HGC ENGINEERING

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# Noise Feasibility Study

# Block D, Retirement Home, south of Harbour Street and West of Highway No. 26, Collingwood, Ontario

Prepared for:

Collingwood Seniors GP Ltd.
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Prepared by


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July 21, 2015

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# 1 Introduction & Summary

Howe Gastmeier Chapnik Limited (HGC Engineering) was retained by Collingwood Seniors GP Ltd. to conduct a noise feasibility study for their proposed seniors residential development (Block 4) to be located south of Harbour Street and west of Highway No. 26 in the Town of Collingwood, Ontario. Area surrounding the proposed development includes existing residential, proposed residential and proposed commercial uses. The subject site will consist of a 4-storey retirement residence and a connected 4-storey apartment building. The study is required by the municipality as part of their planning and approvals process.

The primary noise source impacting the site was determined to be road traffic on Harbour Street West and Highway No. 26. Road traffic data for Highway No. 26 and Harbour Street were obtained from a Traffic Impact Study prepared for Balmoral Village dated July 2011. The data was used to predict future traffic sound levels at the locations of the proposed building facades. The predicted sound levels were compared to the guidelines of the Ministry of Environment and Climate Change (MOECC) to develop noise control recommendations for the proposed development.

The sound level predictions indicate that the future road traffic sound levels will exceed MOECC guidelines at the closest residential units with exposure to Highway No. 26. An alternative means of ventilation to open windows will be required for all dwelling units with exposure to Highway No. 26. It is understood that the building will include air conditioning. Building constructions meeting the minimum requirements of the Ontario Building Code will be sufficient for the entire building. Warning clauses are also recommended, to inform future residents and the owner of the building of the traffic noise impacts and the proximity to existing and future commercial uses.

Since details of the rooftop mechanical equipment is currently in progress, a preliminary investigation of the potential noise impact from the rooftop mechanical equipment of the proposed retirement residence and apartment building at the future residences was conducted. The analysis is based on preliminary information obtained from a similar retirement facility and apartment building. The results indicate that the potential noise from the rooftop mechanical equipment can be within the applicable noise guideline limits of the MOECC at the future residences with screening of the closest and largest rooftop mechanical equipment. A detailed noise study should be conducted when rooftop

mechanical equipment and location specifications are available to confirm that the sound level limits will be met at the adjacent residences and to provide any additional recommendations for mitigation which may be required.

In summary, with suitable controls integrated into the building plans, it is concluded that this proposed development is feasible from the perspective of noise impact. Details of the assessment leading to this conclusion are provided herein.

# 2 Site Description & Noise Sources

The site is situated on the south side of Harbour Street and west of Highway No. 26 in Collingwood, Ontario. Figure 1 shows an aerial photo illustrating the location of the proposed site. A site plan prepared by Lucas & Associates dated July 20, 2015 is shown as Figure 2. Block 4 is the site of the retirement buildings. The proposed development will consist of two 4-storey buildings (128 retirement residence building and 44 unit apartment building that is connected), along with at-grade parking areas and patios areas on the east side of the proposed building. To the south and west of the site, single storey semi-detached and townhouse bungalows are proposed. These are not part of the current study, but an assessment of the impact of rooftop mechanical equipment on the roof two 4-storey retirement and apartment buildings and their impact on future residences to the south were assessed. Block 3 to the west of the site is proposed to be commercial and Block 2 to the west is proposed as condominium. Blocks 2 and 3 are not part of the current study.

A site visit was made by HGC Engineering personnel in July 2015 to make observations of the acoustical environment. The surrounding area is considered to be Class 1 (Urban) in terms of its acoustical environment. Road traffic on Highway No. 26 was confirmed to the dominant source of sound. Highway No. 26 is a 4-lane arterial roadway under the jurisdiction of the Town of Collingwood and is 2 lanes in each direction. In the vicinity of the subject site, Highway No. 26 has a north-south orientation, though overall, the highway is an east-west highway. To the south of Harbour Street, Highway No. 26 has a four lane urban cross-section, which transitions north of Harbour Street to a three and then two-lane section. The roadway is urban through the four-lane cross-section, mixed urban and rural through the three-lane cross-section and rural through the two-lane cross-section. The posted speed limit is 50 km/h. Harbour Street is a two-lane east-west

collector roadway under the jurisdiction of the Town of Collingwood. The roadway has a rural cross-section and the posted speed limit is 40 km/h. Dawson Drive is a two-lane north-south local roadway under the jurisdiction of the Town of Collingwood. The roadway has a rural cross-section and the posted speed limit is 40 km/h.

There are existing 2-storey residences on the north side of Harbour Street and a commercial plaza at the northwest corner of Harbour Street and Highway No. 26. There is a commercial plaza including a Canadian Tire to the south of the subject site and Black Ash Creek. Noise from the commercial uses was not audible over road traffic noise and is not considered further. The lands between the subject site and Highway No. 26 are designated for future resort commercial uses.

# 3 Noise Level Criteria

## 3.1 Road Traffic Noise

Guidelines for acceptable levels of road traffic noise impacting residential developments are given in the MOECC publication NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning", Part C release date October 21, 2013, and are listed in Table I below. The values in Table I are energy equivalent (average) sound levels [$L_{EQ}$] in units of A-weighted decibels [dBA].

**Table I: MOECC Road Traffic Noise Criteria (dBA)**

| Area | Daytime $L_{EQ}$ (16 hour) Road | Nighttime $L_{EQ}$(8 hour) Road |
|---|---|---|
| Outside Bedroom Windows | 55 dBA | 50 dBA |
| Outdoor Living Area | 55 dBA | -- |
| Inside Living/Dining Room | 45 dBA | 45 dBA |
| Inside Sleeping Quarters | 45 dBA | 40 dBA |

Daytime refers to the period between 07:00 and 23:00, while nighttime refers to the period between 23:00 and 07:00. The term "Outdoor Living Area" (OLA) is used in reference to an outdoor patio, a backyard, a terrace or other area where passive recreation is expected to occur. Balconies that are less than 4 m in depth are not considered to be outdoor living areas under MOECC guidelines.

The guidelines in the MOECC publication allow the sound level in an OLA to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the purchase and rental agreements to the property. Where OLA sound levels exceed 60 dBA, physical mitigation is required to reduce the OLA sound level to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible.

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels outside bedroom or living/dining room windows exceed 60 dBA or daytime sound levels outside bedroom or living/dining room windows exceed 65 dBA. Forced-air ventilation with ducts sized to accommodate the future installation of air conditioning is required when nighttime sound levels at bedroom or living/dining room windows are in the range of 51 to 60 dBA or when daytime sound levels at bedroom or living/dining room windows are in the range of 56 to 65 dBA. The location and installation of the outdoor air conditioning device should be done so as to minimize the noise impacts and comply with criteria of MOECC publication NPC-300.

Building components such as walls, windows and doors must be designed to achieve indoor sound level criteria when the plane of window nighttime sound level is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road traffic noise.

Warning clauses to notify future residents of possible excesses are also required when nighttime sound levels exceed 50 dBA at the plane of the bedroom or living/dining room window and daytime sound levels exceed 55 dBA in the outdoor living area and at the plane of the bedroom or living/dining room window due to road traffic.

# 4 Assessment of Road Traffic Noise on the Proposed Residential Buildings, Methods & Results

## 4.1 Road Traffic

Road traffic data for Harbour Street and Highway No. 26 were obtained from Crozier & Associates in their Traffic Impact Study for Balmoral Village dated July 2011, and is provided in Appendix A. The future data for 2019 was further grown to the year 2025 using a 2.8% compound growth rate as indicated in the traffic study. Commercial vehicle percentages of 2% for Harbour Street split into 1.2% medium trucks and 0.8% heavy trucks and 9% for Highway 26 split into 3.5% medium trucks and 5.5% heavy trucks were used in the analysis. A posted speed limit of 40 km/h for Harbour Street and 50 km/h for Highway 26 were used in the analysis. To the north of Harbour Street, the speed of Highway 26 is 60 km/h. A day/night split of 90/10% was also used. The resulting future traffic volumes are listed in Table II.

**Table II: Projected Traffic Data**

| Road Name | | Cars | Medium Trucks | Heavy Trucks | Total |
|---|---|---|---|---|---|
| **Highway No. 26** | Daytime | 21 800 | 838 | 1 318 | 23 957 |
| | Nighttime | 2 422 | 93 | 146 | 2 662 |
| | **Total** | **24 223** | **932** | **1 464** | **26 618** |
| **Harbour Street** | Daytime | 1 389 | 17 | 11 | 1 417 |
| | Nighttime | 154 | 2 | 1 | 157 |
| | **Total** | **1 543** | **19** | **13** | **1 574** |

## 4.2 Road Traffic Noise Predictions

To assess the levels of road traffic noise which will impact the site in the future, predictions were made using STAMSON version 5.04, a computer algorithm developed by the MOECC. Sample STAMSON output is included in Appendix B.

Prediction locations were chosen around the residential site to obtain a good representation of the future sound levels at the buildings with exposure to Harbour Street and Highway No. 26. The worst

case prediction locations were chosen to represent the top floors (4th), to investigate ventilation requirements. The results of these predictions are summarized in Table III.

**Table III: Predicted Road Traffic Sound Levels [dBA], Without Mitigation**

| Prediction Location | Description | Daytime – at Façade $L_{EQ(16)}$ | Nighttime – at Façade $L_{EQ(8)}$ |
|---|---|---|---|
| A | East façade facing Highway 26, 4th floor | 57 | 51 |
| B | East ground floor patio | <55 | NA |
| C | North façade facing Harbour Street | 55 | <50 |
| D | South façade with some exposure to Hwy 26 | <55 | <50 |

## 4.3 Traffic Noise Recommendations

The predictions indicate that the future traffic sound levels will exceed MOECC guidelines at the some dwelling units with exposure to Highway 26. Recommendations for ventilation and warning clauses to achieve the noise criteria stated in Table I are discussed below.

### 4.3.1 Outdoor Living Areas

There are common outdoor amenity areas (two garden level patios and one main floor patio) on the east side of the retirement building that are greater than 4 m in depth. These patio areas have some exposure to road traffic noise from Highway No. 26 and Harbour Street. The predicted sound level at the patios on the east side of the building will be less than 55 dBA. Physical mitigation in the form of acoustic barriers is not required.

There are no other outdoor amenity areas shown on the site plan.

### 4.3.2 Indoor Living Areas & Ventilation Requirements

The predicted future daytime sound levels outside the plane of the living/dining room windows closest Highway 26 are in the range of 56 and 65 dBA and between 51 and 60 dBA during the nighttime hours. All residential units on the facades facing the roadways should be equipped with alternative mean of ventilation so that windows may remain closed. Window or through-the-wall air

conditioning units are not recommended for any commercial or residential units because of the noise they produce and because the units penetrate through the exterior wall which degrades the overall noise insulating properties of the envelope. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MOECC publication NPC-300, central air conditioning will meet and exceed this requirement. The guidelines also recommend warning clauses for units with ventilation requirements. Inclusion of central air conditioning will meet or exceed the requirements. It is understood that the building will be provided with air conditioning throughout from a central plant.

### 4.3.3 Building Facade Constructions

Since the future road traffic sound levels at the plane of window of all dwelling units will be less than or equal to 65 dBA during daytime and 60 dBA during nighttime, any exterior wall, and double glazed window construction meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate sound insulation for all dwelling units in this development.

### 4.3.4 Warning Clauses

The MOECC guidelines recommend that warning clauses be included in the property and tenancy agreements for the proposed residential building with anticipated traffic sound level excesses.

Suggested wording for future dwellings with sound levels exceeding the MOECC criteria is given below.

Type A:

> 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 traffic may on occasion interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment.

Suggested wording for future dwellings requiring forced air ventilation systems is given below.

Type B:

> This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment.

Suitable wording for future dwellings adjacent to commercial facilities is given below.

Type C:

> Tenants are advised that due to the proximity of the adjacent commercial facilities, noise from the facilities may at times be audible.

These sample clauses are provided by the MOECC as examples and can be modified by the Municipality as required.

## 4.4 Summary of Traffic Noise Control Recommendations for the Proposed Retirement Buildings

The following recommendations are provided in regard to noise mitigation for road traffic noise for the proposed retirement building.

1. An alternative means of ventilation to open windows is required for all dwelling units with exposure to Highway No. 26. It is understood that air conditioning will be included in the building which meets and exceeds the requirement.

2. Any building construction meeting the minimum requirements of the Ontario Building Code will provide sufficient acoustical insulation for the indoor spaces.

3. Warning clauses should be included in the property and tenancy agreements and offers of purchase and sale to inform the future residents of the retirement building of the noise issues and the presence of the roadways and commercial facilities.

The reader is referred to the previous sections of the report where these recommendations are discussed in more detail.

# 5 Preliminary Assessment of Stationary Noise Sources

A preliminary noise impact assessment at proposed residences due to the building ventilation equipment of the proposed buildings has been conducted. The details of the rooftop mechanical equipment is in progress and the units and location will be designed to minimize the impact on surrounding residential receptors.

## 5.1 Criteria for Stationary Sources of Sound

NPC-300 is the latest MOECC Guideline specified for use in assessing Land Use Compatibility issues. The facade of a residence (i.e., outside the plane of a window to a noise sensitive interior space such as a bedroom or living room), or any associated usable outdoor area are considered to be sensitive points of reception. NPC-300 stipulates that the non-impulsive sound level limit for a stationary noise source during daytime hours (07:00 to 23:00) is the greater of the minimum one-hour energy equivalent (average) background sound level ($Leq_{1hr}$), or the exclusionary minimum limit of 50 dBA. During nighttime hours (21:00 to 07:00), the exclusionary minimum limit is 45 dBA.

Future residences to the south, southwest and existing residences to the north of the subject site (R1-R8) were considered the representative receptors in this assessment. R1 to R8 are proposed 1-storey bungalows with bedroom receptor height of 2.5 m). R9 and R10 are existing 2-storey residences with a second storey window height of 4.5 m. Receptor locations are shown on Figures 3 and 4. The exclusionary minimum limits of 50 dBA during the day and 45 dBA at night apply for all receptors.

## 5.2 Noise Assessment

Predictive noise modelling was used to assess the potential noise impact of rooftop equipment at the closest residential receptors. The noise prediction model was based on sound emission levels for rooftop equipment, assumed operational profiles (during the daytime and nighttime), and established engineering methods for the prediction of outdoor sound propagation. These methods include the effects of distance, air absorption, and acoustical screening by barrier obstacles.

Detailed mechanical rooftop plans are currently not available as the proposed development is still in the early stages of planning. Typical rooftop equipment was obtained from a rooftop mechanical

plan for a similar retirement residence and apartment building was used in the analysis. Sound emission data for typical rooftop equipment obtained from the manufacturer and HGC Engineering files for similar projects was used in the analysis and is provided in Appendix C.

The following information and assumptions were used in the analysis.

- The retirement residence and apartment building are 4-storey and assumed to be 12 m in height;
- One kitchen exhaust was assumed on the roof, along with one HVAC unit and six make-up air units on the rooftop, shown as green crosses on Figures 3 and 4. The makeup air units were assumed to be 10.5 tonne units and were assumed to be 1.5 m high. Sound Power data for typical units of this tonnage were obtained from HGC Engineering files. Appendix C summarizes the sound data for the significant rooftop mechanical equipment.

In accordance with establishing the predictable worst-case conditions, the rooftop HVAC equipment was assumed to operate at 100% capacity during daytime and 50% during night-time hours.

Commercial activities such as the occasional movement of customer vehicles on the property, the infrequent delivery of goods and garbage collection are not of themselves considered to be significant noise sources in the MOECC guidelines.

## 5.3 Results

The calculations consider the acoustical effects of distance and shielding by the roof. The resultant sound levels due to the rooftop mechanical equipment at the closest neighbouring residences (R1 to R10) are summarized in the following table.

The sound levels were used as input to a predictive computer model. The software used for this purpose (*Cadna-A version 4.4.145*) is a computer implementation of ISO Standard 9613-2.2 "Acoustics - Attenuation of Sound During Propagation Outdoors." The ISO method accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures such as barriers. The calculations consider the acoustical effects of distance and shielding by the building. The unmitigated sound levels due to the rooftop mechanical equipment at the closest neighbouring residences are summarized in the following table. Sound level contours are shown in Figures 3 and 4.

**Table IV: Predicted Sound Levels at Residential Receptors [dBA], Without Mitigation**

| Receptor | Criteria Day/ Night | Predicted Daytime – at Façade | Predicted Night-time – at Façade |
|---|---|---|---|
| R1 (future 1-storey semi-detached house to southeast) | 50 / 45 | 51 | 48 |
| R2 (future 1-storey semi-detached house to south) | 50 / 45 | 49 | 46 |
| R3 (future 1-storey semi-detached house to south) | 50 / 45 | 49 | 46 |
| R4 (future 1-storey townhouse to south) | 50 / 45 | 49 | 46 |
| R5 (future 1-storey townhouse to south) | 50 / 45 | 51 | 48 |
| R6 (future 1-storey semi-detached house to south) | 50 / 45 | 50 | 47 |
| R7 (future 1-storey townhouse to south) | 50 / 45 | 45 | 42 |
| R8 (future 1-storey townhouse to south) | 50 / 45 | 45 | 42 |
| R9 (existing 2-storey residence to the north) | 50 / 45 | 47 | 44 |
| R10 (existing 2-storey residence to the north) | 50 / 45 | 47 | 44 |

The results from the preliminary stationary source noise assessment indicate that noise from rooftop mechanical equipment can exceed the MOECC sound level limits at the nearby residences to the south by up to 1 dBA during the daytime hours and up to 3 dBA during the nighttime hours. A detailed review should be conducted when detailed roof plans and mechanical equipment selections are available to confirm that the MOECC limits will be met at the neighbouring residences and provide any additional recommendations for mitigation which may be required. Recommendations for preliminary noise mitigation to meet MOECC guidelines are provided below. These mitigation measures are subject to the review of the final design and acoustic modeling.

## 5.4 Recommendations for Mitigation

The configuration of the retirement buildings on the site can achieve MOECC guidelines, as long as the following are met.

1. A preliminary investigation of the potential noise from the assumed size and location of rooftop mechanical equipment indicates that 2.0 m high acoustic screens may be required around the closest rooftop units to the residences to the south. Alternatively a 2.0 m solid parapet wall around the roof of the buildings may also be sufficient. The acoustic screens should be a minimum of 0.5 m above the top of the rooftop mechanical equipment. When details of the rooftop mechanical equipment are available, including tonnage, make and model and location, the acoustic model should be revised and appropriate mitigation

recommended, if necessary.

2. Before the issuance of building permits, an acoustical consultant should review the plans and specifications to certify that the rooftop equipment and their selected sound level specifications are in accordance with the noise report. The mechanical equipment should be selected using the dBA values in the table provided in Appendix C. When the selections are finalized, the manufacturers' sound levels should be provided to HGC Engineering for review to ensure MOECC compliance at the offsite residential receptors.

3. After construction, the municipal building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should certify that the rooftop mechanical equipment installed is in accordance with the noise report.

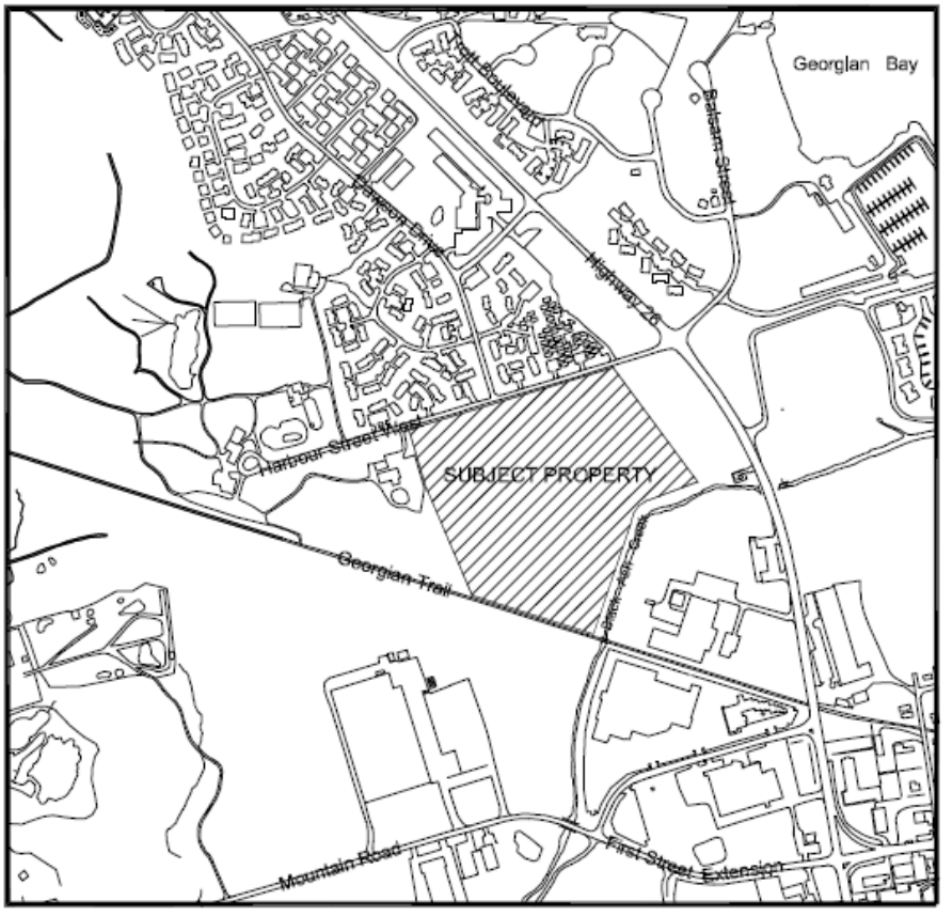
The mitigated sound levels due to the rooftop mechanical equipment at the closest neighbouring residences are summarized in the following table. Sound level contours are shown in Figures 3 and 4.

**Table V: Predicted Sound Levels at Residential Receptors [dBA], With Mitigation**

| Receptor | Criteria Day/ Night | Predicted Daytime – at Façade | Predicted Night-time – at Façade |
|---|---|---|---|
| R1 (future 1-storey semi-detached house to southeast) | 50 / 45 | 46 | 43 |
| R2 (future 1-storey semi-detached house to south) | 50 / 45 | 45 | 42 |
| R3 (future 1-storey semi-detached house to south) | 50 / 45 | 45 | 42 |
| R4 (future 1-storey townhouse to south) | 50 / 45 | 44 | 41 |
| R5 (future 1-storey townhouse to south) | 50 / 45 | 43 | 40 |
| R6 (future 1-storey semi-detached house to south) | 50 / 45 | 43 | 40 |
| R7 (future 1-storey townhouse to south) | 50 / 45 | 43 | 39 |
| R8 (future 1-storey townhouse to south) | 50 / 45 | 40 | 37 |
| R9 (existing 2-storey residence to the north) | 50 / 45 | 47 | 44 |
| R10 (existing 2-storey residence to the north) | 50 / 45 | 47 | 44 |

# 6 Conclusions

Our analysis assuming typical worst-case equipment and operating scenarios as described above indicates that the noise impact of the retirement buildings on the adjacent residential buildings can comply with MOECC criteria with some additional noise mitigation in the form of roof screens or roof parapets for the rooftop mechanical equipment. The mitigation measures should be reviewed based on the final design of the roof layout and specific euqpemnt. Recommendations are provided.




KEY PLAN

Figure 1 – Key Plan

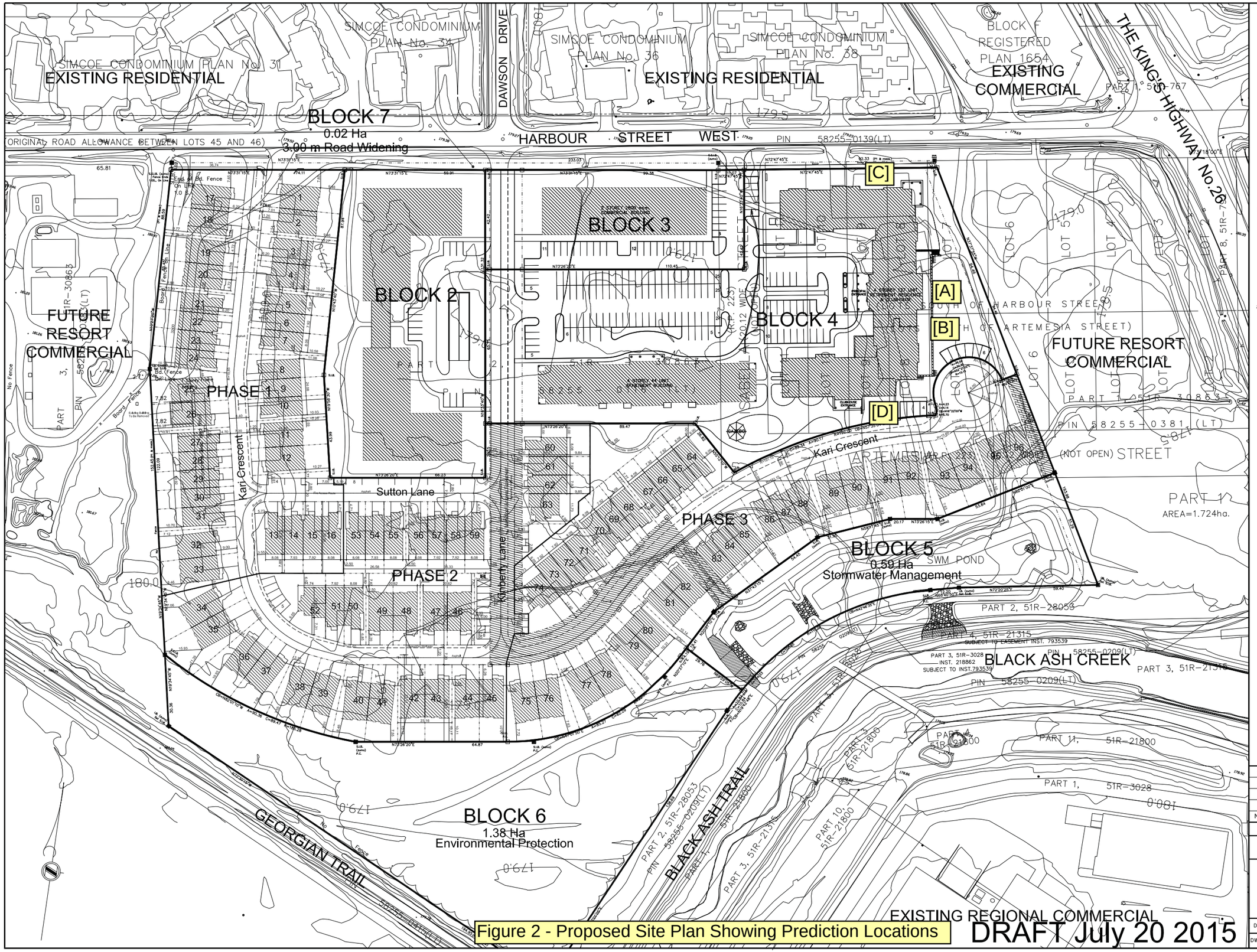
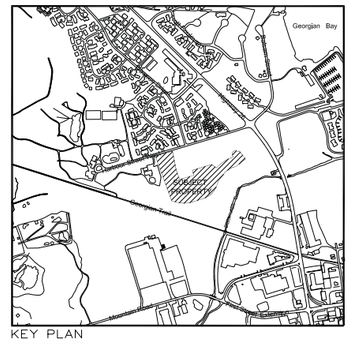



Figure 2 - Proposed Site Plan Showing Prediction Locations

DRAFT July 20 2015




KEY PLAN

BALMORAL VILLAGE
BLOCK 1 PLAN 51-M-1049
PART OF LOT 45
CONCESSION 10
(FORMER TOWNSHIP OF NOTTAWASAGA)
NOW IN THE
TOWN OF COLLINGWOOD
COUNTY OF SIMCOE

SCALE 1 : 750

25 20 15 10 5 0 25 50metres

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL DIMENSIONS ON THE SITE AND REPORT ANY DISCREPENCIES OR VARIATIONS TO LUCAS AND ASSOCIATES. LUCAS AND ASSOCIATES IS NOT RESPONSIBLE FOR THE ACCURACY OF THE SURVEY OR ARCHITECTURAL INFORMATION SHOWN ON THE DRAWING.

THIS DRAWING IS NOT TO BE SCALED.

DEVELOPMENT DETAILS

| | |
|---|---|
| PHASE 1 | |
| DEVELOPMENT AREA | 13,135,46 m² |
| UNITS (Semi-Detached) | 14 |
| UNITS (Townhomes) | 19 |
| UNITS (Total) | 33 |
| BUILDING AREA | 4,827,83 m² |
| PERCENTAGE LOT COVERAGE | 36,75% |
| TOTAL PAVED AREA | 2,684,09 m² |
| PERCENTAGE PAVED AREA | 20,43% |
| LANDSCAPED AREA | 5,623,54 m² |
| PERCENTAGE LANDSCAPED AREA | 42,82% |
| No. PARKING SPACES | 80 |
| PARKING RATIO | 2,42 SPACES/UNIT |
| PHASE 2 | |
| DEVELOPMENT AREA | 14,125,90 m² |
| UNITS (Semi-Detached) | 16 |
| UNITS (Townhomes) | 14 |
| UNITS (Total) | 30 |
| BUILDING AREA | 4,174,67 m² |
| PERCENTAGE LOT COVERAGE | 29,55% |
| TOTAL PAVED AREA | 3,916,58 m² |
| PERCENTAGE PAVED AREA | 27,74% |
| LANDSCAPED AREA | 6,034,65 m² |
| PERCENTAGE LANDSCAPED AREA | 42,71% |
| No. PARKING SPACES | 83 |
| PARKING RATIO | 3,76 SPACES/UNIT |
| PHASE 3 | |
| DEVELOPMENT AREA | 15,483,98 m² |
| UNITS (Semi-Detached) | 16 |
| UNITS (Townhomes) | 17 |
| UNITS (Total) | 33 |
| BUILDING AREA | 4,904,13 m² |
| PERCENTAGE LOT COVERAGE | 31,67% |
| TOTAL PAVED AREA | 4,085,29 m² |
| PERCENTAGE PAVED AREA | 26,38% |
| LANDSCAPED AREA | 6,494,56 m² |
| PERCENTAGE LANDSCAPED AREA | 41,95% |
| No. PARKING SPACES | 83 |
| PARKING RATIO | 2,51 SPACES/UNIT |
| TOTAL DEVELOPMENT | |
| DEVELOPMENT AREA | 42,745,34 m² |
| UNITS (Semi-Detached) | 46 |
| UNITS (Townhomes) | 50 |
| UNITS (Total) | 96 |
| BUILDING AREA | 13,906,63 m² |
| PERCENTAGE LOT COVERAGE | 32,53% |
| TOTAL PAVED AREA | 10,685,96 m² |
| PERCENTAGE PAVED AREA | 25,00% |
| LANDSCAPED AREA | 18,152,75 m² |
| PERCENTAGE LANDSCAPED AREA | 42,47% |
| No. PARKING SPACES | 246 |
| PARKING RATIO | 2,56 SPACES/UNIT |

R3 ZONING DETAILS

| | REQUIRED | PROVIDED |
|---|---|---|
| MIN. LOT AREA | (Nil) | 42,745,34 m² |
| MIN. LOT FRONTAGE | (Nil) | 74,11 m |
| MIN. LANDSCAPED AREA | 40,00% | 62,33% |
| MAX. LOT COVERAGE | 40,00% | 8,12% |
| MIN. FRONT YARD | 6,00 m | 6,00 m |
| MIN. INT. SIDEYARD | 6,00 m | 6,00 m |
| MIN. REAR YARD | 7,50 m | 7,50 m |
| MAX. HEIGHT | 12,00 m | +12,00 m |
| PARKING SPACES | 216 | 246 |

| No. | Description | Date |
|---|---|---|
| 4. | | |
| 3. | | |
| 2. | | |
| 1. | | |

REVISIONS

# SITE PLAN

Lucas & Associates
Consultants in Planning and Land Development
24 Debra Crescent, Barrie, Ontario L4N 3T1
(705) 721-9635 Fax (705) 721-7367

DATE : July 20, 2015 | DRAWN BY : G.J.L. | SP1

DWG NAME: Balmoral Village Block A Site Plan Jul 20 15.DWG

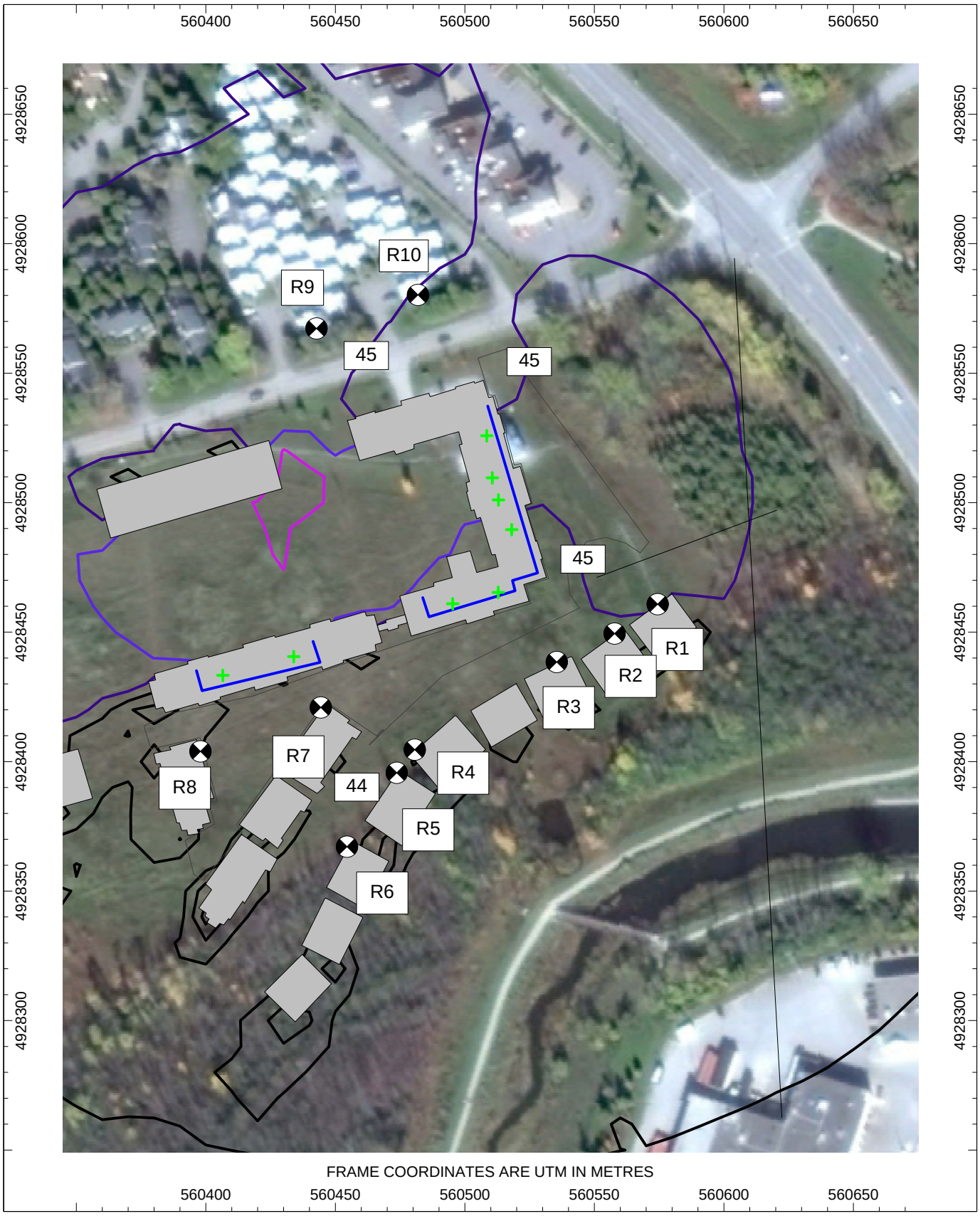



Figure 3 - Predicted Daytime Sound Level Contours with Mitigation

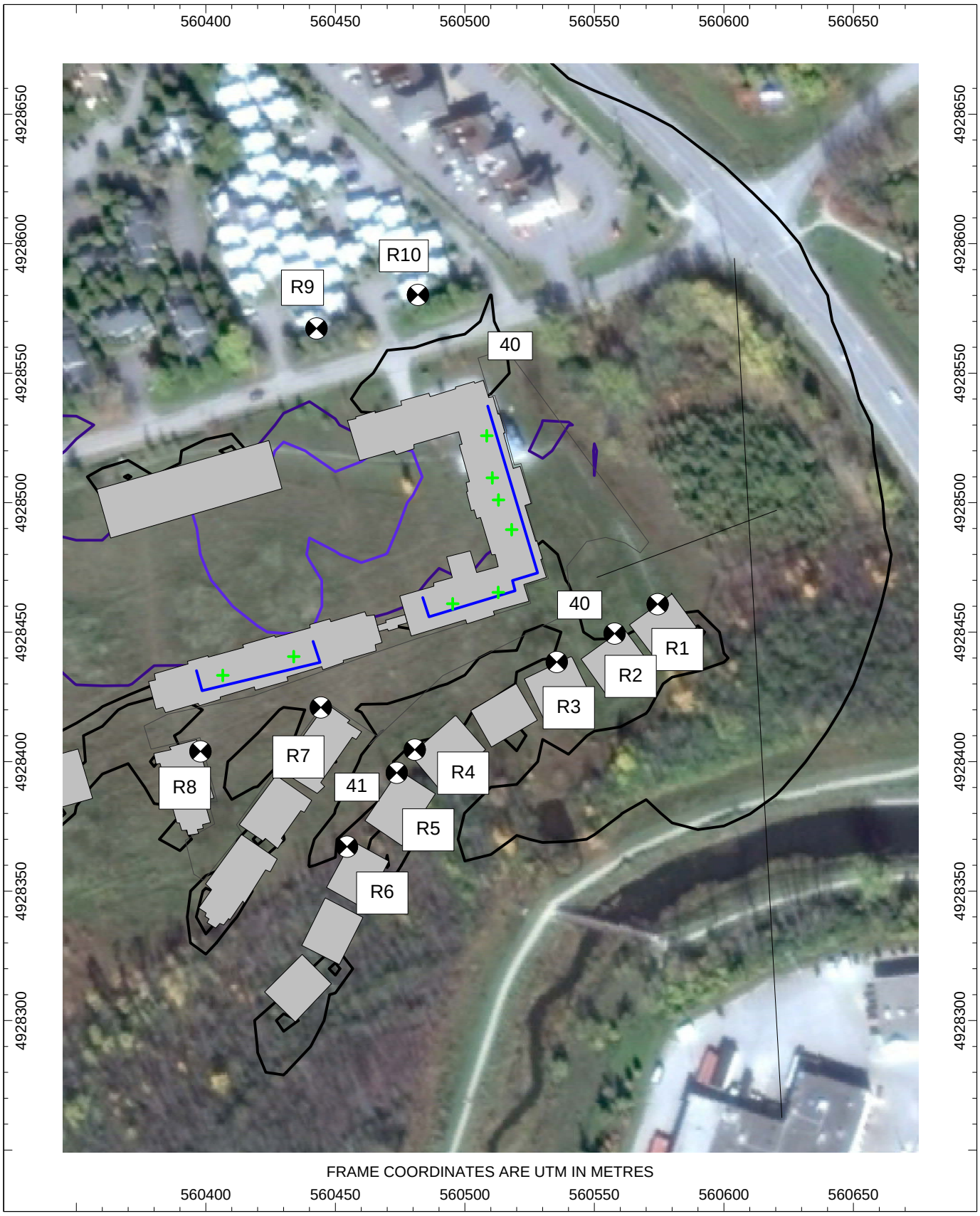
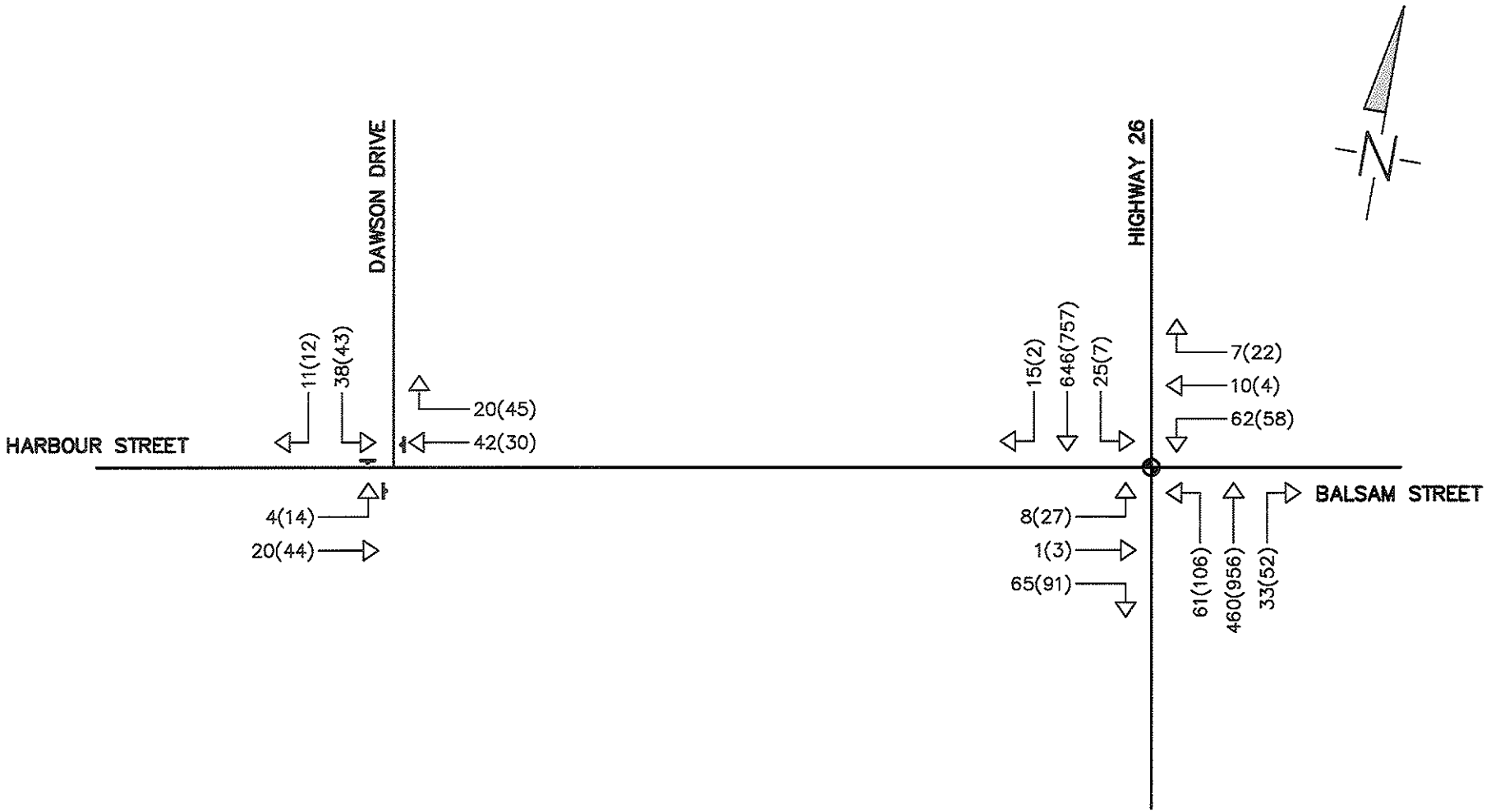



Figure 4 - Predicted Nighttime Sound Level Contours with Mitigation

# APPENDIX A

# Road Traffic Information




Legend

- STOP CONTROL
- SIGNAL CONTROL
- XX(YY) WEEKDAY A.M. (P.M.)PEAK HOUR TRAFFIC VOLUMES

NOTE:
THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Project: BLACK ASH VILLAGE TIS
TOWN OF COLLINGWOOD

Drawing: 2019 FUTURE BACKGROUND TRAFFIC VOLUMES

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|---|---|---|
| P.H. | A.J.F. | 362-2897 |
| Scale | Date | Drawing No. |
| N.T.S. | 08/13/2009 | FIG. 8 |

## 1.0 Future Background Traffic

### 1.1. Study Horizon

As per the ITE "Transportation Impact Analyses for Site Development" manual, the horizon year should reflect the anticipated full build out year. Accordingly, a ten year horizon of 2019 would capture full build-out and was used for analysis.

To assess the interim affects of the development, a five year horizon representing 50 percent of the full-build out traffic generation was also analyzed.

### 1.2. Traffic Growth Rates

Traffic growth rates were based on the "Highway 26 Corridor Collingwood Area Study Design Traffic Operations Report", May 2004, prepared by McCormick Rankin Corporation. This report was a comprehensive examination of the future transportation demands in Collingwood driven by growth in population, tourism and projected development. The report forecasted ten and twenty year demands on major routes in the area, including Highway 26. Excerpts of this report were provided by Town of Collingwood staff.

The report provided traffic volume forecasts for the nearby intersection of Highway 26/Mountain Road/First Street/High Street to the south of the subject development. Growth rates were calculated from these forecasts. A compound growth rate of 2.8 percent (simple growth rate of 3.7 percent) was calculated for Highway 26. The compound growth rate was used for calculating future background traffic volumes as a simple growth rate tends to overstate growth in the initial years and understate growth in the final years.

No background growth rates were applied to volumes on Harbour Street, Balsam Street, and Dawson Drive. Instead, development specific traffic volumes were calculated and used (refer to Section 3.3).

Figures 4 and 5 illustrate the 2014 and 2019 corridor growth traffic volumes, respectively.

### 1.3. Other Local Developments

Local developments that would directly affect the traffic volumes on either Harbour Street or Balsam Street were considered separately from the background Highway 26 corridor growth.

The partially occupied Cranberry Mews commercial development is located immediately west of Highway 26 between Harbour Street and Keith Avenue. Town of Collingwood staff provided information on the size and legal uses of the development. Traffic volumes were forecast for this development and applied to the boundary road network per the commercial distribution described in Section 4.2. The forecasted trips were further classified as primary and pass-by. A primary trip is defined as a trip made for the specific purpose of visiting the generator. A pass-by trip is defined as an intermediary stop on the way from an origin to a primary trip destination. A primary trip will add a new trip to the roadway system while a pass-by trip will only add new turning movements to the system.

Development is anticipated on the site of the former Kaufman furniture plant, and lands immediately west and east of the Black Ash Village development. However, at the time of writing of the report, no information on the type, scale or schedule of potential development was available. Accordingly, future uses of these lands have not been accounted for in the analysis.

It was assumed that Cranberry Mews commercial development would be fully operational with the interim five year (2014) horizon. Figure 6 illustrates the traffic volumes associated with this development.

The calculated 2014 and 2019 future background traffic volumes are illustrated in Figures 7 and 8, respectively, and represent the Cranberry Mews trip generation in Figure 6 added to the Highway 26 corridor growth volumes in Figures 4 and 5.

# APPENDIX B

# Sample STAMSON 5.04 Output

```
STAMSON 5.0        NORMAL REPORT        Date: 21-07-2015 10:01:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: e.te                 Time Period: Day/Night 16/8 hours
Description: Daytime and nighttime sound levels at the east façade facing
Highway 26, 4th floor

Road data, segment # 1: Hwy 26 (day/night)
----------------------------------------
Car traffic volume  : 21800/2422  veh/TimePeriod  *
Medium truck volume :   838/93    veh/TimePeriod  *
Heavy truck volume  :  1318/146   veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  22554
    Percentage of Annual Growth        :   2.80
    Number of Years of Growth          :   6.00
    Medium Truck % of Total Volume     :   3.50
    Heavy Truck  % of Total Volume     :   5.50
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Hwy 26 (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  : 120.00 / 120.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   9.00 m
Reference angle           :   0.00

Road data, segment # 2: Harbour (day/night)
----------------------------------------
Car traffic volume  :  1389/320   veh/TimePeriod
Medium truck volume :    17/2     veh/TimePeriod
Heavy truck volume  :    11/1     veh/TimePeriod
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: Harbour (day/night)
----------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  40.00 / 40.00  m
Receiver height           :   1.50 / 1.50   m
```

```
Topography                :      3       (Elevated; no barrier)
Elevation                 :   9.00 m
Reference angle           :   0.00

Results segment # 1: Hwy 26 (day)
----------------------------------

Source height = 1.53 m

ROAD (0.00 + 57.22 + 0.00) = 57.22 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.39  70.73   0.00 -12.54  -0.96   0.00   0.00   0.00
57.22
-------------------------------------------------------------------------
---

Segment Leq : 57.22 dBA

Results segment # 2: Harbour (day)
----------------------------------

Source height = 0.94 m

ROAD (0.00 + 41.48 + 0.00) = 41.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
     0     90   0.41  51.48   0.00  -5.99  -4.01   0.00   0.00   0.00
41.48
-------------------------------------------------------------------------
---

Segment Leq : 41.48 dBA

Total Leq All Segments: 57.33 dBA

Results segment # 1: Hwy 26 (night)
----------------------------------

Source height = 1.53 m

ROAD (0.00 + 50.68 + 0.00) = 50.68 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.39  64.18   0.00 -12.54  -0.96   0.00   0.00   0.00
50.68
-------------------------------------------------------------------------
---
```

```
Segment Leq : 50.68 dBA

Results segment # 2: Harbour (night)
------------------------------------

Source height = 0.75 m

ROAD (0.00 + 36.72 + 0.00) = 36.72 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
     0     90   0.41  46.75   0.00  -6.02  -4.02   0.00   0.00   0.00
36.72
-------------------------------------------------------------------------
---

Segment Leq : 36.72 dBA

Total Leq All Segments: 50.85 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.33
                           (NIGHT): 50.85
```

# APPENDIX C

# Assumed Rooftop Mechanical Equipment Information

**Table I: Typical Manufacturer's Sound Power Levels (PWL) for Rooftop Mechanical Equipment [dB re 10-12 W]**

| Source | Octave Band Centre Frequency [Hz] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **63** | **125** | **250** | **500** | **1k** | **2k** | **4k** | **8k** | **dBA** |
| 10.5 Tonne Make Up Air Unit | 106 | 100 | 102 | 101 | 97 | 95 | 91 | 84 | 103 |
| 12 Section Condenser Unit | 90 | 97 | 92 | 91 | 88 | 83 | 79 | 72 | 93 |
| Kitchen Exhaust Fan | 85 | 85 | 84 | 82 | 75 | 68 | 64 | 62 | 82 |