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NOISE & VIBRATION FEASIBILITY STUDY

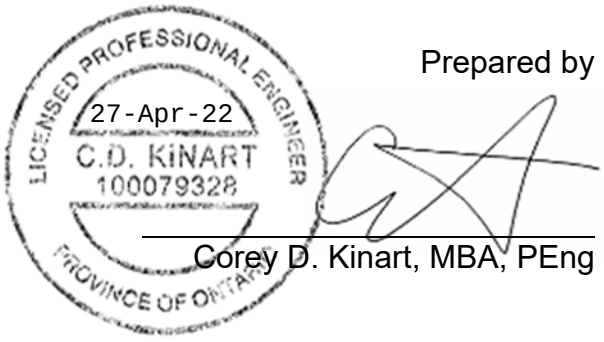
Proposed Hot Mix Asphalt Plant

291 North Service Road, Burlington, Ontario

Prepared for

King Paving
3385 Harvester Road
Burlington, Ontario
L7R 3Y5

Prepared by



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April 27, 2022

HGC Engineering Project No. 02200293

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1 Introduction & Summary

HGC Engineering was retained by King Paving & Construction Ltd. (King Paving) to undertake a noise and vibration feasibility study of a hot mix asphalt (HMA) plant proposed at 291 North Service Road in Burlington, Ontario, in support of applications to the City for amendments to the Official Plan and Zoning By-Law.

The study uses predictive analysis to assess the potential noise impacts of the HMA plant with respect to Ontario Ministry of the Environment, Conservation and Parks (MECP) Publication NPC-300 [1] and the City noise by-law [2]. The analysis indicates that the sound levels of the proposed HMA plant are predicted to be within the applicable limits of MECP Publication NPC-300, which are the same as the quantitative limits stipulated in the City noise by-law.

MECP Publication NPC-207 [3] specifies limits for impulse vibration induced upon residential structures by industrial/commercial sources, such as metal presses. The proposed HMA plant will include no sources of ground borne impulse vibration, and thus the facility will comply with the limits of NPC-207. Ground-borne vibration during operation of the proposed HMA plant is thus not discussed further herein.

At the request of the City, this report includes consideration of potential impacts of vibration associated with construction of the proposed plant, which are anticipated to be negligible given the considerable distances to the nearest neighbouring buildings.

2 Description of Site & Noise Sources

The subject site is located immediately north of Highway 403, southwest of Hickory Lane, in Burlington, as indicated in Figure 1. The HMA plant will typically operate on weekdays between 06:00 and 17:00, and occasionally during evenings or overnight hours as market conditions may dictate. The primary sources of noise at the proposed HMA plant will be trucks delivering raw materials and shipping HMA, a front-end loader and various components of the HMA plant.

3 Points of Reception

MECP Publication NPC-300 defines a point of reception as any location on a noise sensitive land use where noise from a stationary source is received. Noise sensitive land uses include those that accommodate a dwelling, or a building used for a noise sensitive commercial use (with sleeping facilities such as hotels/motels) or a noise sensitive institutional use (such as a school, day care, hospital of place of worship). The nearest and most potentially impacted points of reception to the subject site are homes on the south side of Highway 403 and south of Waterdown Road. Two receptors have been selected to represent these locations, labelled as R1 and R2 in Figure 2.

In pre-consultation with the City of Burlington, Halton Region and Conservation Halton, it was requested that this study also consider potential noise/vibration impacts on neighbouring commercial buildings (i.e. offices), notwithstanding they are not noise sensitive, per MECP guidelines. The nearest commercial buildings to the site are located to the southwest and northeast, labelled as C1 through C6 in Figure 2.

During visits to the area by HGC Engineering personnel for past projects, the background sound in the area has been observed to be dominated by road traffic on Highway 403, rail traffic on the CN Rail thoroughfare south of and parallel to Highway 403, and existing industrial/commercial activities in the area. In that regard, the area is best categorized as a Class 1 (“urban”) acoustical environment, under the applicable MECP noise assessment guideline.

4 Noise Criteria

4.1 MECP Publication NPC-300

4.1.1 Residential Receptors

In Ontario, the MECP guideline that forms the basis of environmental noise assessment is Publication NPC-300. The sound level limits for stationary sources of sound, such as the subject site, are site specific and depend on the background sound in the vicinity, which includes road traffic sound but excludes the source under assessment. The guideline also stipulates that the assessment consider the potential noise impact during a “predictable worst-case hour” of operation, which is

defined as a situation when the normally busy activity of the source coincides with an hour of low background sound. The sound level limit for a stationary source operating up to 24 hours per day in a Class 1 acoustical environment is the greater of the minimum one-hour energy-equivalent ambient sound level (L_{EQ}) or the exclusionary minimum limit of 45 dBA. This limit applies outside the plane of window on a noise sensitive space.

As noted above, background sound in the area of the subject site is dominated by road traffic on Highway 403, rail traffic on the CN Rail thoroughfare, and existing industrial/commercial activities in the area. That notwithstanding, this study conservatively adopts the exclusionary minimum sound level limit of 45 dBA, despite the likelihood that background sound levels in the area (and therefore the applicable sound level limits) may be greater than the exclusionary minimum during many hours during which the subject facility may operate.

4.1.2 Commercial Receptors

As noted in Section 3, this study considers the potential noise impact of the subject facility at surrounding commercial uses (represented by locations C1 through C6), as requested through the pre-consultation process. Specifically, noise impacts at office spaces are to be assessed in accordance with Table C-9 of NPC-300.

Table C-9 of NPC-300 presents sound level limits for office spaces, which are applicable to road and rail sources (i.e. not to stationary sources such as the subject site). The limits are 50 dBA for road traffic and 45 dBA for rail traffic, and are *indoor* criteria (i.e. they take into account attenuation afforded by the building envelope). For the purposes of this assessment, the more stringent indoor criterion of 45 dBA has conservatively been evaluated at each of locations C1 through C6.

4.2 City of Burlington By-Law No. 19-2003

Section 6.(1) of City of Burlington By-Law No. 19-2003, which is a "by-law to prohibit and regulate certain noises", states "[n]o person shall emit or cause or permit the emission of any sound from a station source such that the level of resultant sound at a point of reception exceeds the applicable sound level limit prescribed in Schedule 4 - Publications, Publication NPC-205". The aforementioned publication [4] was superseded in 2013 by Publication NPC-300. Nevertheless, the

derivation of sound level limits applicable to a stationary source of sound in an urban acoustical environment are identical between the two. Therefore, the sound level limits detailed in Section 4.1.1 are also applicable under the City noise by-law.

Section 5 of the by-law outlines prohibitions related to audibility. Given the subjective nature of potential audibility, a technical evaluation thereof within an engineering study of a proposed facility (sound emissions from which cannot be observed) is problematic. Municipalities with noise by-laws that include clauses regarding audibility typically rely on compliance with MECP limits in determining acceptability of sound emissions from proposed facilities.

4.3 Exemptions

Auditory warning devices such as reverse alarms ("backup beepers") are exempt from assessment under MECP guidelines and from the City by-law, as they are required by law and/or are in accordance with good safety practices.

5 Analysis Methods & Results

The primary sources of sound at the proposed plant will be trucking activities, a front-end loader and various components of the HMA plant. Sound emission levels of all equipment/activities at the site were based on a combination of measurements conducted by HGC Engineering at the existing King Paving HMA plant at 1077 Howard Road in Burlington and at numerous similar facilities for past projects, and are summarized in Table A1 of Appendix A. The location of each sound source is identified on the site plan overlay in Figure 3. The predictable worst-case hour of onsite activity assessed herein is included in Table A1 of Appendix A.

Note that the level of onsite activity assessed herein is a generous estimate of predictable worst-case operations. This degree of activity is unlikely to occur on a frequent basis, particularly during evening and overnight hours.

A computational acoustical model of the site and surrounding area was created to predict sound levels at the selected receptors. The model (developed using Cadna/A software) is a computer implementation of ISO standard 9613-2 [5] and is based on the sound emission levels and operating

parameters detailed in Table A1 of Appendix A. The ISO method accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening topography and structures such as buildings. Detailed topographical data obtained from Natural Resources Canada was incorporated into the model, as were building footprints/elevations obtained from the City of Burlington. Any acoustical attenuation afforded by forested areas was conservatively excluded from the analysis.

The sound levels of the subject site were predicted at the selected receptor locations without any special noise control measures. For the receptors representing commercial uses, where the criterion applies to indoor sound levels, the analysis assumed the acoustical transmission loss of a typical commercial building window (assumed to be fixed/sealed) with a modest Sound Transmission Class rating of STC-33.

Table 1: Predicted Site Sound Levels, L_{EQ} [dBA]

Receptor	Sound Level of Site	Criterion	Compliance with Criterion?
R1	41	45	Yes
R2	33	45	Yes
C1	29	45	Yes
C2	32	45	Yes
C3	32	45	Yes
C4	23	45	Yes
C5	29	45	Yes
C6	23	45	Yes

Note: For locations C1 through C6, the predicted sound levels and criteria are indoors.

From the table above, the sound levels of the subject site are predicted to be within the criteria detailed in Section 4 at all receptor locations. Detailed results are summarized in Appendix B. Figure 4 shows the predicted outdoor energy-equivalent (L_{EQ}) sound level contours resulting from worst-case onsite activities.

6 Construction Vibration

The proponent indicates that construction at the site will consist of grading of pre-existing fill, with some excavation of fill for installing footings and connecting services. Construction will not include vibratory compaction, pile driving, vibratory sheeting piling, or other common sources of construction vibration.

In the absence of explicit guidance or limits stipulated by the City of Burlington for construction vibration, this study considers the United States Federal Transit Administration Noise and Vibration Assessment Manual [6]. Section 7 of the Manual, entitled "Noise and Vibration during Construction", provides estimated vibration levels at 7.6 metres from various construction equipment, along with damage criteria for various building types. For engineered concrete and masonry buildings (typical of the commercial buildings nearest to the subject site), the peak particle velocity criterion is 0.3 in/sec. At the same distance of 7.6 metres, approximate vibration levels from equipment such as loaded trucks or a large bulldozer range between 0.076 and 0.089 in/sec, which are well below the criterion. Given that the nearest existing building is approximately 250 metres from the construction area on the subject site – more than 30 times the reference distance at which estimated construction vibration levels comply with the criterion – vibration impacts on surrounding buildings resulting from construction of the proposed HMA plant are anticipated to be negligible.

As there are no existing buildings on the site, construction vibration will have no impact on the site itself.

7 Conclusion & Recommendations

The assessment detailed herein has adopted the most stringent sound level limits that could be applicable in the given acoustical environment of the study area and considered a generous estimate of activity on the subject site. The assessment results indicate that the sound levels of the subject site will comply with the applicable MECP sound level limits at all neighbouring points of reception without any special noise control measures.

Given the absence of any sources of ground-borne vibration associated with the proposed HMA plant, the facility will also comply with the applicable vibration limits of the MECP.

The equipment/activities related to construction of the plant are expected to generate a modest degree of vibration that is anticipated to be negligible at the nearest surrounding buildings.

It is recommended that King Paving obtain an Environmental Compliance Approval for the subject site, pursuant to Section 9 of the Environmental Protection Act.

References

1. Ontario Ministry of the Environment, Conservation and Parks Publication NPC-300, *Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning*, August, 2013.

2. By-Law No. 19-2003 (as amended), The Corporation of the City of Burlington, February, 2003.

3. Ontario Ministry of the Environment, Conservation and Parks Publication NPC-207, "Impulse Vibration in Residential Buildings, November, 1983."

4. Ontario Ministry of the Environment Publication NPC-205, *Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)*, October, 1995.

5. International Organization for Standardization, Standard 9613-2, "Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation," Switzerland, 1996.

6. U.S. Department of Transportation, Federal Transit Administration, "Transit Noise and Vibration Impact Assessment Manual", September, 2018.

7. Ontario Ministry of the Environment, Conservation and Parks Publication NPC-104, *Sound Level Adjustments*, August, 1978.

Limitations

This document was prepared solely for the addressed party and titled project or named part thereof, and should not be relied upon or used for any other project without obtaining prior written authorization from HGC Engineering. HGC Engineering accepts no responsibility or liability for any consequence of this document being used for a purpose other than for which it was commissioned. Any person or party using or relying on the document for such other purpose agrees, and will by such use or reliance be taken to confirm their agreement to indemnify HGC Engineering for all loss or damage resulting therefrom. HGC Engineering accepts no responsibility or liability for this document to any person or party other than the party by whom it was commissioned.

Any conclusions and/or recommendations herein reflect the judgment of HGC Engineering based on information available at the time of preparation, and were developed in good faith on information provided by others, as noted in the report, which has been assumed to be factual and accurate. Changed conditions or information occurring or becoming known after the date of this report could affect the results and conclusions presented.

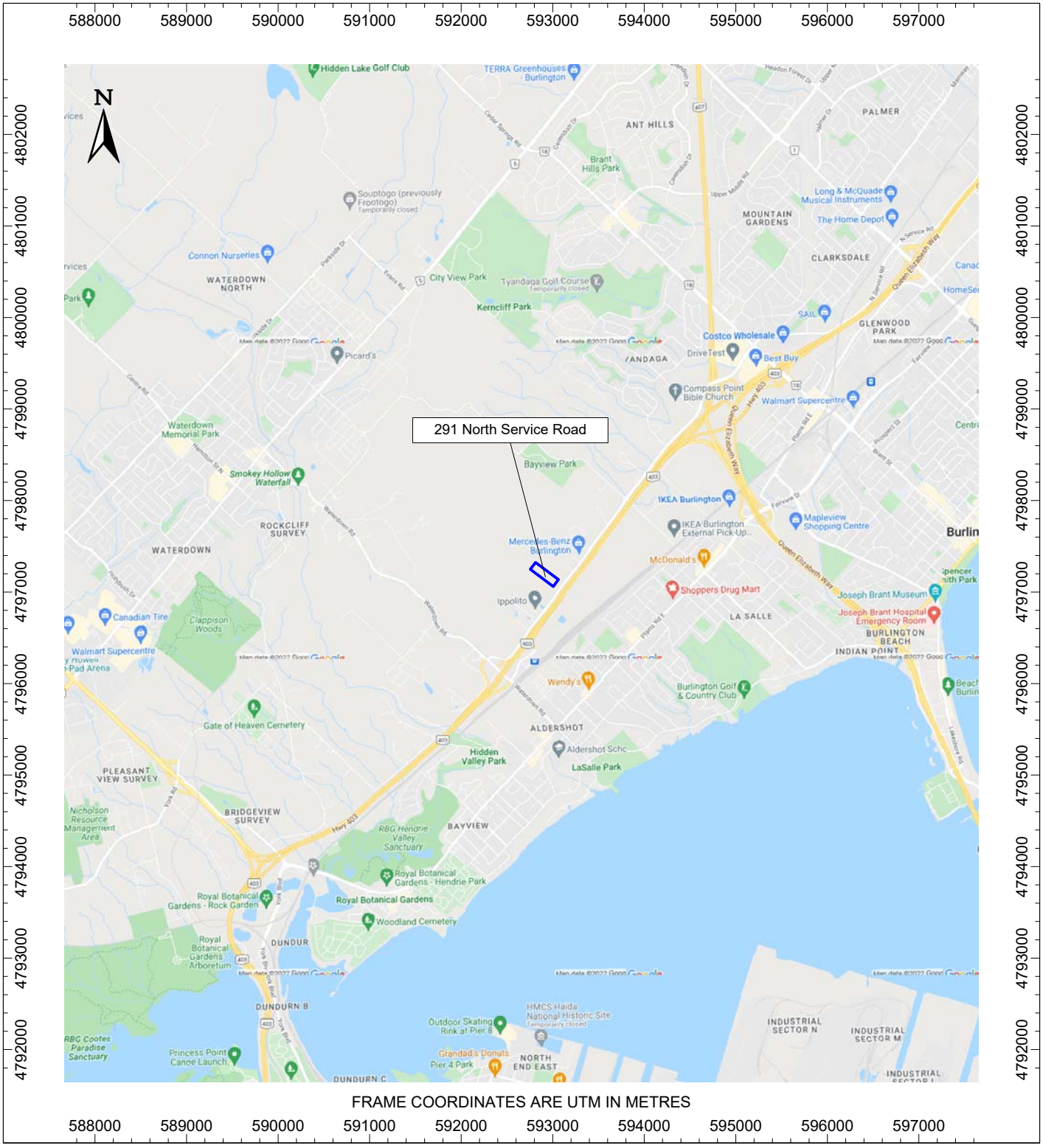


Figure 1: Location Map

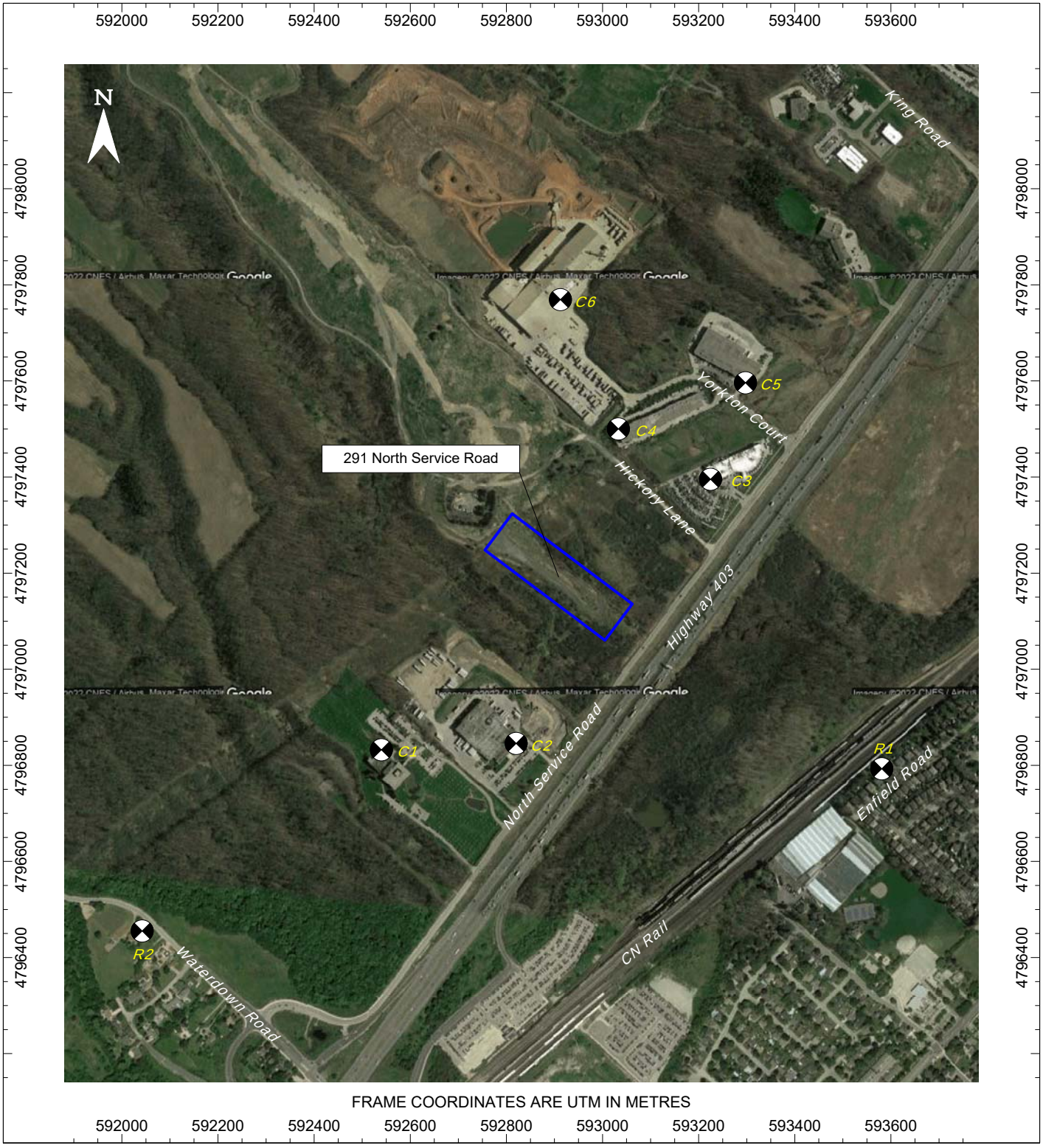


Figure 2: Site and Receptor Locations

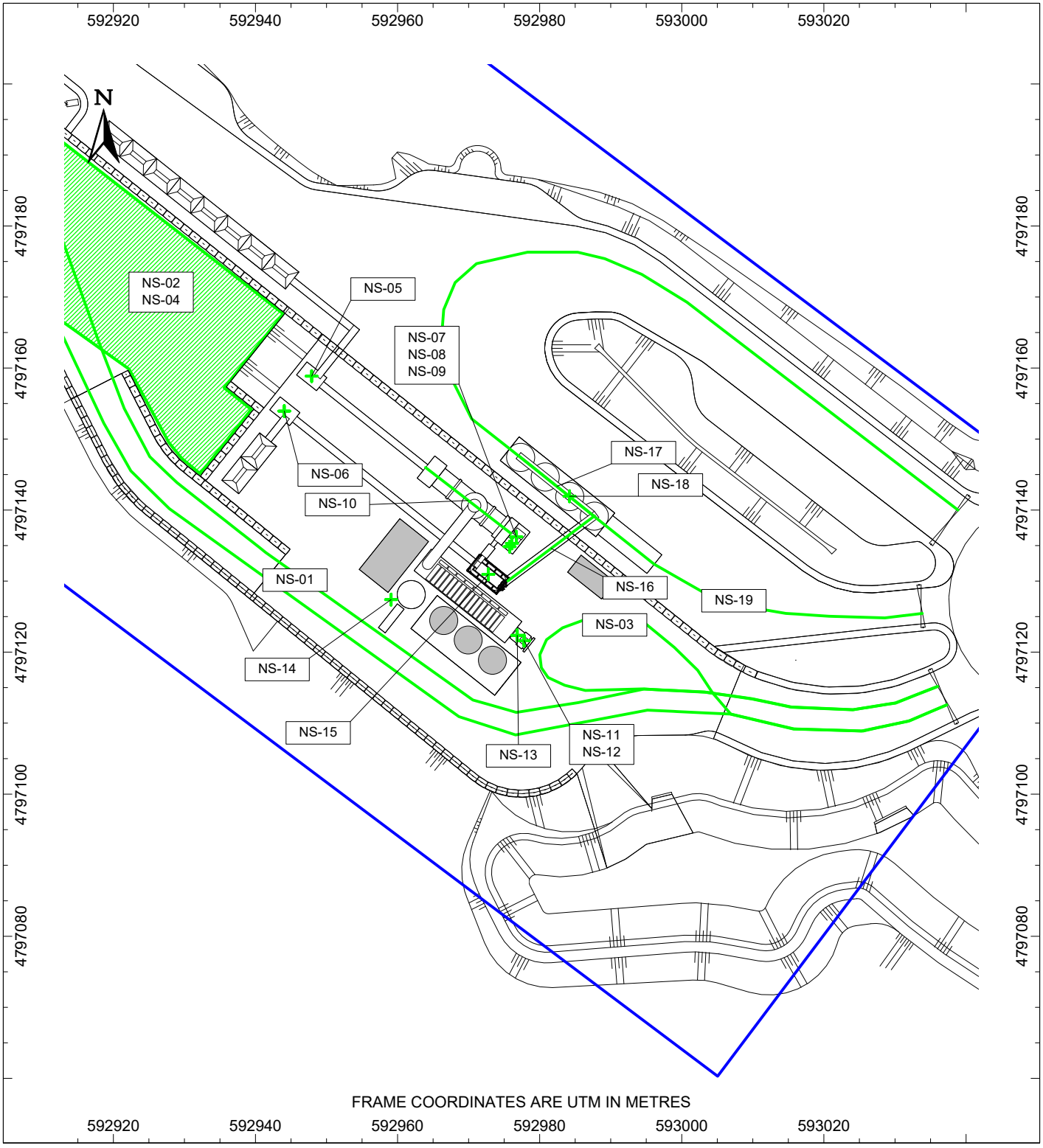


Figure 3: Site Plan Showing Locations of Noise Sources

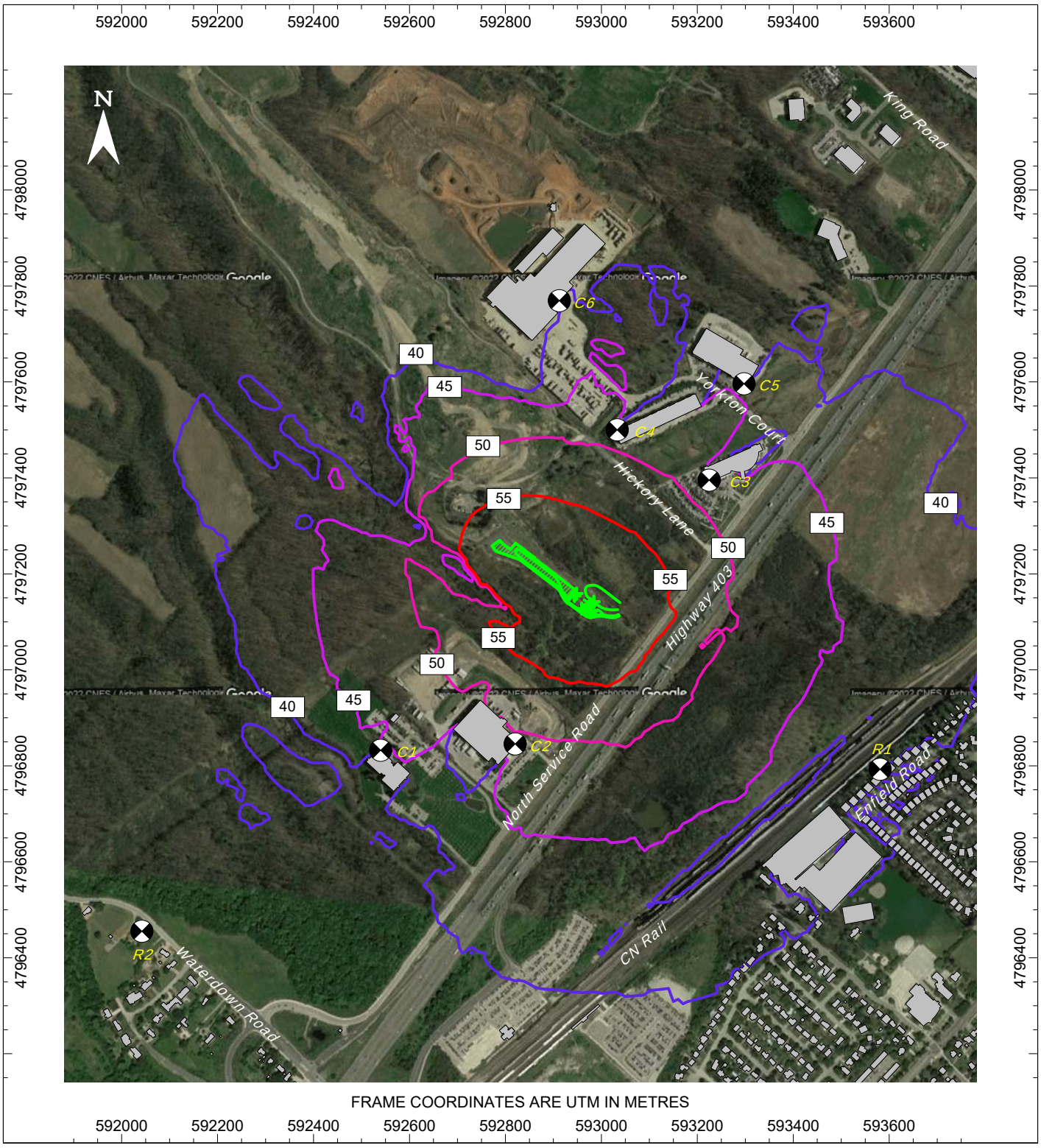


Figure 4: Predicted Sound Level Contours, Leq [dBA] at 4.5 metres Above Grade

APPENDIX A

Equipment Sound Power Levels & Worst-Case Hour Activities

Table A1: Summary of Source Sound Power Levels & Operating Times

Source ID	Source Name	Sound Power Level, dB re: 10^{-12} Watts[1]									Operating Time or Quantity/Hr
		Octave Band Centre Frequency, Hz								A	
		63	125	250	500	1000	2000	4000	8000		
NS-01[1]	Aggregate/RAP Truck Movements	104	101	101	99	97	94	89	81	102	12 at 10 km/hr
NS-02[1]	Aggregate/RAP Trucks Unloading	109	94	94	94	93	97	98	97	104	6 min (30 sec/truck)
NS-03[1]	Asphalt Cement Truck Movements	101	100	94	96	97	95	91	86	101	1 at 10 km/hr
NS-04	Front-End Loader	106	106	108	104	103	99	97	94	108	60 min/hr
NS-05	Aggregate Scalp Screen	104	100	97	96	91	86	86	85	97	60 min/hr
NS-06	RAP Scalp Screen	98	93	93	91	88	87	85	80	94	60 min/hr
NS-07	Burner	108	101	88	91	88	85	82	77	94	60 min/hr
NS-08	Burner Supply Fan	81	85	88	84	86	81	78	75	89	60 min/hr
NS-09	Burner Supply Fan Inlet	101	96	95	88	84	85	83	77	93	60 min/hr
NS-10	Dryer Drum	102	97	94	89	92	84	88	88	96	60 min/hr
NS-11	Baghouse Fan Casing	86	90	94	93	90	86	82	77	95	60 min/hr
NS-12	Baghouse Fan Motor	78	89	88	91	88	86	79	75	93	60 min/hr
NS-13	Baghouse Stack Outlet	113	108	108	103	97	94	90	87	105	60 min/hr
NS-14[2]	Dust Blower	98	110	100	96	92	89	80	76	99	60 min/hr
NS-15	Mixer	83	83	92	94	97	94	87	90	100	60 min/hr
NS-16	Hot Elevator & Conveyor	98	96	92	93	93	88	81	77	96	60 min/hr
NS-17	HMA Silo Traverse Conveyor	95	95	93	92	88	82	73	67	93	60 min/hr
NS-18[1]	HMA Silo Pneumatic Loading Gates	90	88	83	88	96	98	101	102	106	7.5 min/hr
NS-19[1]	HMA Truck Movements	101	100	94	96	97	95	91	86	101	12 at 10 km/hr

Notes:

[1] Sound power levels exclude time weighting, as specified in the right-most column.

[2] Includes +5 dB tonal adjustment, in accordance with MECP Publication NPC-104 [7].

APPENDIX B

Summary of Calculations

In the following tables of calculation results, the column headings for the various sound attenuation mechanisms follow the terminology of ISO Standard 9613-2. LxD and LxN are the A-weighted, one-hour energy-equivalent source sound power levels for day/evening and night, respectively, which include the effects of any source-abatement measures included in the model, and any time-averaging effects for intermittent sources. LrD and LrN are the A-weighted, one-hour energy-equivalent sound levels at the points of reception. The results are presented in terms of overall A-weighted results, at the most impacted off-site points of reception.

R1	Residential - 353 Enfield Road	593581	4796793	107.7												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Aggregate/RAP Truck Movements	592934	4797114	124.8	100	68	0	0.0	-1.0	0.5	3.0	0.0	0.0	0.0	0.0	29
NS-02	Aggregate/RAP Trucks Unloading	592883	4797178	126.4	94	69	0	0.0	-0.5	0.4	8.0	0.0	0.0	0.0	0.0	16
NS-03	Asphalt Cement Truck Movements	593008	4797098	121.9	82	67	0	0.0	-1.3	0.0	3.7	0.0	0.0	0.0	0.0	13
NS-04	Front-End Loader	592886	4797194	128.3	108	69	0	0.0	-1.2	0.1	3.3	0.0	0.0	0.0	0.0	36
NS-05	Aggregate Scalp Screen	592948	4797160	125.5	97	68	0	0.0	-0.9	0.0	2.4	0.0	0.0	0.0	0.0	28
NS-06	RAP Scalp Screen	592944	4797154	125.5	94	68	0	0.0	-0.7	1.1	3.3	0.0	0.0	0.0	0.0	22
NS-07	Burner	592977	4797136	123.6	94	68	0	0.0	-1.6	4.7	1.1	0.0	0.0	0.0	0.0	22
NS-08	Burner Supply Fan	592976	4797136	123.7	89	68	0	0.0	-1.0	4.0	2.7	0.0	0.0	0.0	0.0	16
NS-09	Burner Fan Air-Inlet	592976	4797136	124.7	93	68	0	0.0	-0.6	1.4	2.8	0.0	0.0	0.0	0.0	21
NS-10	Dryer Drum	592970	4797142	125.2	96	68	0	0.0	-1.2	1.8	3.7	0.0	0.0	0.0	0.0	24
NS-11	Baghouse Fan Casing	592978	4797122	122.5	95	68	0	0.0	0.2	0.0	2.6	0.0	0.0	0.0	0.7	25
NS-12	Baghouse Fan Motor	592978	4797122	122.5	93	68	0	0.0	-0.2	0.0	3.1	0.0	0.0	0.0	0.7	23
NS-13	Baghouse Stack Outlet	592977	4797123	129.1	105	68	0	0.0	-1.0	0.0	1.9	0.0	0.0	0.0	0.0	36
NS-14	Dust Blower	592959	4797128	122.5	104	68	0	0.0	2.7	5.6	0.9	0.0	0.0	0.0	0.0	27
NS-15	Mixer	592973	4797132	123.4	100	68	0	0.0	-1.6	0.0	3.8	0.0	0.0	0.0	0.0	30
NS-16	Hot Elevator & Conveyor	592981	4797134	130.6	96	68	0	0.0	-1.1	0.0	2.8	0.0	0.0	0.0	0.0	27
NS-17	HMA Silo Traverse Conveyor	592982	4797144	136.5	93	68	0	0.0	-0.8	0.0	2.0	0.0	0.0	0.0	0.0	24
NS-18	HMA Silo Pneumatic Loading Gates	592984	4797144	123.0	97	68	0	0.0	-1.7	0.0	9.5	0.0	0.0	0.0	0.0	22
NS-19	HMA Truck Movements	593001	4797170	120.3	95	68	0	0.0	-1.7	0.0	3.8	0.0	0.0	0.0	0.0	25

R2	Residential - 1360 Waterdown Road	592042	4796455	135.4												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Aggregate/RAP Truck Movements	592935	4797122	124.9	100	72	0	0.0	1.5	2.1	3.5	0.0	0.0	0.0	0.0	21
NS-02	Aggregate/RAP Trucks Unloading	592847	4797212	128.2	94	72	0	0.0	1.9	3.8	7.7	0.0	0.0	0.0	0.0	8
NS-03	Asphalt Cement Truck Movements	593009	4797100	121.9	82	72	0	0.0	0.8	4.3	4.6	0.0	0.0	0.0	0.0	0
NS-04	Front-End Loader	592847	4797216	130.2	108	72	0	0.0	1.5	1.2	3.7	0.0	0.0	0.0	0.0	29
NS-05	Aggregate Scalp Screen	592948	4797160	125.5	97	72	0	0.0	2.9	2.8	2.1	0.0	0.0	0.0	0.0	17
NS-06	RAP Scalp Screen	592944	4797154	125.5	94	72	0	0.0	2.5	3.2	3.2	0.0	0.0	0.0	0.0	13
NS-07	Burner	592977	4797136	123.6	94	72	0	0.0	0.8	2.5	3.3	0.0	0.0	0.0	0.0	15
NS-08	Burner Supply Fan	592976	4797136	123.7	89	72	0	0.0	1.5	3.9	3.5	0.0	0.0	0.0	0.0	8
NS-09	Burner Fan Air-Inlet	592976	4797136	124.7	93	72	0	0.0	2.9	2.7	2.5	0.0	0.0	0.0	0.0	12
NS-10	Dryer Drum	592970	4797142	125.2	96	72	0	0.0	1.2	3.8	3.7	0.0	0.0	0.0	0.0	15
NS-11	Baghouse Fan Casing	592978	4797122	122.5	95	72	0	0.0	5.4	16.1	2.9	0.0	0.0	0.0	0.0	--
NS-12	Baghouse Fan Motor	592978	4797122	122.5	93	72	0	0.0	4.6	17.4	3.6	0.0	0.0	0.0	0.0	--
NS-13	Baghouse Stack Outlet	592977	4797123	129.1	105	72	0	0.0	1.8	2.3	2.9	0.0	0.0	0.0	0.0	26
NS-14	Dust Blower	592959	4797128	122.5	104	72	0	0.0	4.0	1.3	2.7	0.0	0.0	0.0	0.0	24
NS-15	Mixer	592973	4797132	123.4	100	72	0	0.0	2.2	16.2	4.3	0.0	0.0	0.0	0.0	5
NS-16	Hot Elevator & Conveyor	592980	4797134	129.2	96	72	0	0.0	0.2	0.7	4.1	0.0	0.0	0.0	0.0	19
NS-17	HMA Silo Traverse Conveyor	592983	4797143	136.5	93	72	0	0.0	1.2	0.0	3.1	0.0	0.0	0.0	0.0	16
NS-18	HMA Silo Pneumatic Loading Gates	592984	4797144	123.0	97	72	0	0.0	-1.1	4.7	12.1	0.0	0.0	0.0	0.0	9
NS-19	HMA Truck Movements	593002	4797172	120.3	95	72	0	0.0	0.5	5.0	4.7	0.0	0.0	0.0	0.0	12

C1	Commercial - 151 North Service Road	592540	4796833	131.9												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Aggregate/RAP Truck Movements	592935	4797122	124.9	100	65	0	0.0	-0.7	0.1	2.3	0.0	0.0	0.0	0.0	33
NS-02	Aggregate/RAP Trucks Unloading	592817	4797232	129.6	94	65	0	0.0	0.0	1.7	6.0	0.0	0.0	0.0	0.0	21
NS-03	Asphalt Cement Truck Movements	593007	4797100	121.9	82	66	0	0.0	-1.1	0.4	3.2	0.0	0.0	0.0	0.0	14
NS-04	Front-End Loader	592819	4797242	131.6	108	65	0	0.0	-0.5	0.2	2.4	0.0	0.0	0.0	0.0	41
NS-05	Aggregate Scalp Screen	592948	4797160	125.5	97	65	0	0.0	-0.2	0.0	1.9	0.0	0.0	0.0	0.0	30
NS-06	RAP Scalp Screen	592944	4797154	125.5	94	65	0	0.0	-0.4	0.0	2.8	0.0	0.0	0.0	0.0	27
NS-07	Burner	592977	4797136	123.6	94	66	0	0.0	-1.2	0.0	2.0	0.0	0.0	0.0	0.0	28
NS-08	Burner Supply Fan	592976	4797136	123.7	89	66	0	0.0	-0.9	0.0	2.7	0.0	0.0	0.0	0.0	22
NS-09	Burner Fan Air-Inlet	592976	4797136	124.7	93	65	0	0.0	-0.6	0.0	2.5	0.0	0.0	0.0	0.0	25
NS-10	Dryer Drum	592970	4797141	125.2	96	65	0	0.0	-1.0	0.0	3.4	0.0	0.0	0.0	0.0	28
NS-11	Baghouse Fan Casing	592978	4797122	122.5	95	65	0	0.0	1.2	8.7	1.5	0.0	0.0	0.0	0.0	18
NS-12	Baghouse Fan Motor	592978	4797122	122.5	93	65	0	0.0	0.8	9.5	1.8	0.0	0.0	0.0	0.0	15
NS-13	Baghouse Stack Outlet	592977	4797123	129.1	105	65	0	0.0	-1.0	0.0	1.5	0.0	0.0	0.0	0.0	39
NS-14	Dust Blower	592959	4797128	122.5	104	65	0	0.0	1.3	0.0	1.7	0.0	0.0	0.0	0.0	36
NS-15	Mixer	592973	4797132	123.4	100	65	0	0.0	-1.0	4.4	3.0	0.0	0.0	0.0	0.0	28
NS-16	Hot Elevator & Conveyor	592980	4797134	129.2	96	66	0	0.0	-0.9	0.5	2.2	0.0	0.0	0.0	0.0	29
NS-17	HMA Silo Traverse Conveyor	592983	4797142	136.5	93	66	0	0.0	-0.9	0.0	1.6	0.0	0.0	0.0	0.0	26
NS-18	HMA Silo Pneumatic Loading Gates	592984	4797144	123.0	97	66	0	0.0	-1.3	0.0	8.5	0.0	0.0	0.0	0.0	24
NS-19	HMA Truck Movements	593002	4797172	120.3	95	66	0	0.0	-1.3	3.8	3.2	0.0	0.0	0.0	0.0	23

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

C2	Commercial - 201 North Service Road	592820	4796846	119.5												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Aggregate/RAP Truck Movements	592935	4797124	124.9	100	62	0	0.0	0.5	1.1	1.3	0.0	0.0	0.0	0.0	35
NS-02	Aggregate/RAP Trucks Unloading	592847	4797212	128.2	94	63	0	0.0	0.4	4.3	4.0	0.0	0.0	0.0	0.0	22
NS-03	Asphalt Cement Truck Movements	593009	4797099	121.9	82	61	0	0.0	-0.4	0.8	2.2	0.0	0.0	0.0	0.0	19
NS-04	Front-End Loader	592847	4797216	130.2	108	62	0	0.0	0.5	0.1	1.9	0.0	0.0	0.0	0.0	43
NS-05	Aggregate Scalp Screen	592948	4797160	125.5	97	62	0	0.0	2.3	1.9	1.7	0.0	0.0	0.0	0.0	30
NS-06	RAP Scalp Screen	592944	4797154	125.5	94	61	0	0.0	1.6	2.3	2.4	0.0	0.0	0.0	0.0	27
NS-07	Burner	592977	4797136	123.6	94	61	0	0.0	0.0	4.8	1.0	0.0	0.0	0.0	0.0	27
NS-08	Burner Supply Fan	592976	4797136	123.7	89	61	0	0.0	1.0	4.4	1.6	0.0	0.0	0.0	0.0	21
NS-09	Burner Fan Air-Inlet	592976	4797136	124.7	93	61	0	0.0	2.4	2.8	1.4	0.0	0.0	0.0	0.0	25
NS-10	Dryer Drum	592970	4797142	125.2	96	61	0	0.0	0.8	3.6	2.5	0.0	0.0	0.0	0.0	28
NS-11	Baghouse Fan Casing	592978	4797122	122.5	95	61	0	0.0	2.9	1.4	1.7	0.0	0.0	0.0	2.5	30
NS-12	Baghouse Fan Motor	592978	4797122	122.5	93	61	0	0.0	2.1	1.8	1.9	0.0	0.0	0.0	2.5	28
NS-13	Baghouse Stack Outlet	592977	4797123	129.1	105	61	0	0.0	1.1	0.0	1.4	0.0	0.0	0.0	0.0	41
NS-14	Dust Blower	592959	4797128	122.5	104	61	0	0.0	1.7	3.7	1.1	0.0	0.0	0.0	0.0	37
NS-15	Mixer	592973	4797132	123.4	100	61	0	0.0	-0.3	4.2	2.4	0.0	0.0	0.0	0.0	33
NS-16	Hot Elevator & Conveyor	592981	4797134	130.5	96	61	0	0.0	0.3	0.5	1.4	0.0	0.0	0.0	0.0	33
NS-17	HMA Silo Traverse Conveyor	592983	4797142	136.5	93	62	0	0.0	1.1	0.0	1.1	0.0	0.0	0.0	0.0	29
NS-18	HMA Silo Pneumatic Loading Gates	592984	4797144	123.0	97	62	0	0.0	-1.2	4.8	6.6	0.0	0.0	0.0	0.0	25
NS-19	HMA Truck Movements	593000	4797173	120.3	95	62	0	0.0	-0.1	5.4	2.3	0.0	0.0	0.0	0.0	25

C3	Commercial - 441 North Service Road	593225	4797396	119.2												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Aggregate/RAP Truck Movements	592937	4797113	124.8	100	63	0	0.0	0.2	0.8	1.7	0.0	0.0	0.0	0.0	34
NS-02	Aggregate/RAP Trucks Unloading	592847	4797212	128.2	94	63	0	0.0	-0.4	1.5	5.2	0.0	0.0	0.0	0.0	24
NS-03	Asphalt Cement Truck Movements	593008	4797100	121.9	82	62	0	0.0	-0.8	0.3	2.3	0.0	0.0	0.0	0.0	19
NS-04	Front-End Loader	592847	4797216	130.2	108	63	0	0.0	0.4	0.0	2.1	0.0	0.0	0.0	0.0	42
NS-05	Aggregate Scalp Screen	592948	4797160	125.5	97	62	0	0.0	0.9	0.0	1.5	0.0	0.0	0.0	0.0	33
NS-06	RAP Scalp Screen	592944	4797154	125.5	94	62	0	0.0	0.1	0.0	2.2	0.0	0.0	0.0	0.0	30
NS-07	Burner	592977	4797136	123.6	94	62	0	0.0	-0.8	0.0	1.6	0.0	0.0	0.0	0.0	31
NS-08	Burner Supply Fan	592976	4797136	123.7	89	62	0	0.0	-0.4	0.0	2.0	0.0	0.0	0.0	0.0	26
NS-09	Burner Fan Air-Inlet	592976	4797136	124.7	93	62	0	0.0	0.7	0.0	2.0	0.0	0.0	0.0	0.0	28
NS-10	Dryer Drum	592970	4797142	125.2	96	62	0	0.0	-0.4	0.0	2.8	0.0	0.0	0.0	0.0	32
NS-11	Baghouse Fan Casing	592978	4797122	122.5	95	62	0	0.0	2.5	7.0	1.1	0.0	0.0	0.0	3.4	25
NS-12	Baghouse Fan Motor	592978	4797122	122.5	93	62	0	0.0	1.7	8.1	1.3	0.0	0.0	0.0	3.9	23
NS-13	Baghouse Stack Outlet	592977	4797123	129.1	105	62	0	0.0	1.3	0.0	1.2	0.0	0.0	0.0	0.0	40
NS-14	Dust Blower	592959	4797128	122.5	104	63	0	0.0	1.4	0.0	1.4	0.0	0.0	0.0	0.0	39
NS-15	Mixer	592973	4797132	123.4	100	62	0	0.0	-1.1	0.0	2.4	0.0	0.0	0.0	1.0	38
NS-16	Hot Elevator & Conveyor	592982	4797135	131.0	96	62	0	0.0	0.2	0.0	1.6	0.0	0.0	0.0	0.0	32
NS-17	HMA Silo Traverse Conveyor	592982	4797144	136.5	93	62	0	0.0	1.1	0.0	1.1	0.0	0.0	0.0	0.0	29
NS-18	HMA Silo Pneumatic Loading Gates	592984	4797144	123.0	97	62	0	0.0	-1.3	0.0	6.8	0.0	0.0	0.0	0.0	30
NS-19	HMA Truck Movements	593001	4797170	120.3	95	61	0	0.0	-0.6	0.4	2.2	0.0	0.0	0.0	0.0	31

C4	Commercial - 1550 Yorkton Court, Unit 1	593033	4797500	128.5												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Aggregate/RAP Truck Movements	592938	4797112	124.8	100	62	0	0.0	1.5	16.7	1.1	0.0	0.0	0.0	0.0	19
NS-02	Aggregate/RAP Trucks Unloading	592847	4797212	128.2	94	62	0	0.0	-0.6	18.5	2.3	0.0	0.0	0.0	0.0	12
NS-03	Asphalt Cement Truck Movements	593007	4797099	122.0	82	63	0	0.0	-0.1	20.7	1.8	0.0	0.0	0.0	0.0	--
NS-04	Front-End Loader	592847	4797217	130.2	108	62	0	0.0	2.2	14.4	1.2	0.0	0.0	0.0	0.0	29
NS-05	Aggregate Scalp Screen	592948	4797160	125.5	97	62	0	0.0	1.2	16.6	0.7	0.0	0.0	0.0	0.0	17
NS-06	RAP Scalp Screen	592944	4797154	125.5	94	62	0	0.0	1.4	17.8	1.2	0.0	0.0	0.0	0.0	12
NS-07	Burner	592977	4797136	123.6	94	62	0	0.0	-2.3	16.4	0.3	0.0	0.0	0.0	0.0	17
NS-08	Burner Supply Fan	592976	4797136	123.7	89	62	0	0.0	1.2	19.0	1.5	0.0	0.0	0.0	0.0	5
NS-09	Burner Fan Air-Inlet	592976	4797136	124.7	93	62	0	0.0	0.8	16.7	0.7	0.0	0.0	0.0	0.0	12
NS-10	Dryer Drum	592970	4797142	125.2	96	62	0	0.0	-0.6	18.5	0.9	0.0	0.0	0.0	0.0	15
NS-11	Baghouse Fan Casing	592978	4797122	122.5	95	63	0	0.0	2.2	18.1	1.4	0.0	0.0	0.0	0.0	10
NS-12	Baghouse Fan Motor	592978	4797122	122.5	93	63	0	0.0	1.4	19.1	1.7	0.0	0.0	0.0	0.0	8
NS-13	Baghouse Stack Outlet	592977	4797123	129.1	105	63	0	0.0	1.1	16.6	0.5	0.0	0.0	0.0	0.0	24
NS-14	Dust Blower	592959	4797128	122.5	104	63	0	0.0	3.0	18.5	0.7	0.0	0.0	0.0	0.0	19
NS-15	Mixer	592973	4797132	123.4	100	62	0	0.0	-0.1	20.8	2.1	0.0	0.0	0.0	0.5	15
NS-16	Hot Elevator & Conveyor	592982	4797135	131.0	96	62	0	0.0	0.8	19.4	1.1	0.0	0.0	0.0	0.0	13
NS-17	HMA Silo Traverse Conveyor	592982	4797144	136.5	93	62	0	0.0	1.6	15.7	0.9	0.0	0.0	0.0	0.0	12
NS-18	HMA Silo Pneumatic Loading Gates	592984	4797144	123.0	97	62	0	0.0	-1.1	23.4	5.9	0.0	0.0	0.0	0.0	7
NS-19	HMA Truck Movements	593001	4797170	120.3	95	62	0	0.0	0.3	20.2	1.6	0.0	0.0	0.0	0.0	11

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

C5	Commercial - 1549 Yorkton Court	593297	4797597	123.4												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Aggregate/RAP Truck Movements	592937	4797112	124.8	100	66	0	0.0	0.3	0.8	2.4	0.0	0.0	0.0	0.0	30
NS-02	Aggregate/RAP Trucks Unloading	592847	4797212	128.2	94	66	0	0.0	-0.1	1.3	6.4	0.0	0.0	0.0	0.0	20
NS-03	Asphalt Cement Truck Movements	593008	4797099	121.9	82	66	0	0.0	-0.7	0.4	3.3	0.0	0.0	0.0	0.0	13
NS-04	Front-End Loader	592847	4797217	130.2	108	66	0	0.0	0.5	0.0	2.6	0.0	0.0	0.0	0.0	38
NS-05	Aggregate Scalp Screen	592948	4797160	125.5	97	66	0	0.0	1.1	0.0	2.0	0.0	0.0	0.0	0.0	28
NS-06	RAP Scalp Screen	592944	4797154	125.5	94	66	0	0.0	0.4	0.0	2.9	0.0	0.0	0.0	0.0	25
NS-07	Burner	592977	4797136	123.6	94	66	0	0.0	-0.9	0.0	2.1	0.0	0.0	0.0	0.0	27
NS-08	Burner Supply Fan	592976	4797136	123.7	89	66	0	0.0	-0.3	0.0	2.8	0.0	0.0	0.0	0.6	21
NS-09	Burner Fan Air-Inlet	592976	4797136	124.7	93	66	0	0.0	0.8	0.0	2.6	0.0	0.0	0.0	0.0	23
NS-10	Dryer Drum	592970	4797142	125.2	96	66	0	0.0	-0.4	0.0	3.5	0.0	0.0	0.0	0.0	27
NS-11	Baghouse Fan Casing	592978	4797122	122.5	95	66	0	0.0	1.4	2.8	2.6	0.0	0.0	0.0	2.6	24
NS-12	Baghouse Fan Motor	592978	4797122	122.5	93	66	0	0.0	0.7	3.2	3.0	0.0	0.0	0.0	2.8	22
NS-13	Baghouse Stack Outlet	592977	4797123	129.1	105	66	0	0.0	1.2	0.0	1.6	0.0	0.0	0.0	0.0	36
NS-14	Dust Blower	592959	4797128	122.5	104	66	0	0.0	1.9	0.0	2.2	0.0	0.0	0.0	0.0	34
NS-15	Mixer	592973	4797132	123.4	100	66	0	0.0	-1.1	0.0	3.3	0.0	0.0	0.0	1.0	33
NS-16	Hot Elevator & Conveyor	592982	4797135	131.0	96	66	0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	28
NS-17	HMA Silo Traverse Conveyor	592982	4797144	136.5	93	66	0	0.0	1.3	0.0	1.6	0.0	0.0	0.0	0.0	24
NS-18	HMA Silo Pneumatic Loading Gates	592984	4797144	123.0	97	66	0	0.0	-1.4	0.0	8.5	0.0	0.0	0.0	0.0	24
NS-19	HMA Truck Movements	593001	4797170	120.3	95	66	0	0.0	-0.5	0.4	3.1	0.0	0.0	0.0	0.0	26

C6	Commercial - 1570 Yorkton Court	592912	4797770	132.5												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Aggregate/RAP Truck Movements	592937	4797114	124.9	100	67	0	0.0	1.4	3.9	2.7	0.0	0.0	0.0	0.0	25
NS-02	Aggregate/RAP Trucks Unloading	592851	4797215	128.1	94	66	0	0.0	1.8	6.7	6.1	0.0	0.0	0.0	0.0	13
NS-03	Asphalt Cement Truck Movements	593008	4797099	121.9	82	67	0	0.0	-0.3	3.8	4.0	0.0	0.0	0.0	0.0	7
NS-04	Front-End Loader	592852	4797218	130.1	108	66	0	0.0	1.9	4.0	2.8	0.0	0.0	0.0	0.0	33
NS-05	Aggregate Scalp Screen	592948	4797160	125.5	97	67	0	0.0	2.3	1.7	2.5	0.0	0.0	0.0	0.0	24
NS-06	RAP Scalp Screen	592944	4797154	125.5	94	67	0	0.0	1.6	2.0	3.6	0.0	0.0	0.0	0.0	20
NS-07	Burner	592977	4797136	123.6	94	67	0	0.0	-0.1	3.3	2.3	0.0	0.0	0.0	0.0	22
NS-08	Burner Supply Fan	592976	4797136	123.7	89	67	0	0.0	0.6	2.8	3.4	0.0	0.0	0.0	0.0	15
NS-09	Burner Fan Air-Inlet	592976	4797136	124.7	93	67	0	0.0	2.1	3.1	1.6	0.0	0.0	0.0	0.0	19
NS-10	Dryer Drum	592970	4797142	125.2	96	67	0	0.0	0.6	2.8	3.9	0.0	0.0	0.0	0.0	22
NS-11	Baghouse Fan Casing	592978	4797122	122.5	95	67	0	0.0	1.9	1.8	2.9	0.0	0.0	0.0	0.8	22
NS-12	Baghouse Fan Motor	592978	4797122	122.5	93	67	0	0.0	1.3	2.2	3.4	0.0	0.0	0.0	0.8	19
NS-13	Baghouse Stack Outlet	592977	4797123	129.1	105	67	0	0.0	1.7	2.4	2.0	0.0	0.0	0.0	0.0	31
NS-14	Dust Blower	592959	4797128	122.5	104	67	0	0.0	3.7	9.6	0.7	0.0	0.0	0.0	0.8	24
NS-15	Mixer	592973	4797132	123.4	100	67	0	0.0	-0.5	3.7	3.9	0.0	0.0	0.0	1.6	28
NS-16	Hot Elevator & Conveyor	592982	4797135	131.0	96	67	0	0.0	0.5	3.5	2.8	0.0	0.0	0.0	0.0	22
NS-17	HMA Silo Traverse Conveyor	592982	4797144	136.5	93	67	0	0.0	1.2	0.0	1.8	0.0	0.0	0.0	0.0	23
NS-18	HMA Silo Pneumatic Loading Gates	592984	4797144	123.0	97	67	0	0.0	-1.4	4.7	9.0	0.0	0.0	0.0	0.0	18
NS-19	HMA Truck Movements	593001	4797170	120.3	95	67	0	0.0	0.1	3.4	3.8	0.0	0.0	0.0	0.0	20

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl