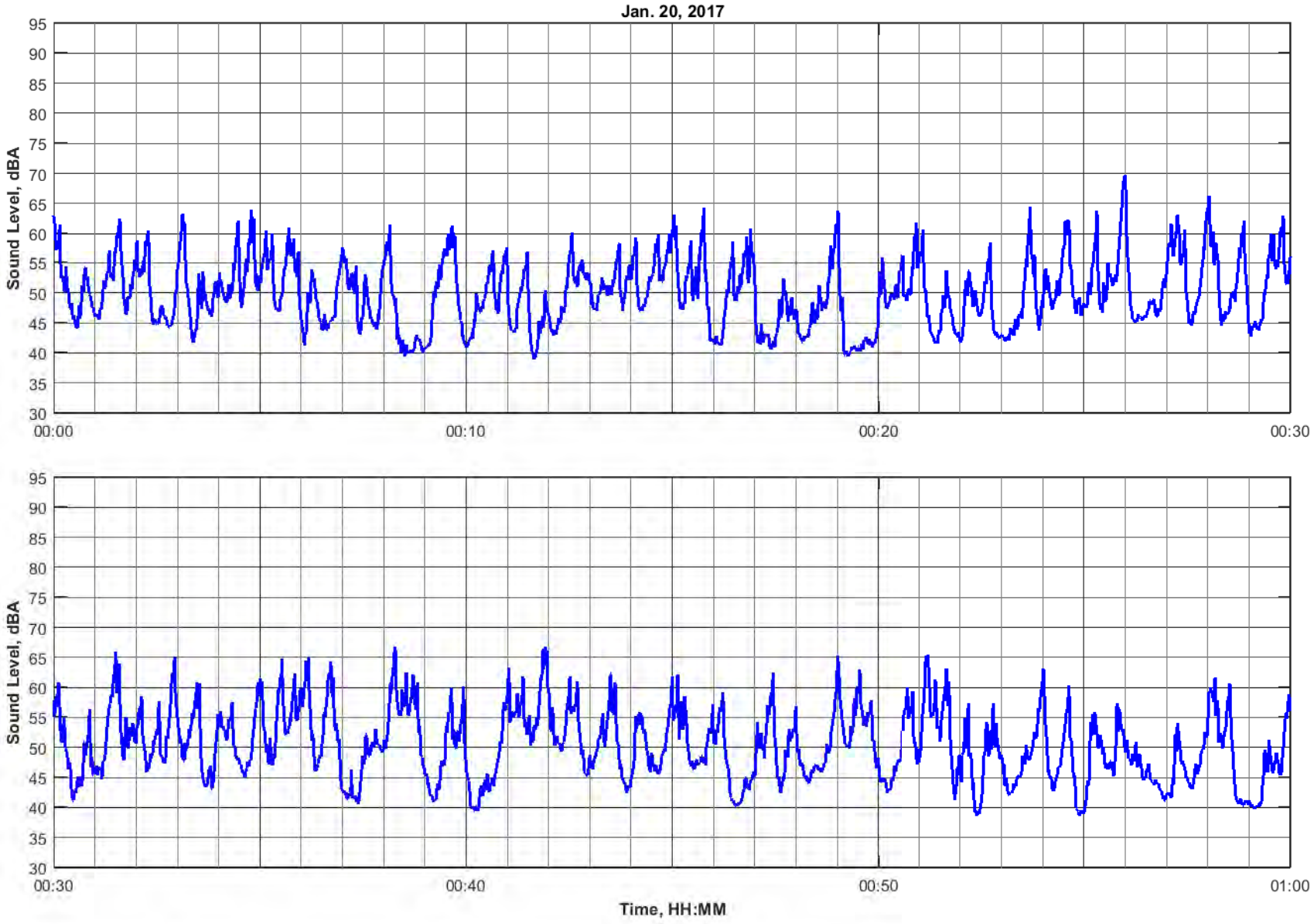
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 2** | Date<br>**2017-04-18** | Figure<br>**G26** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |




VALCOUSTICS Canada Ltd.

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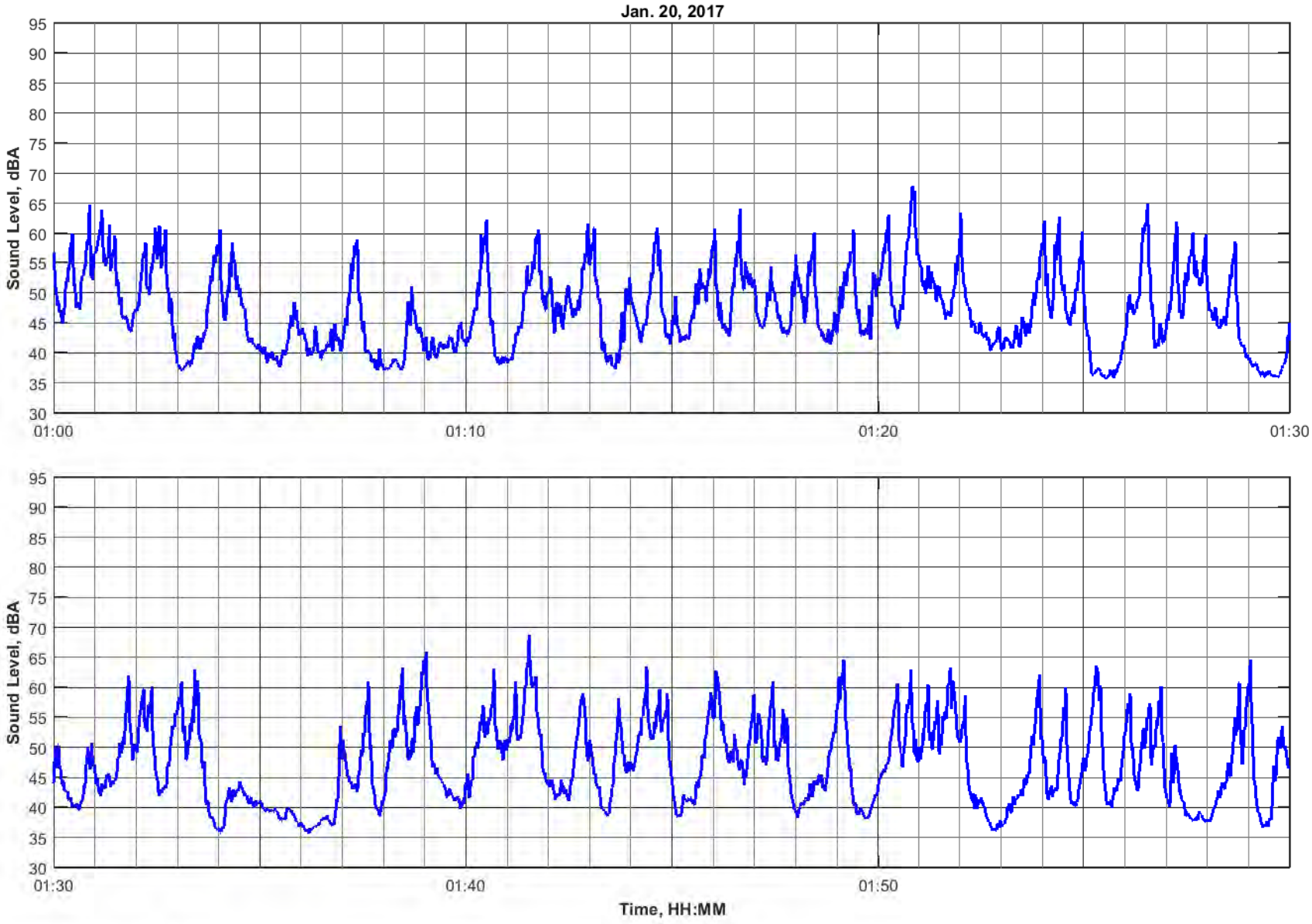
|---|---|---|
| Title: **Time History - Location 2** | Date: **2017-04-18** | Figure: **G27** |
| Project Name: **Villalago Residences/Bolton** | Project Number: **116-0170** | |

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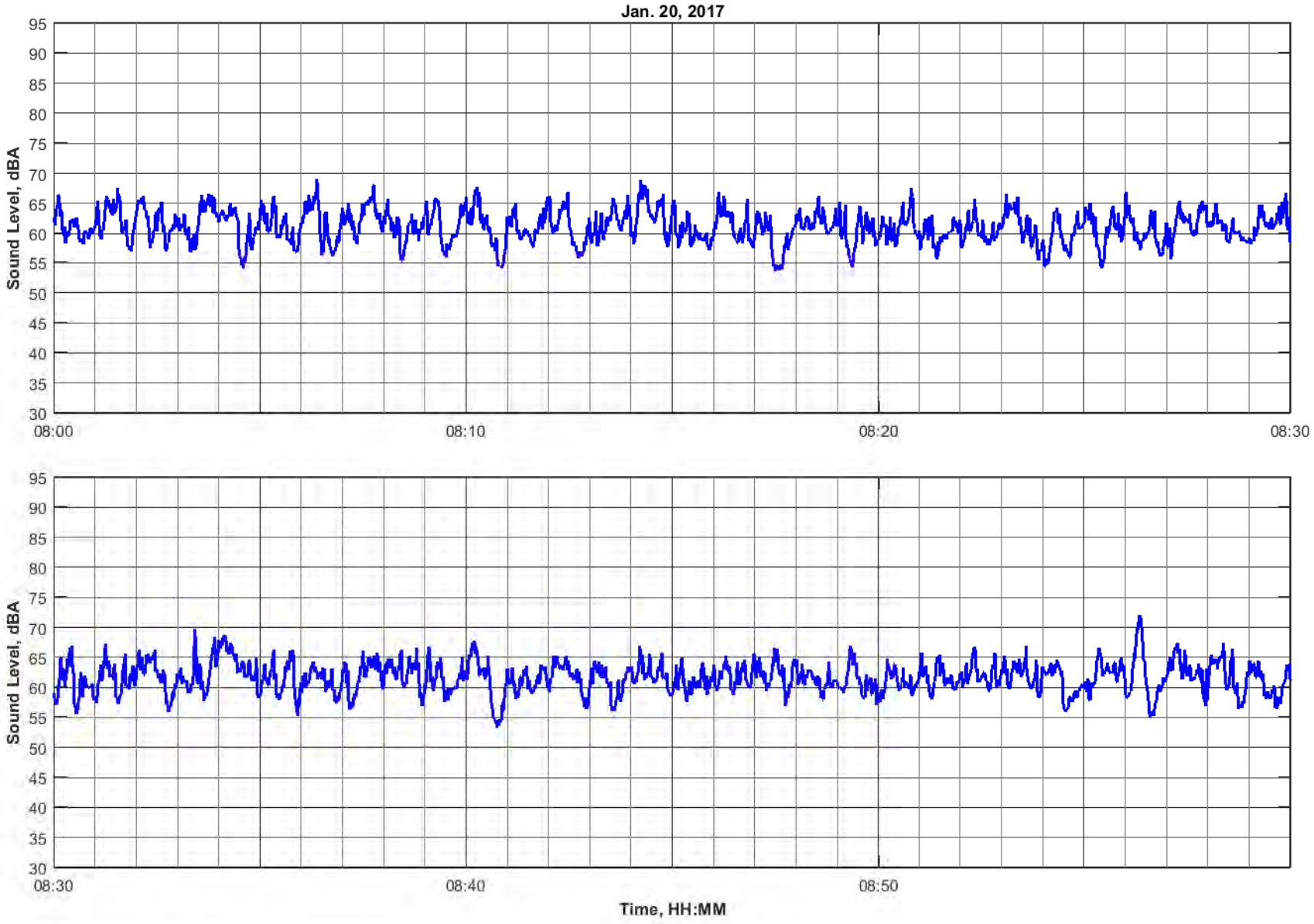
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 2** | Date<br>**2017-04-18** | Figure<br>**G28** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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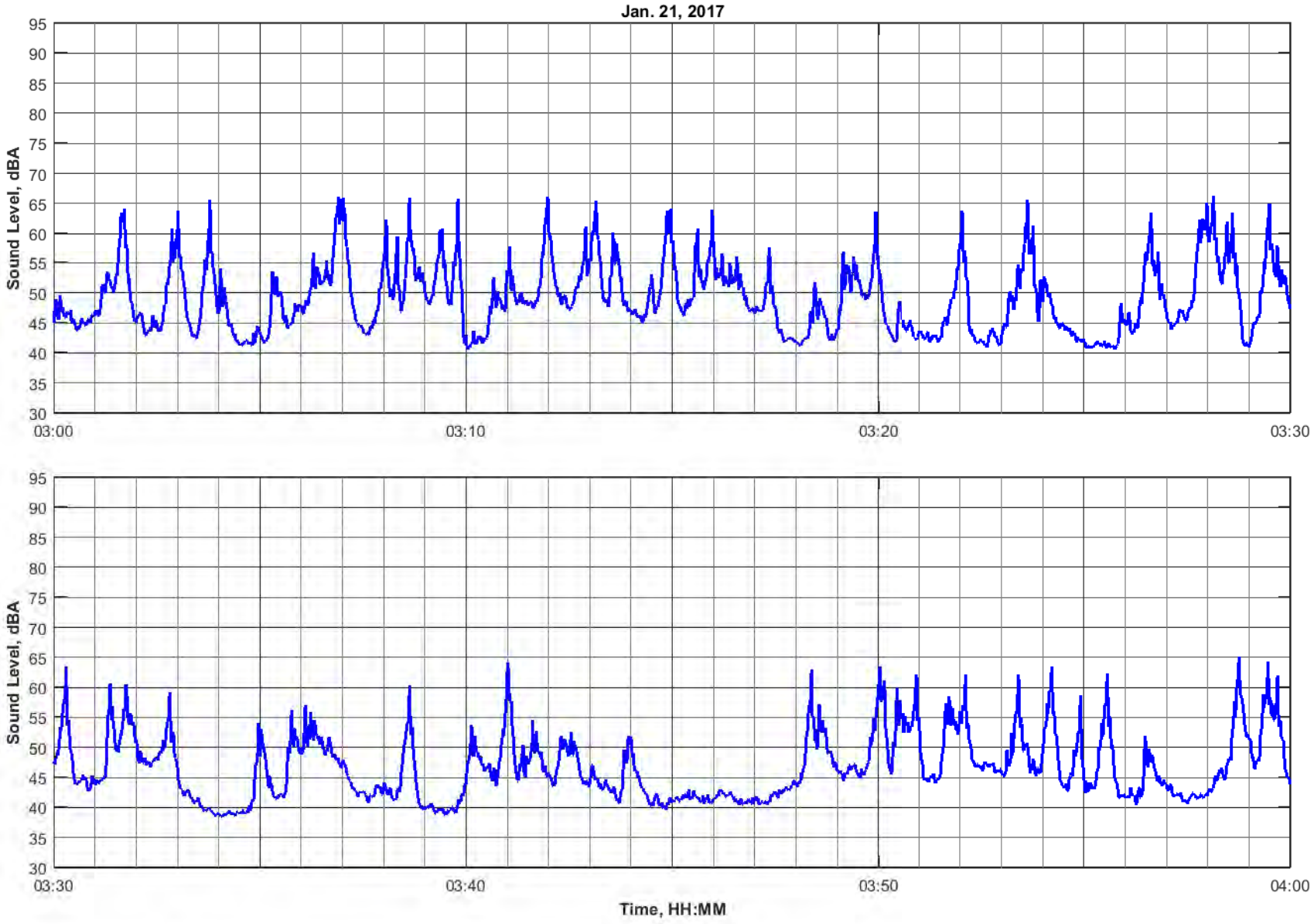
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 2** | Date<br>**2017-04-18** | Figure<br>**G29** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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| VALCOUSTICS Canada Ltd. | **Title**<br>**Time History - Location 2** | **Date**<br>**2017-04-18** | **Figure**<br>**G30** |
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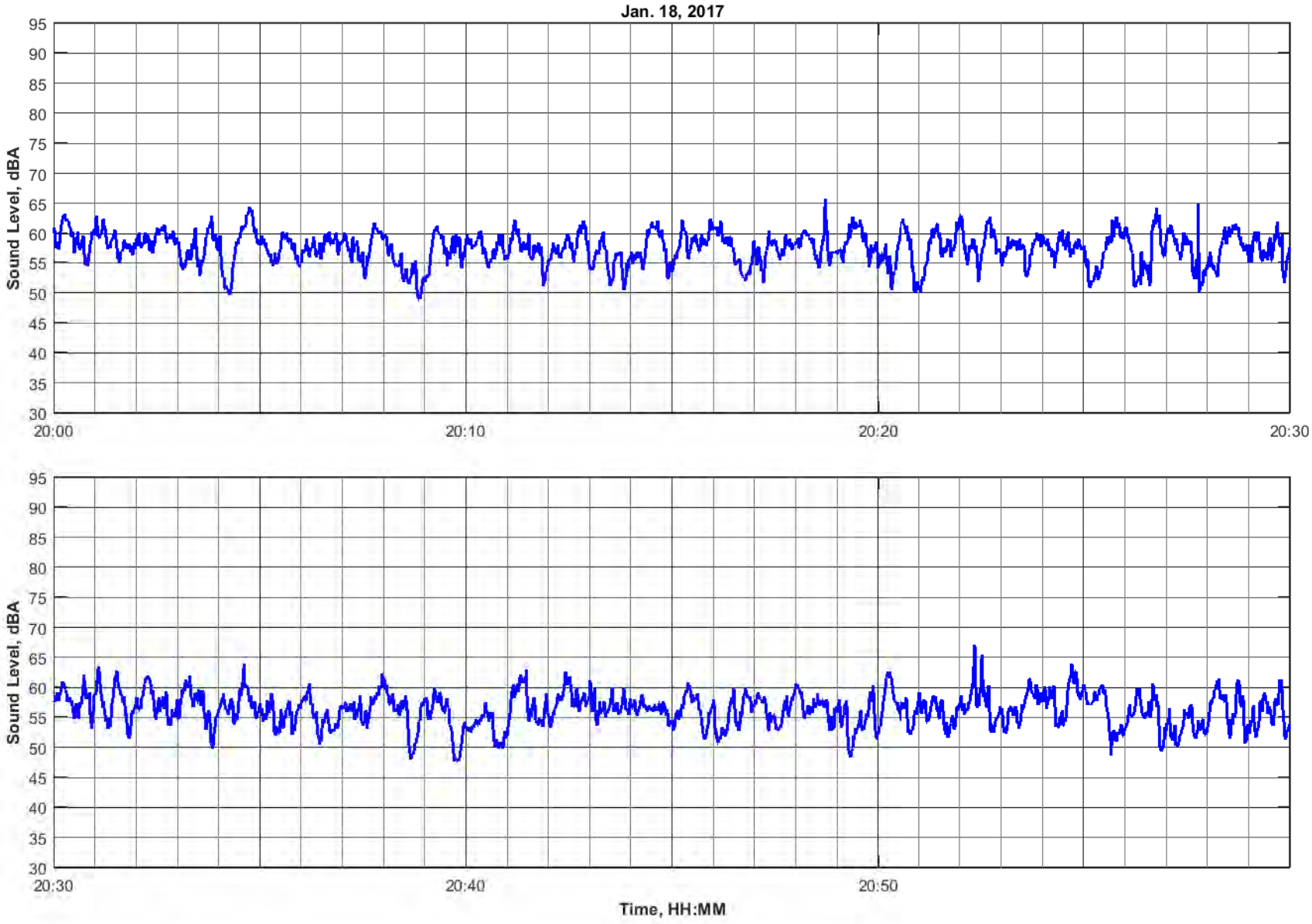


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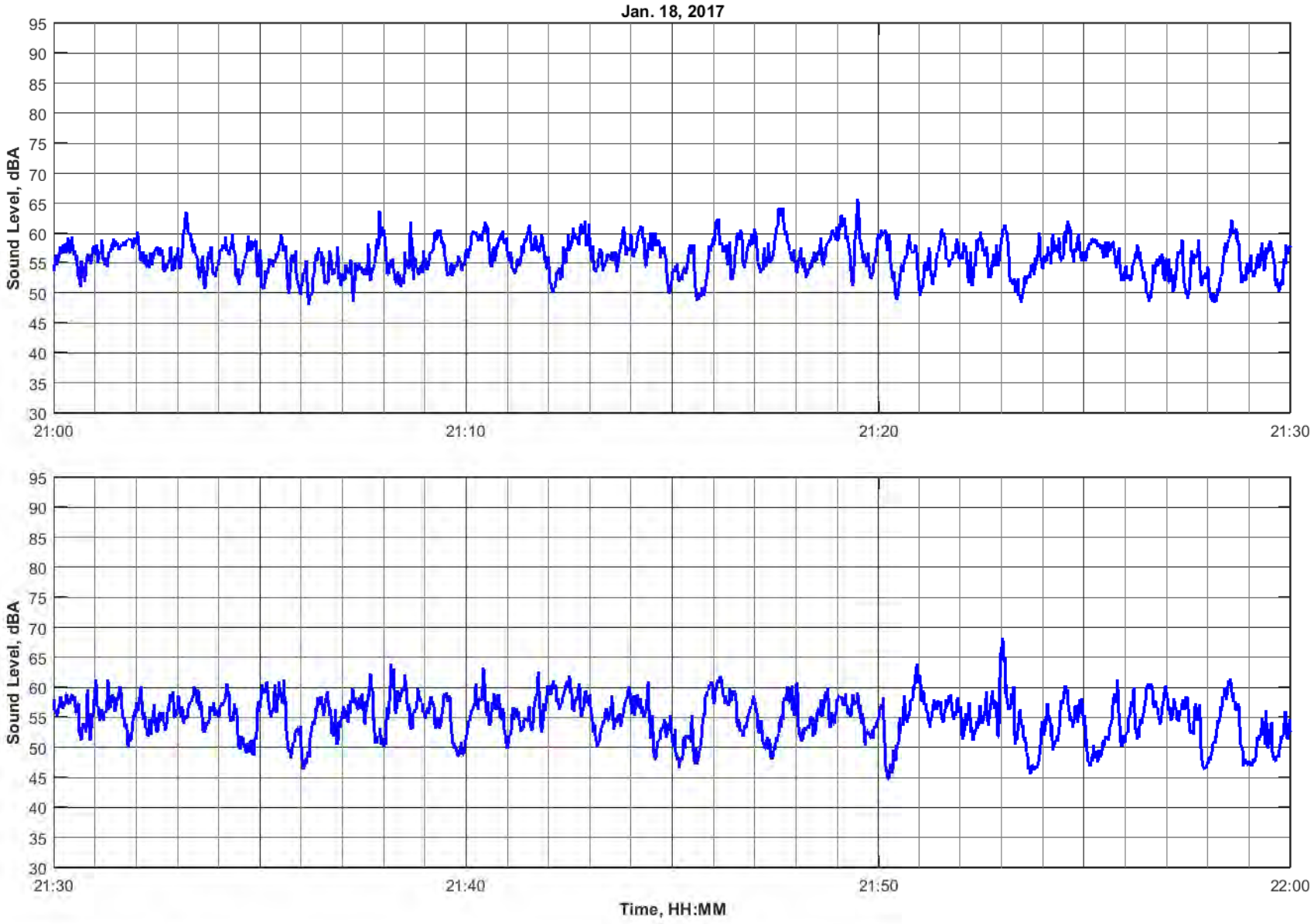
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 3** | Date<br>**2017-04-18** | Figure<br>**G31** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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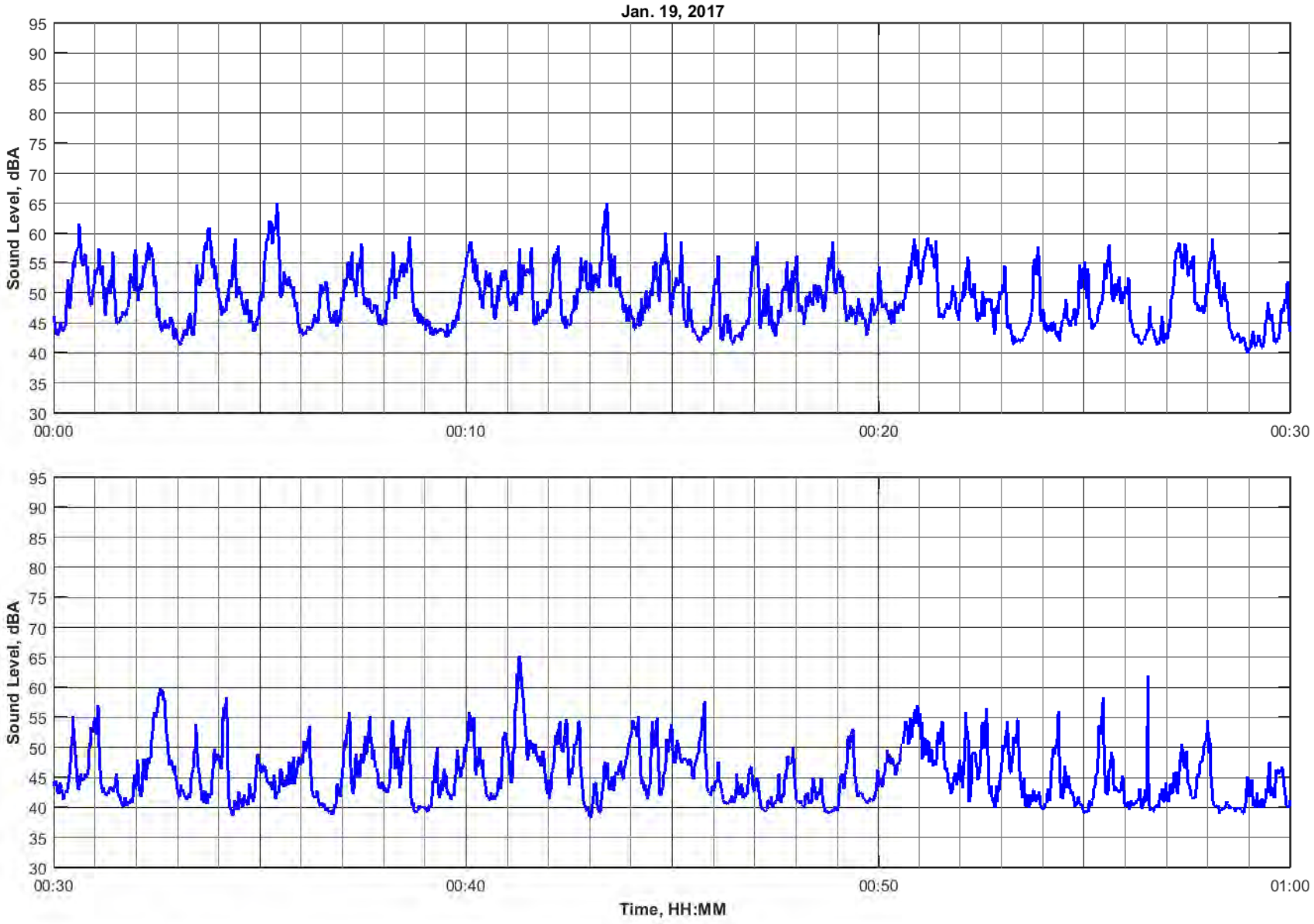
|---|---|---|
| Title: Time History - Location 3 | Date: 2017-04-18 | Figure: G32 |
| Project Name: Villalago Residences/Bolton | Project Number: 116-0170 | |

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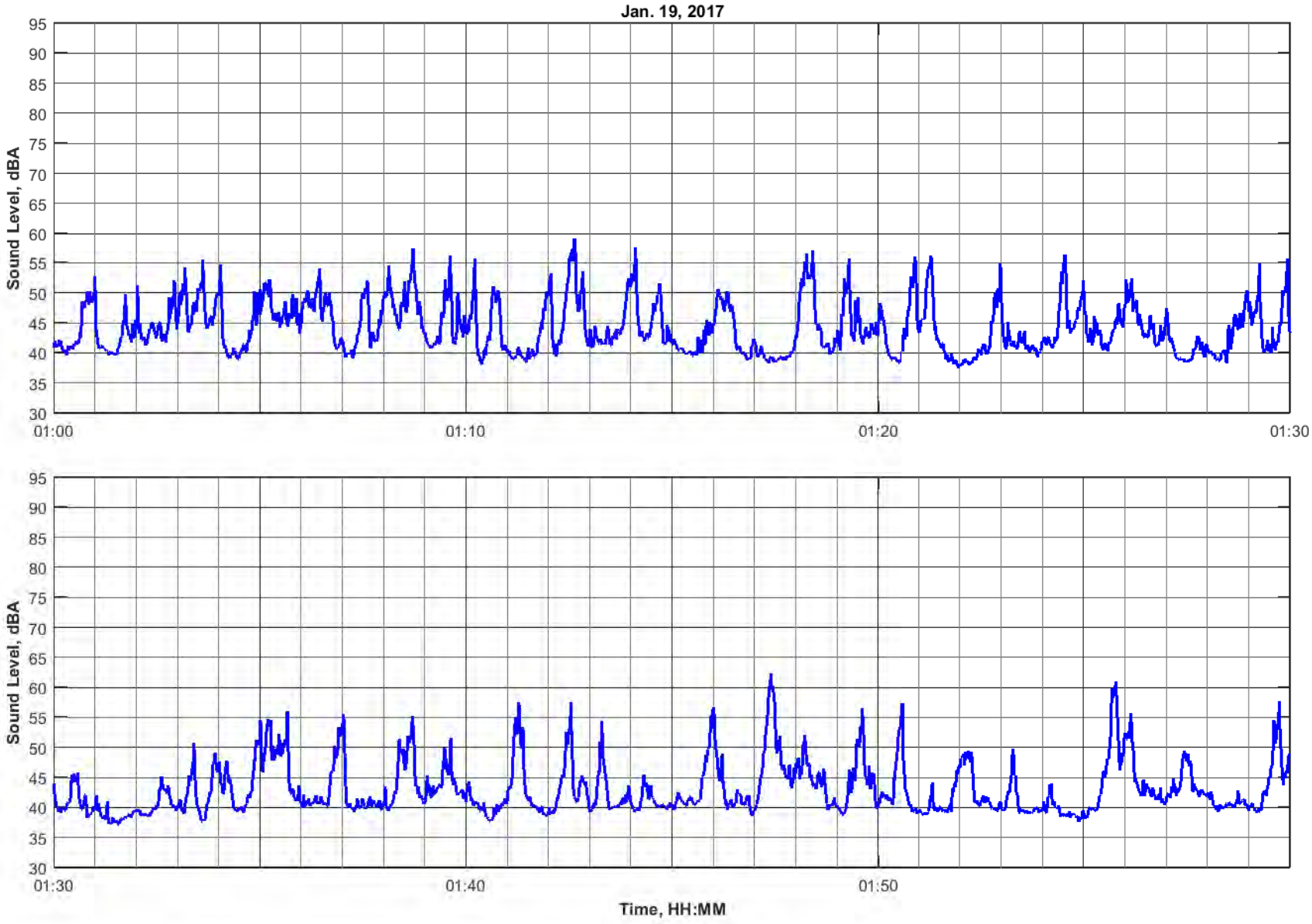
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 3** | Date<br>**2017-04-18** | Figure<br>**G33** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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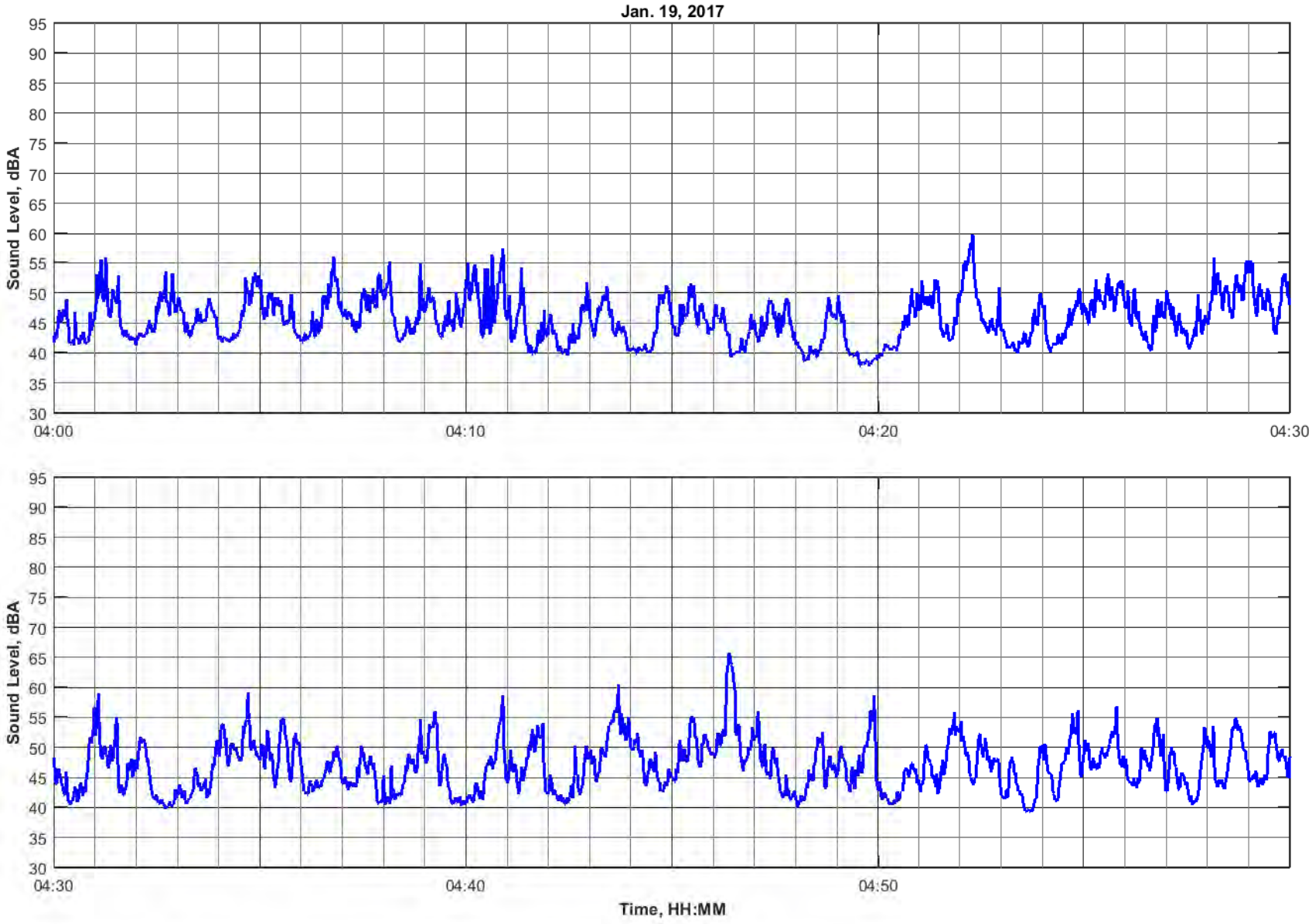
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 3** | Date<br>**2017-04-18** | Figure<br>**G34** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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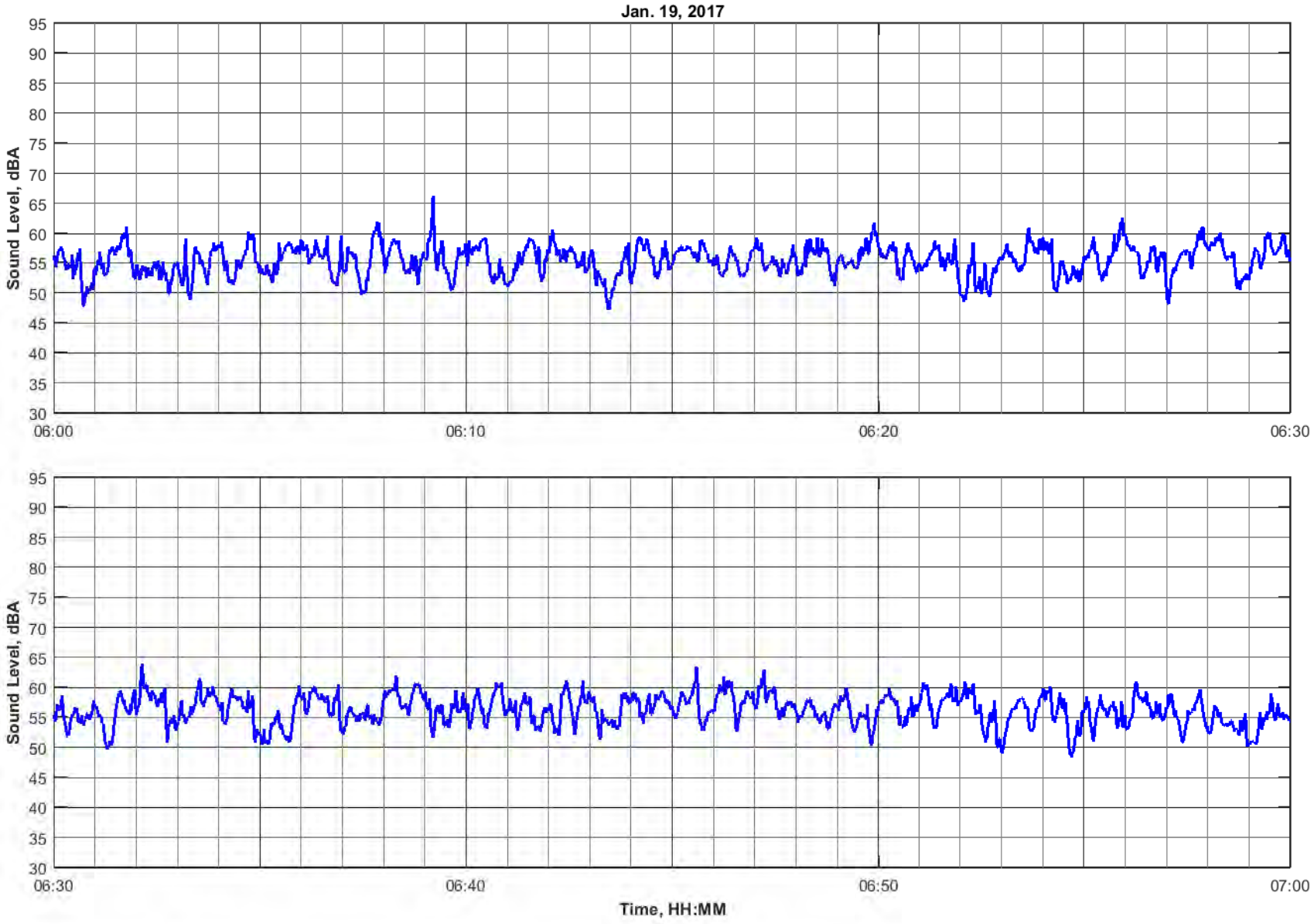
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 3** | Date<br>**2017-04-18** | Figure<br>**G35** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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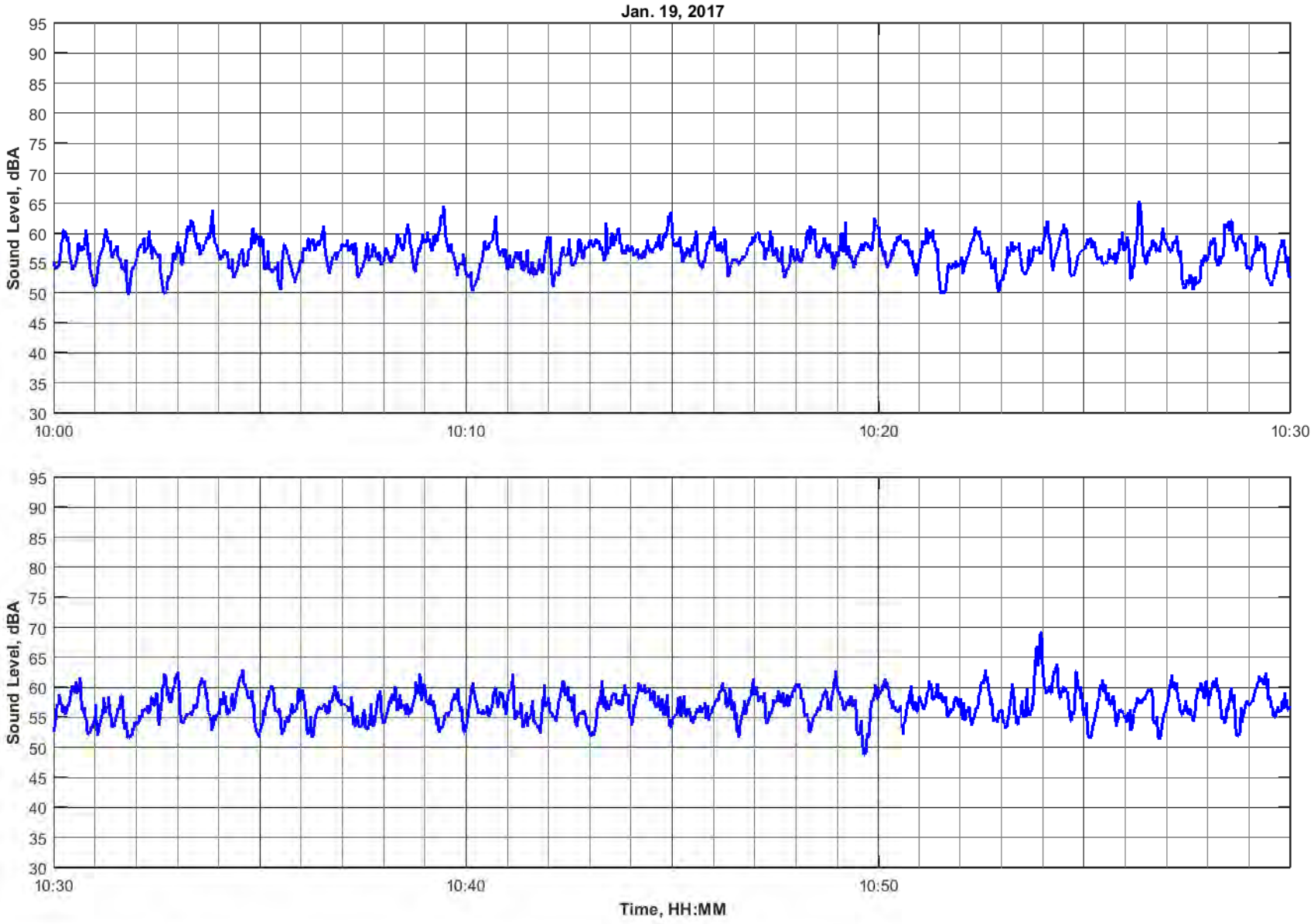
| VALCOUSTICS Canada Ltd. | **Title**<br>Time History - Location 3 | **Date**<br>2017-04-18 | **Figure**<br>G36 |
| | **Project Name**<br>Villalago Residences/Bolton | **Project Number**<br>116-0170 | |

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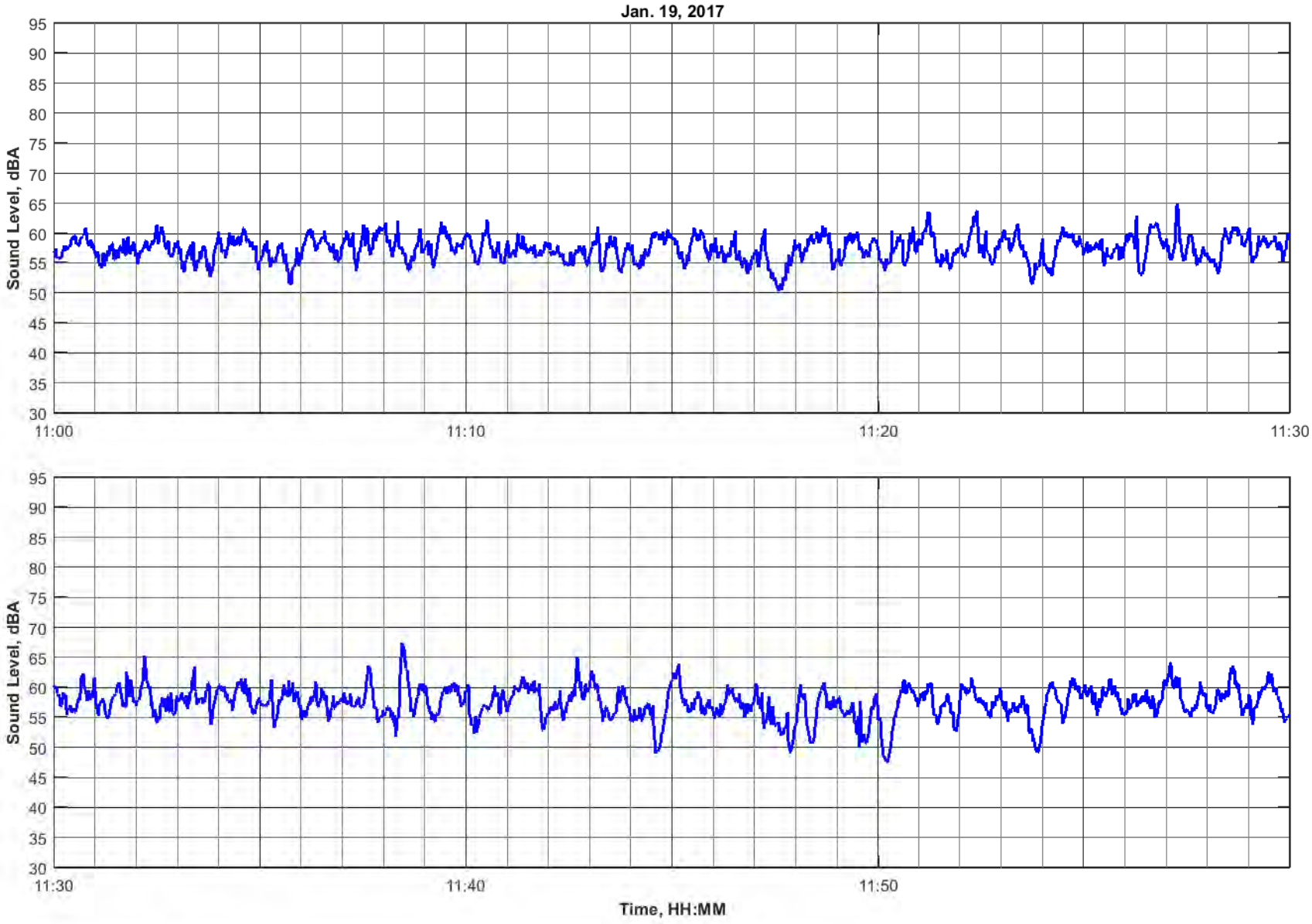
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 3** | Date<br>**2017-04-18** | Figure<br>**G37** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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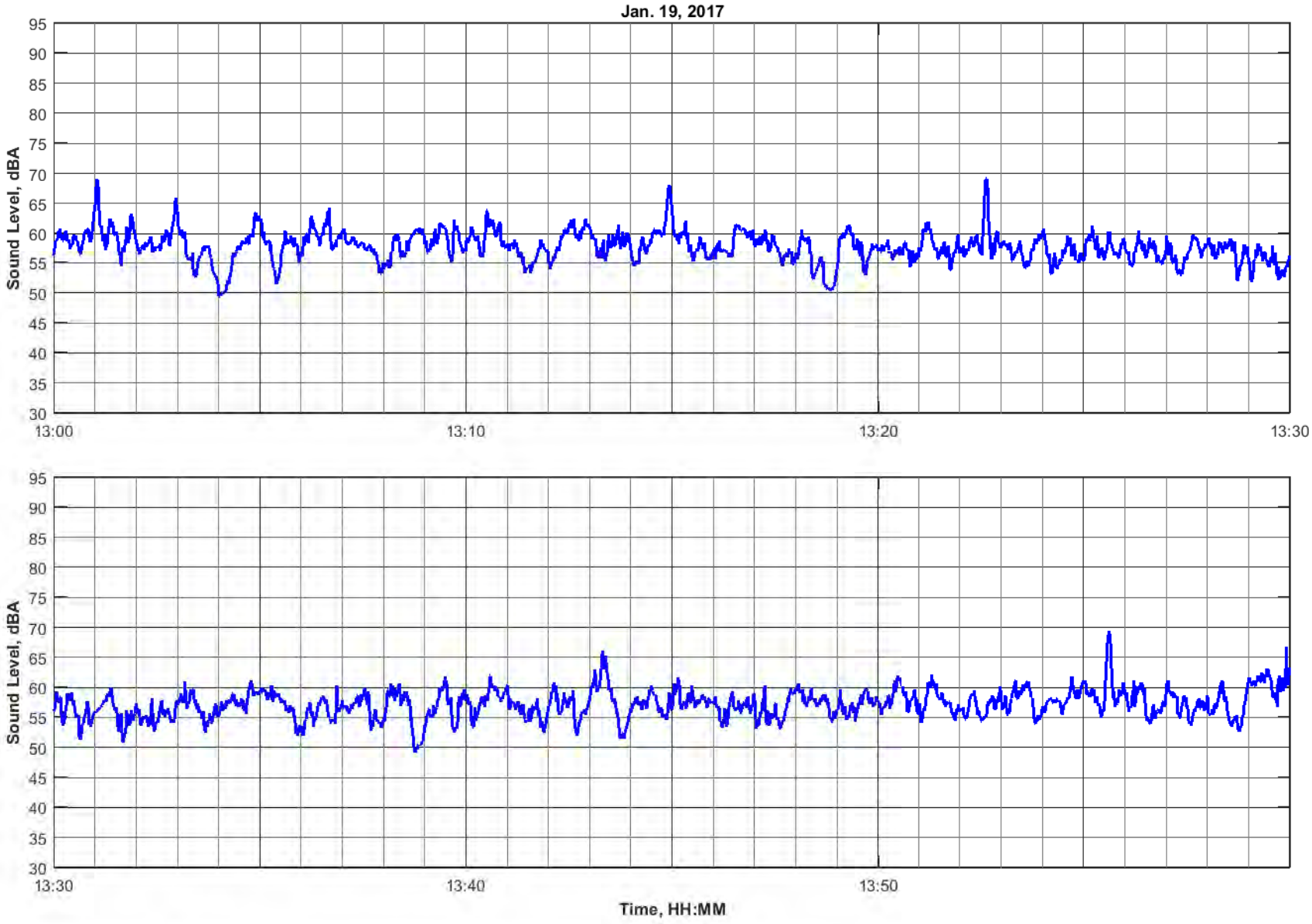
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 3** | Date<br>**2017-04-18** | Figure<br>**G38** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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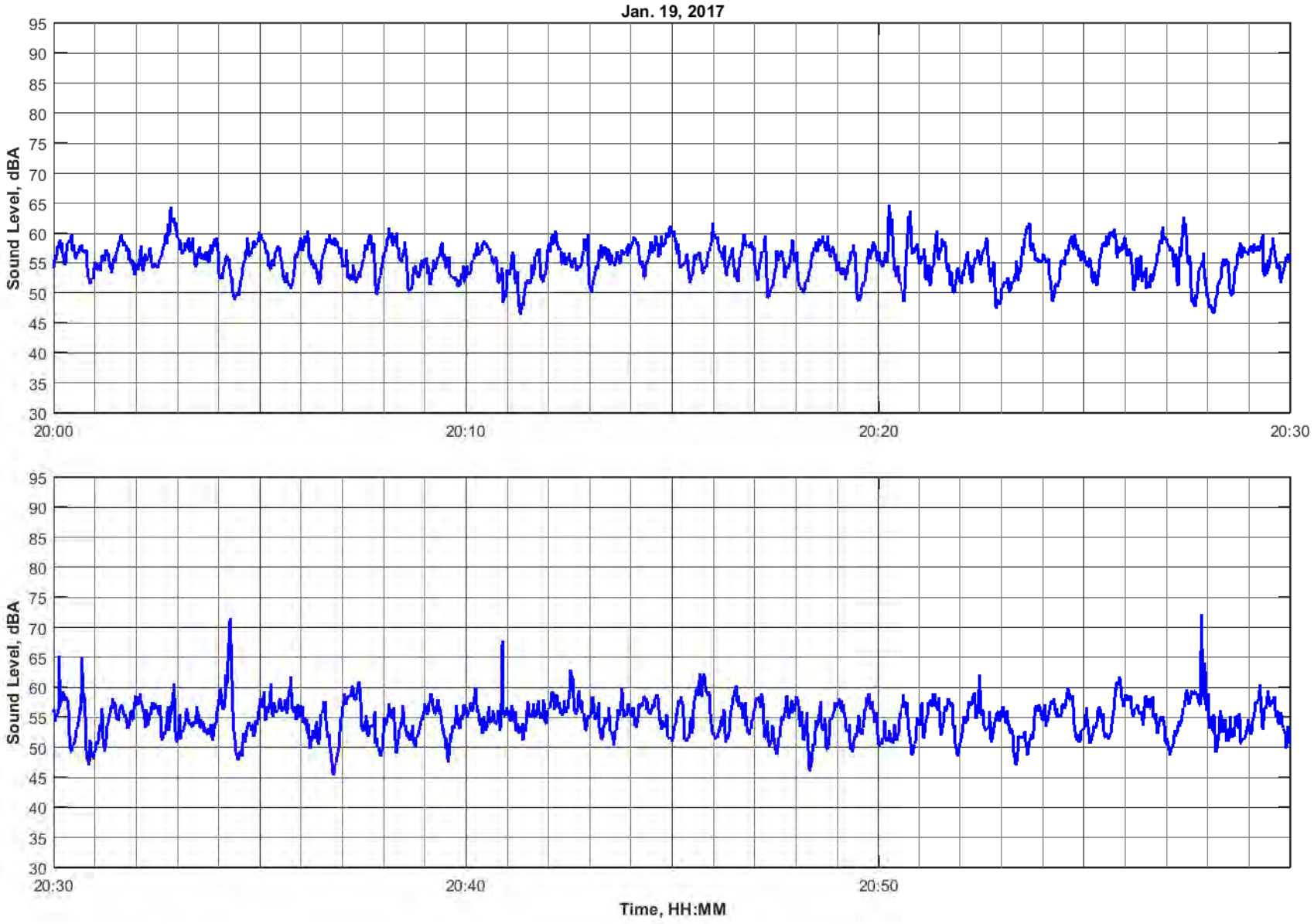
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 3** | Date<br>**2017-04-18** | Figure<br>**G39** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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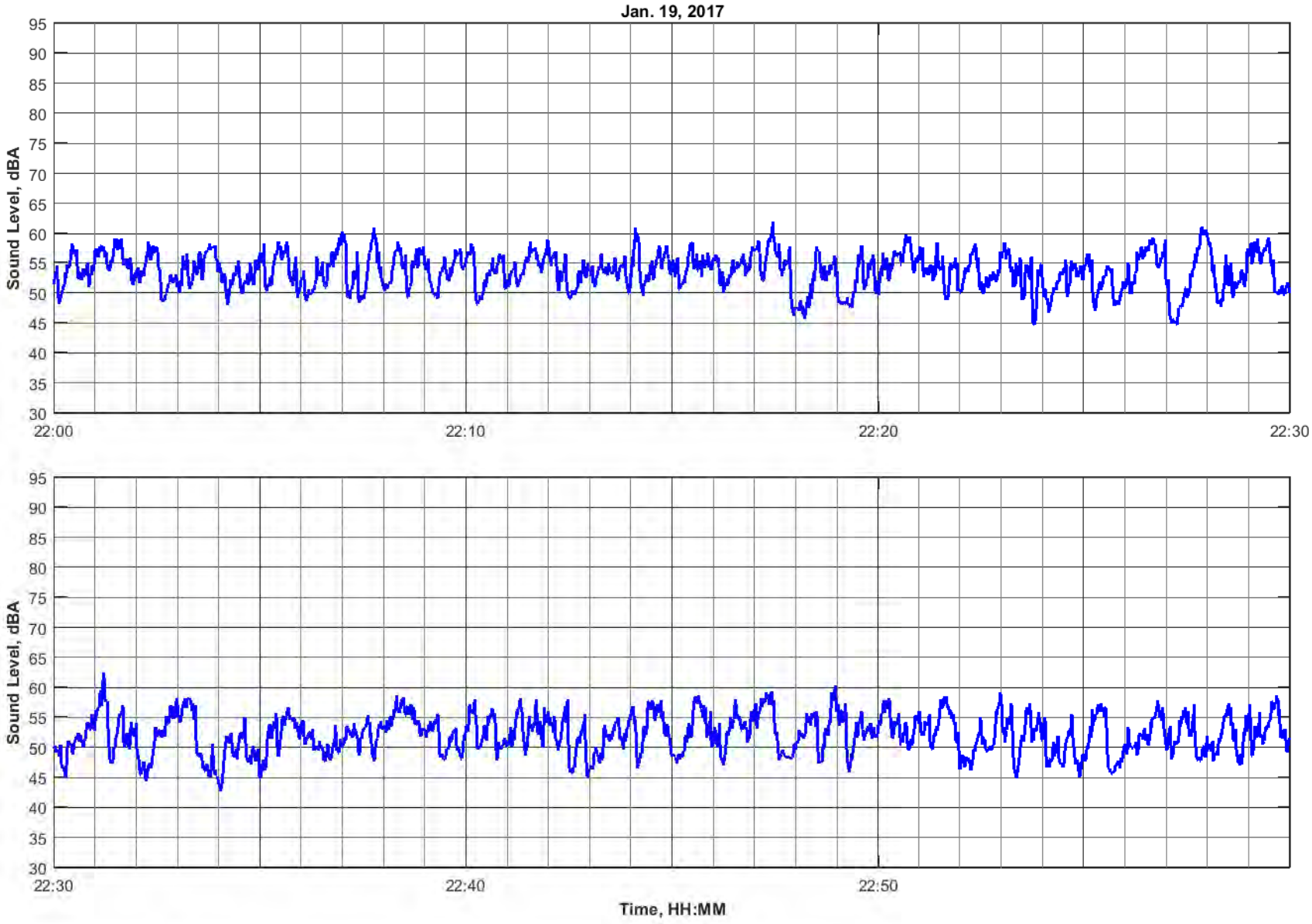
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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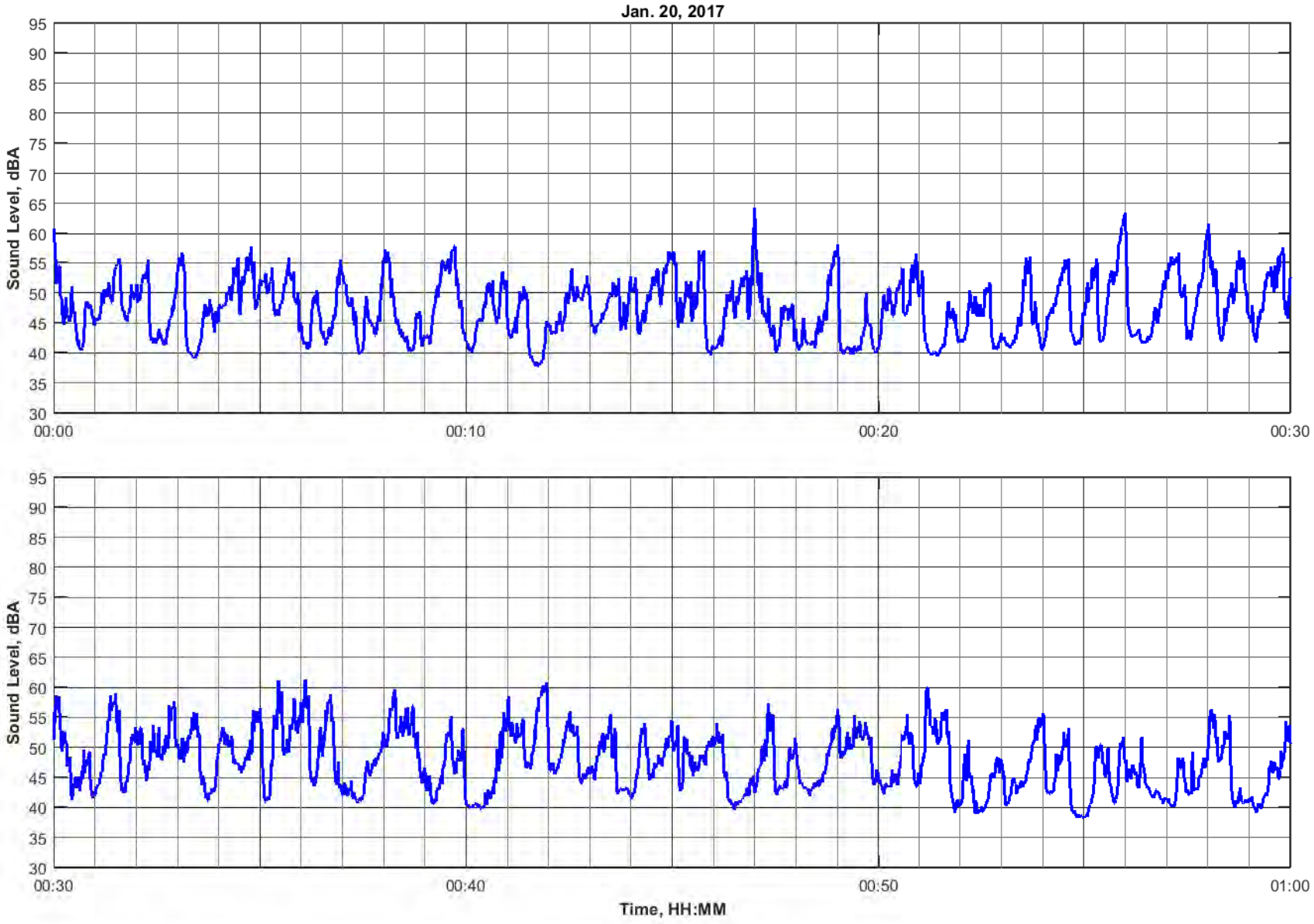
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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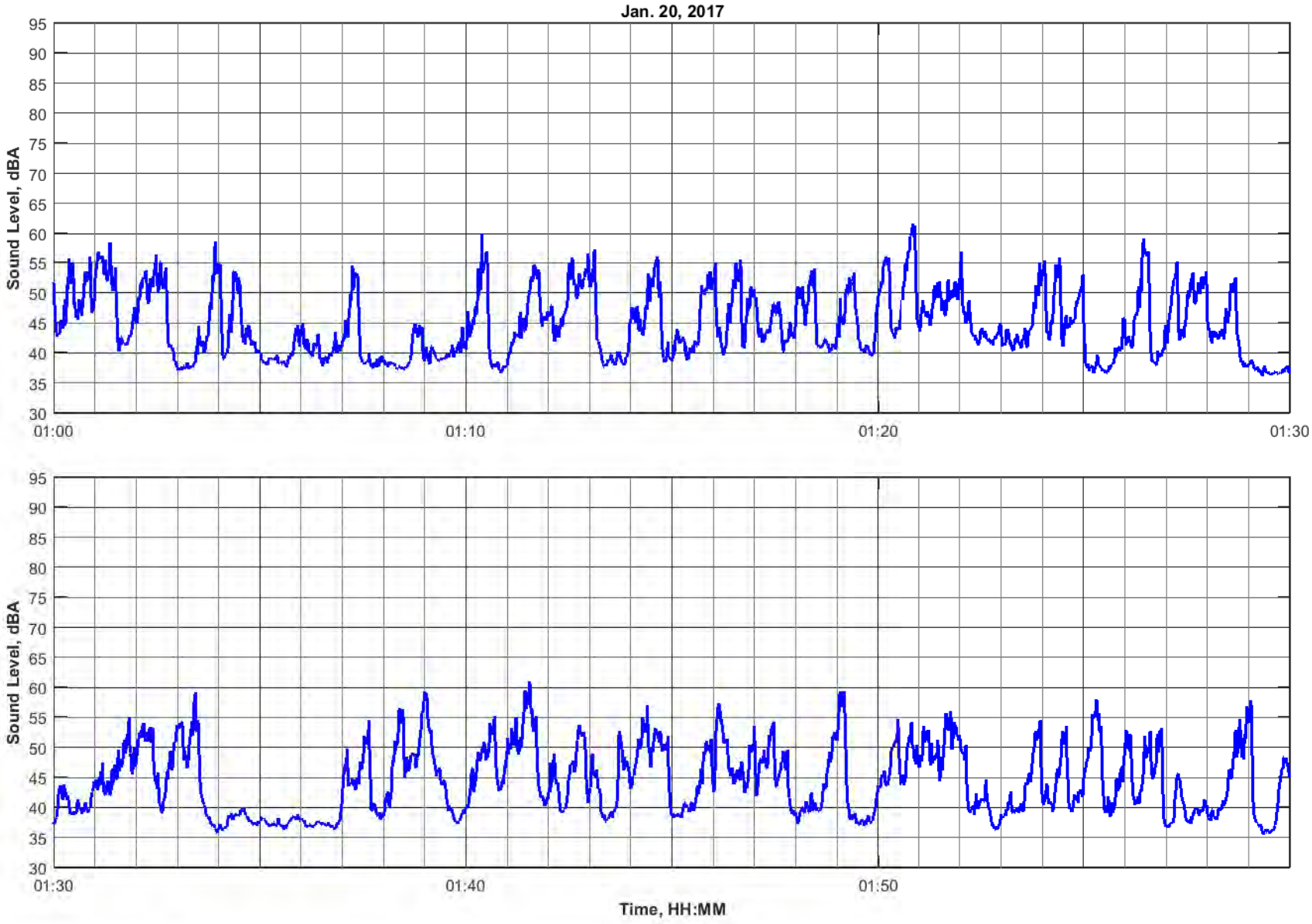
|---|---|---|---|
| VALCOUSTICS Canada Ltd. | **Title**<br>**Time History - Location 3** | **Date**<br>**2017-04-18** | **Figure**<br>**G42** |
| | **Project Name**<br>**Villalago Residences/Bolton** | **Project Number**<br>**116-0170** | |

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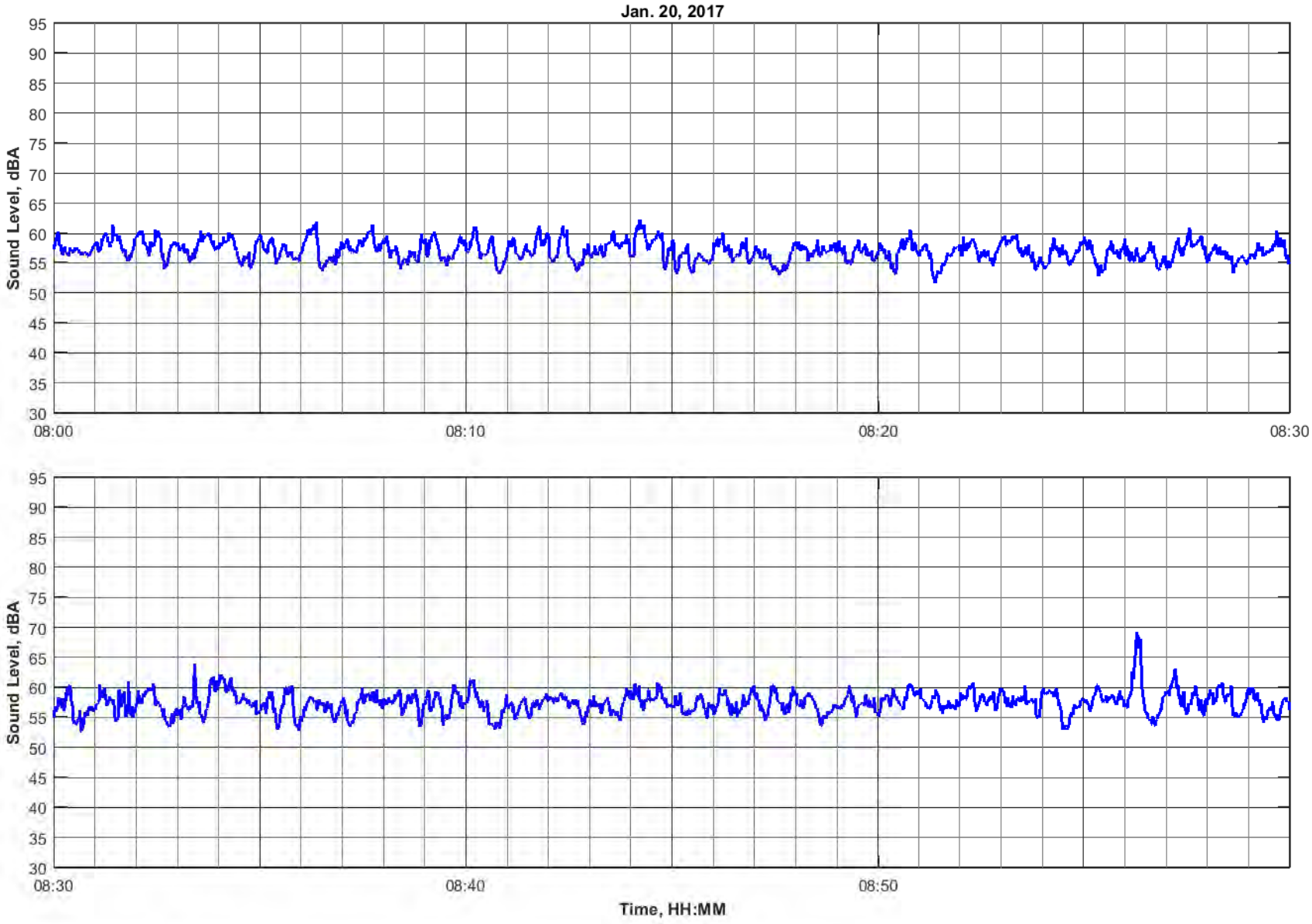
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 3** | Date<br>**2017-04-18** | Figure<br>**G43** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |

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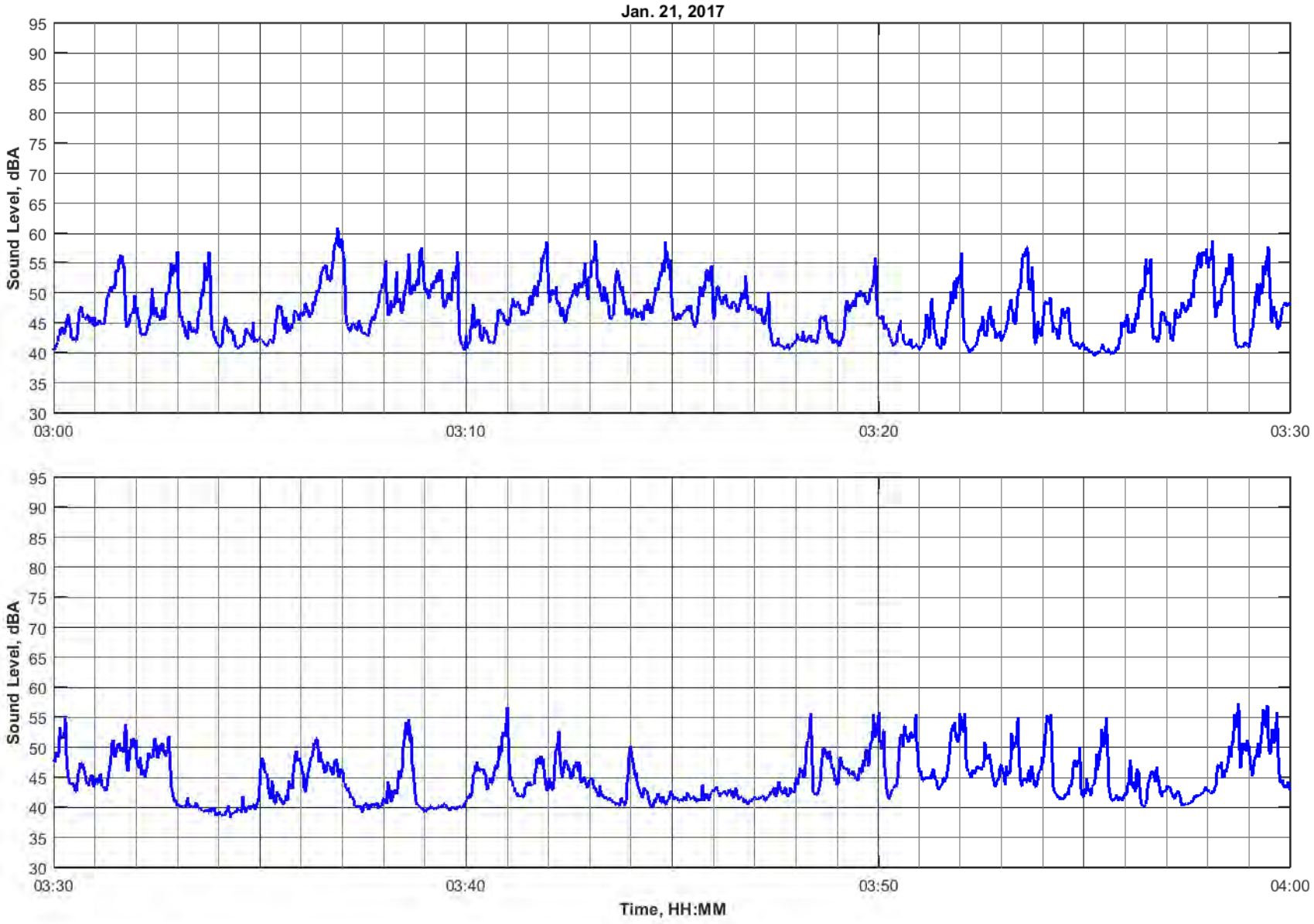
| VALCOUSTICS Canada Ltd. | Title<br>**Time History - Location 3** | Date<br>**2017-04-18** | Figure<br>**G44** |
| | Project Name<br>**Villalago Residences/Bolton** | Project Number<br>**116-0170** | |




VALCOUSTICS Canada Ltd.

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|---|---|---|
| Title: Time History - Location 3 | Date: 2017-04-18 | Figure: G45 |
| Project Name: Villalago Residences/Bolton | Project Number: 116-0170 | |

# APPENDIX H

## STATIONARY NOISE SOURCE ASSESSMENT MONTERRA LUMBER MILL

## TABLE H

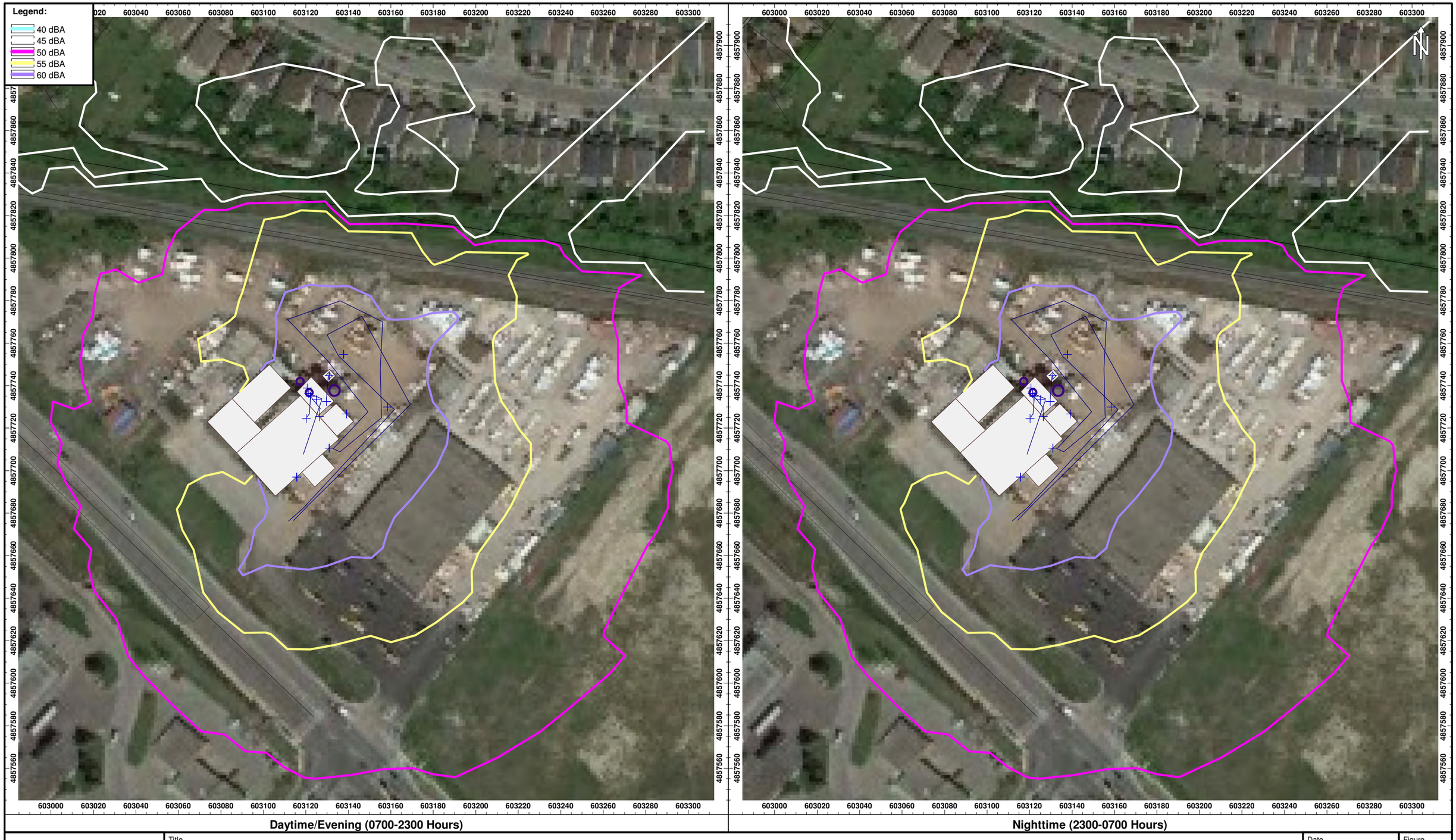
## MONTERRA LUMBER MILLS NOISE SOURCES(1)

| Source ID | Description | Sound Power Level (dBA re $10^{-12}$ W) | Operating Time (min per hour) | |
|---|---|---|---|---|
| | | | Day/Evening | Nighttime |
| MONT_A | Pressure blower housing & motor | 91 | 60 | 60 |
| MONT_B | Fan casing & motor | 90 | 60 | 60 |
| MONT_C | Fan housing & motor | 96 | 60 | 60 |
| MONT_D | Conveyor motor atop storage silo | 99 | 60 | 60 |
| MONT_D1 | South door west | 98 | 60 | 60 |
| MONT_D2 | South door middle | 96 | 60 | 60 |
| MONT_D3 | East door | 92 | 60 | 60 |
| MONT_DC1a | Dust collector - bottom | 97 | 60 | 60 |
| MONT_DC1b | Dust collector - surface | 94 | 60 | 60 |
| MONT_STACK2 | Dust collector outlet | 94 | 60 | 60 |
| MONT_WC | Wood chipper | 107 | 60 | 60 |
| MONT_NV3 | Truck idling | 93 | 60 | 60 |
| MONT_NV4 | Truck idling | 93 | 60 | 0 |
| MONT_N1 | Duct 1 | 89 | 60 | 60 |
| MONT_N2 | Duct 6 | 83 | 60 | 60 |
| MONT_N3 | Duct 7 | 84 | 60 | 60 |
| MONT_N4 | Duct 4 | 81 | 60 | 60 |
| MONT_N5 | Duct 5 | 83 | 60 | 60 |
| MONT_N6 | Duct 2 | 80 | 60 | 60 |
| MONT_N7 | Duct 3 | 84 | 60 | 60 |
| MONT_N8 | Duct 8 | 94 | 60 | 60 |
| MONT_NV2 | Forklift | 89 | 30 | 30 |

| Moving Point Sources | | | Movements per Hour | | Speed (km/hr) |
|---|---|---|---|---|---|
| | | | Day/Evening | Nighttime | |
| MONT_NV1 | Trucks arriving/departing | 96 | 3 | 1 | 20 |

Note:

(1) Source information taken from Reference 4.




Daytime/Evening (0700-2300 Hours)

Nighttime (2300-0700 Hours)

VALCOUSTICS Canada Ltd. consulting acoustical engineers

Title

**Sound Level Contours at 4.5 m Above Grade (from HGC Acoustic Assessment Report)**

Project Name

**Villalago Residences/Bolton**

Date: **2017-04-13**

Project No.: **116-0170**

Figure: **H-1**

E:\AA\1160170\Cadna\2017-04-03 Villalago - Monterra.cna

Date Plotted: 13.04.17


Daytime/Evening (0700-2300 Hours)

Nighttime (2300-0700 Hours)

VALCOUSTICS Canada Ltd. consulting acoustical engineers

Title
**Predicted Sound Level Contours from Monterra Lumber Mills - 4.5 m Above Grade**

Date
**2017-04-13**

Figure
**H-2**

Project Name
**Villalago Residences/Bolton**

Project No.
**116-0170**

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Date Plotted: 13.04.17


Daytime/Evening (0700-2300 Hours)

Nighttime (2300-0700 Hours)

VALCOUSTICS Canada Ltd. consulting acoustical engineers

| | | |
|---|---|---|
| Title: **Predicted Sound Level Contours from Monterra Lumber Mills 7.5 m Above Grade** | Date: **2017-04-13** | Figure: **H-3** |
| Project Name: **Villalago Residences/Bolton** | Project No.: **116-0170** | |

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Date Plotted: 13.04.17

**Legend:**

- No Excess
- Excesses Occur

602750 602800 602850 602900 602950

4858150 4858100 4858050 4858000 4857950 4857900 4857850 4857800

Block 1 Block 2 Block 3 Block 4 Block 5 Block 6 Block 7 Block 8 Block 9 Block 10 Block 11 Block 12 Block 13 Block 14 Block 15 Block 16 Block 17 Block 18

**Daytime (0700-1900 Hours)**

**Evening (1900-2300 Hours)**

**Nighttime (2300-0700 Hours)**

VALCOUSTICS Canada Ltd. consulting acoustical engineers

Title

**Predicted Excesses (dBA) due to Monterra Lumber Mills**

Project Name

**Villalago Residences/Bolton**

Date **2017-04-13**

Project No. **116-0170**

Figure **H-4**

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Date Plotted: 13.04.17