



Hillstone Aggregates

Annual Operations Report 2021

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TABLE OF CONTENTS

1.0 INTRODUCTION	5
2.0 OPERATION DETAILS	6
APPENDIX A – Groundwater Elevations and Monitoring Summaries	8
APPENDIX B – Air Quality & Noise Monitoring Data Collection Report.....	9



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1.0 INTRODUCTION

This report is prepared for 2021 in conformance with the Phase 2 Development Permit #PRDP202004084 and the Master Site Development Plan: Hillstone Aggregates (Feb. 23, 2021) and is an overview of activity within the quarter section: NW 36 026 04 W5.

The quarter section has two land uses, the west portion is A-SML and the east portion is S-NAT. The west portion comprises Phase 2 which began mining operations in 2021.



2.0 OPERATION DETAILS

Site Operations Manager contact information: Gerard Penney (587.223.7784 - gpenney@hillstoneagg.com)

Site complaints/incident reports: None

Extraction details: Moved 445,995 Tonnes of material from June 7 - Dec 31 2021. See Table 1 for the inventory at the end of December 2021.

Table 1: Onsite Inventory as of 12/31/2021

Description	Unit	Quantity
40mm Drain Rock	Tonne	1,200.000
25mm Road Gravel	Tonne	3,552.690
40mm Road Gravel	Tonne	154.710
3" Minus	Tonne	6,265.818
Bedding Sand	Tonne	5,247.804
8mm Sand	Tonne	9,104.067
MF Sand	Tonne	5,191.750
20mm Drain Rock	Tonne	10,950.953

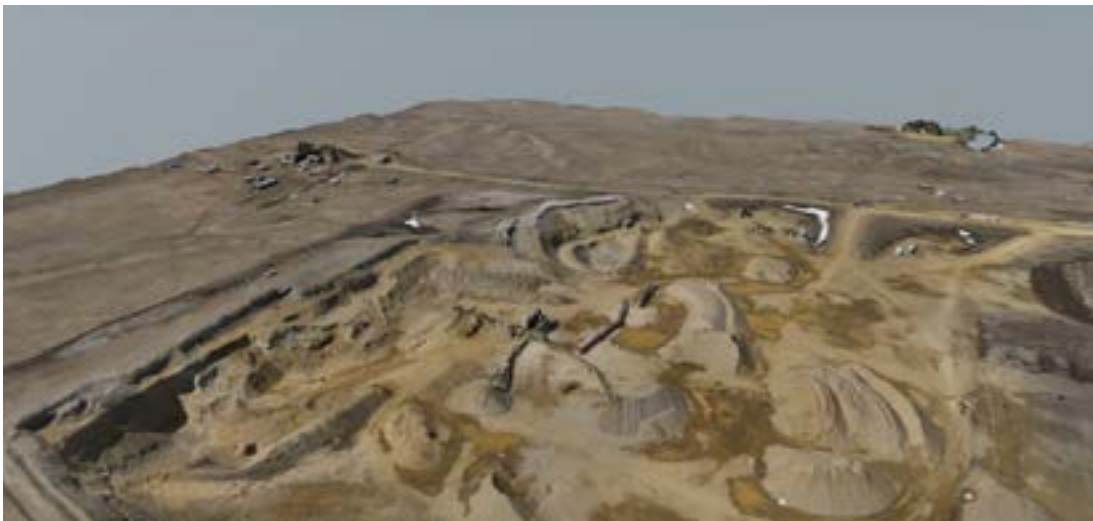
Groundwater elevations and monitoring summaries are included as Appendix A.

Onsite procedure updates:

- Air quality monitoring system has been implemented (Appendix B)
- Pit watering and calcium chloride has been controlling dust
- Open pit area is maintained below the 40.00 ac maximum
- Safety measures have been taken in the pit including toolbox meetings and inspections
- Safety manual is in the process of being updated to the current standard



2.1 Flyover Pit Photos



APPENDIX A – Groundwater Elevations and Monitoring Summaries

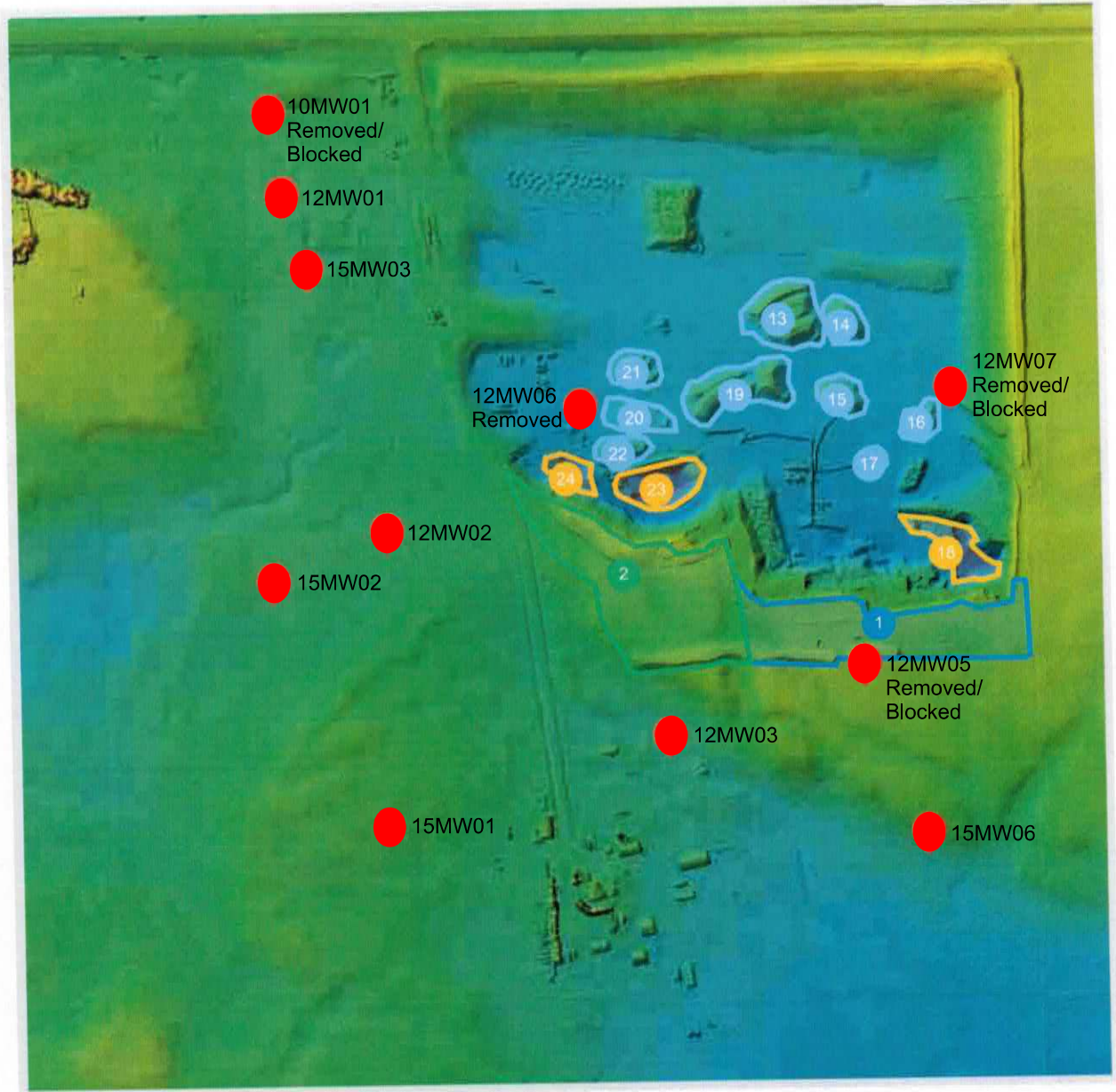


Hillstone Aggregates

				Groundwater Levels - Field Records Jul 2021		Groundwater Levels - Field Records Aug 2021		Groundwater Levels - Field Records Sep 2021		Groundwater Levels - Field Records Oct 2021		Groundwater Levels - Field Records Nov 2021	
				<i>Recording Date: July 15, 2021</i>		<i>Recording Date: August 4, 2021</i>		<i>Recording Date: September 23, 2021</i>		<i>Recording Date: October 18, 2021</i>		<i>Recording Date: November 3, 2021</i>	
Monitoring well Number (MW)	Geodetic Ground Elevation at MW (GE)	Depth of Groundwater (Meters Below Top of Casing, MBTOC)	Top of Casing to Ground (TOCG)	Groundwater Elevation (Meters below Grade) (GE - MBTOC + TOCG)	Notes	Groundwater Elevation (Meters below Grade) (GE - MBTOC + TOCG)	Notes	Groundwater Elevation (Meters below Grade) (GE - MBTOC + TOCG)	Notes	Groundwater Elevation (Meters below Grade) (GE - MBTOC + TOCG)	Notes	Groundwater Elevation (Meters below Grade) (GE - MBTOC + TOCG)	Notes
12MW01	1289.6		0.5		Blocked	1266.5		1283.1	blocked at 7m	1283.1	blocked		
12MW02	1289.1		0.5		Blocked	1277.6		1266.3	top of east road	1265.9	Top of east road	1265.9	
12MW03	1287.5	12.3	0.4	1275.6		1275.6		1275.9	blocked at 12m centre east field	1287.9			
15MW01	1291	18.25	1	1273.75		1273.7		1273.7		1273.5		1277.4	
15MW02	1288	12.4	1	1276.6		1276.66		1276.5		1276.5		1276.5	
15MW03	1288	13.34	0.85	1275.51		1275.75		1275.45		1275.45	catching on the base of the pipe	1275.45	
15MW06	1284.5	11.15	1.1	1274.45		1274.44		1274.4		1274.2		1274.43	

Note: Data is not available for December 2021 due to freezing conditions.

Digital Elevation Model



APPENDIX B – Air Quality & Noise Monitoring Data Collection Report





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EXTERNAL MEMO

To: Gustavo Rojas **Company: Hillstone Aggregates**

cc: Ellie Abootorabi, QuantumPlace Developments

From: Jennifer North **Company: Millennium**

Date: June 2022 **Reference Number: 21-00364-00**

Re: Hillstone Aggregates Pit at NW-36-26-04-W5M
- Air Monitoring Report for 2021

Hillstone Aggregates c/o Quantum Place Developments (QPD) engaged Millennium EMS Solutions (MEMS) in September 2021, to provide remote air monitoring services for the Hillstone Aggregates Pit (the "Pit") in Big Hill Springs, Alberta. This memo summarizes the air quality monitoring results from September to December 2021 at the Hillstone Aggregates Pit and compares to the Alberta Ambient Air Quality Objectives (AAAQO) and Canadian Ambient Air Quality Standards (CAAQS) for PM_{2.5}.

Ambient Air Quality Standards

The 24-hour average AAAQO for fine particulate matter (PM_{2.5}) is 29 µg/m³ based on health effects (AEP 2019).

The 24-hour PM_{2.5} CAAQS is 27 µg/m³ based on the 98th percentile 24-hour value for a year averaged over three consecutive years (CCME 2012).

Air Quality Monitoring

Air Quality Monitoring for particulate matter (PM) at the Hillstone Aggregates Pit began in September 2021 using one temporary DustTrak (DT_CCI) dust monitoring equipment located north of the pit. This temporary equipment was replaced in November 2021 with a multi-parameter near-reference level station (DT002). Two additional dust monitoring stations (DT001 and DT003) were installed in November 2021 at west and east of the pit, respectively. Monitoring map below shows the current monitoring locations.

- DT001 (Installed November 2021): located to the west of pit operations in an open field and is considered an ambient monitoring station.
- DT002 (Installed November 2021), DT_CCI (Temp Install Sept-Oct 2021): located to the north of pit operations approximately 1/3 up the berm which keeps airborne particulates from traveling to Highway 567.
- DT003 (Installed November 2021): located to the east of pit operations and considered an “in pit” monitoring point. This location was selected at the onset to monitor dust levels in pit.

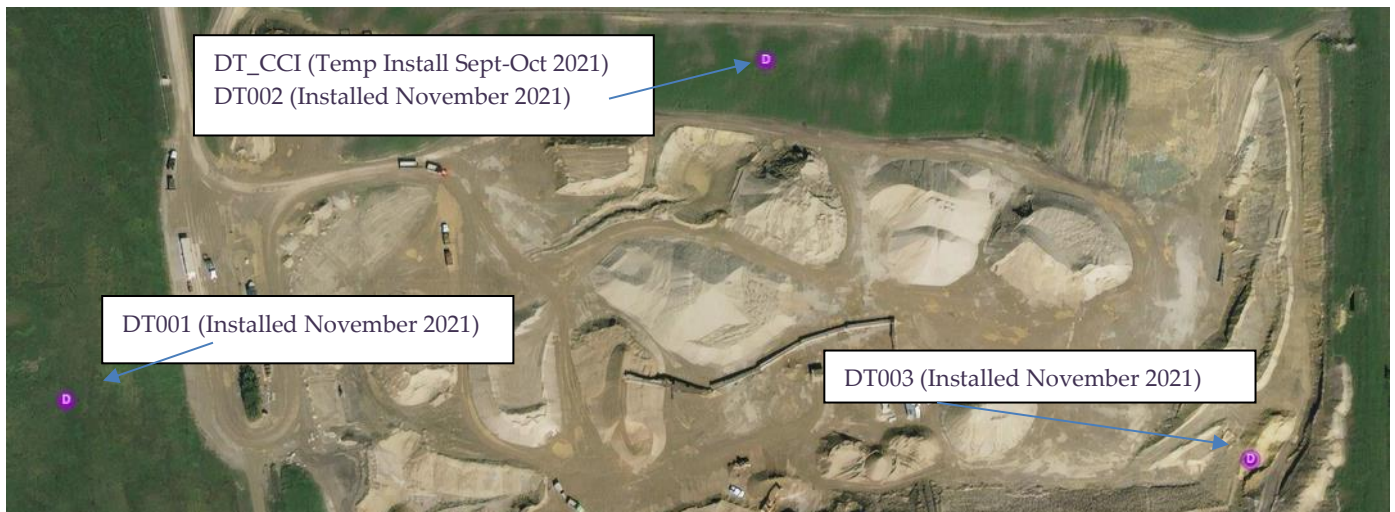


Figure 1: Monitoring Locations at Hillstone Aggregates Pit at NW-36-26-04-W5M

Availability of 24-hour PM Measurements

Table 1 summarizes the data availability of the 24-hour PM measurements at the Pit for the period from September to December 2021.

Table 1: Data Availability of 24-hour PM Measurements			
Monitoring Station	Monitoring Period	Count of 24-h Measurement	Data Availability (%)
DT_CCI	Sep. 2021	28	93%
	Oct. 2021	31	100%
DT001	Nov. 2021	1	3%
	Dec. 2021	-	-
DT002	Nov. 2021	1	3%
	Dec. 2021	-	-
DT003 ¹	Nov. 2021	12	40%
	Dec. 2021	4	13%

¹ Denotes monitoring from within the active pit area

24-hour PM data availability was above 93% during September and October 2021 at north of pit location. The other three stations were installed later and data availability were lower than 40% during November and December at all three locations. Several factors including low temperatures, fluctuating power demand and network connectivity were considered as possible sources of data collection inconsistency. Through multiple site visits and tests, it was determined that network connectivity, poor cell phone coverage, was the leading cause of data inconsistency.

Result of 24-hour PM_{2.5} Measurements

Table 2 presents the 24-hour PM_{2.5} measurements, comparing to AAAQO and CAAQS. 24-hour PM_{2.5} measurements are presented in Figure 2 for north of the Pit (DT_CCI) for September and October 2021 and Figure 3 for east of the Pit (DT003) for November and December 2021.

The existing monitoring data indicate:

- DT_CCI – No PM_{2.5} exceedances of 24-hour AAAQO and CAAQS were recorded during September and October 2021 at north of the Pit location.
- DT001 – Only one 24-hour PM_{2.5} of 0.9 µg/m³ available during November 2021 at west of the Pit location.
- DT002 – Only one 24-hour PM_{2.5} of 0.03 µg/m³ available during November 2021 at north of the Pit location.
- DT003 – At east of the Pit location, which was considered an “in pit” monitoring point, there were 7 days of values above guideline over total 16 days of valid measurements during November and December 2021.

Table 2: Summary of 24-hour PM_{2.5} Measurements							
Monitoring Station	Monitoring Period	Data Availability (%)	Minimum (µg/m³)	Maximum (µg/m³)	98th Percentile (µg/m³)	AAAQO (µg/m³)	CAAQS (µg/m³)
DT_CCI	Sep. 2021	93%	0	15.3	11.4	29	27
	Oct. 2021	100%	0	26.0	15.6	29	27
DT001	Nov. 2021	3%	0.9	0.9	-	29	27
	Dec. 2021 ¹	-	-	-	-	29	27
DT002	Nov. 2021	3%	0.03	0.03	-	29	27
	Dec. 2021 ¹	-	-	-	-	29	27
DT003	Nov. 2021	40%	9.8	48.4	47.0	29	27
	Dec. 2021	13%	12.1	94.8	90.9	29	27

¹ No data was recorded due to poor network connectivity

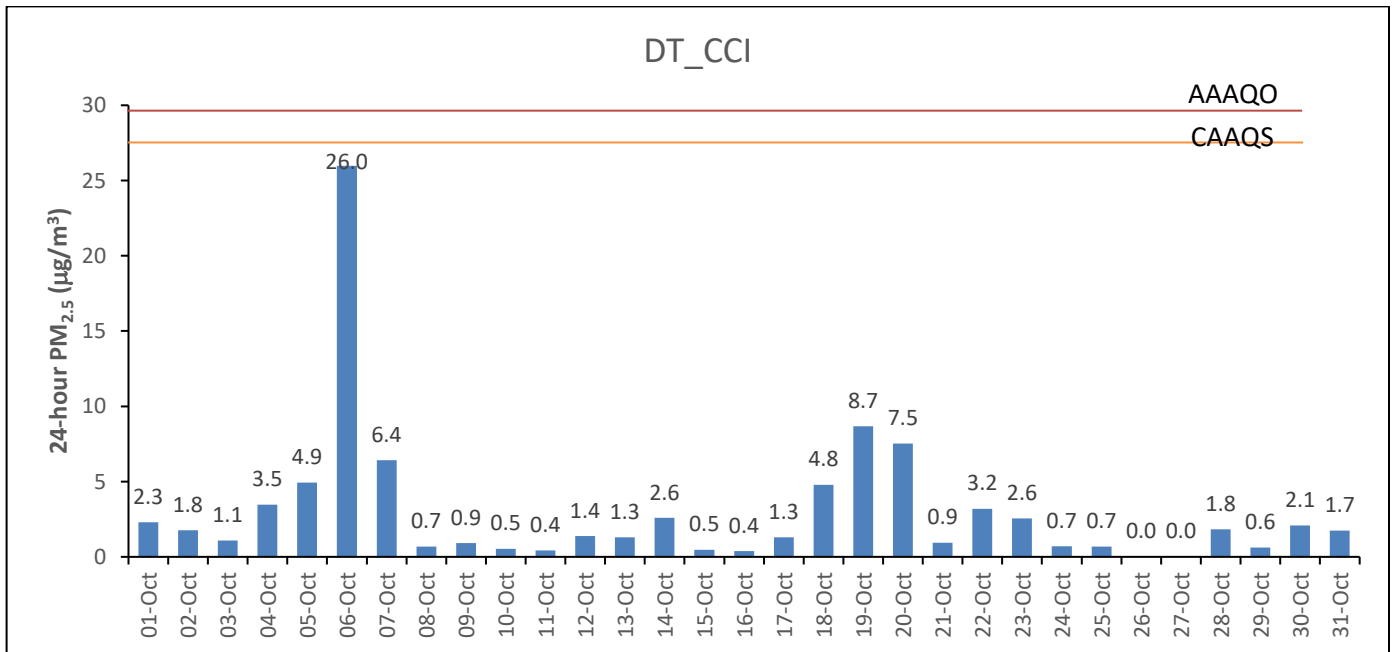
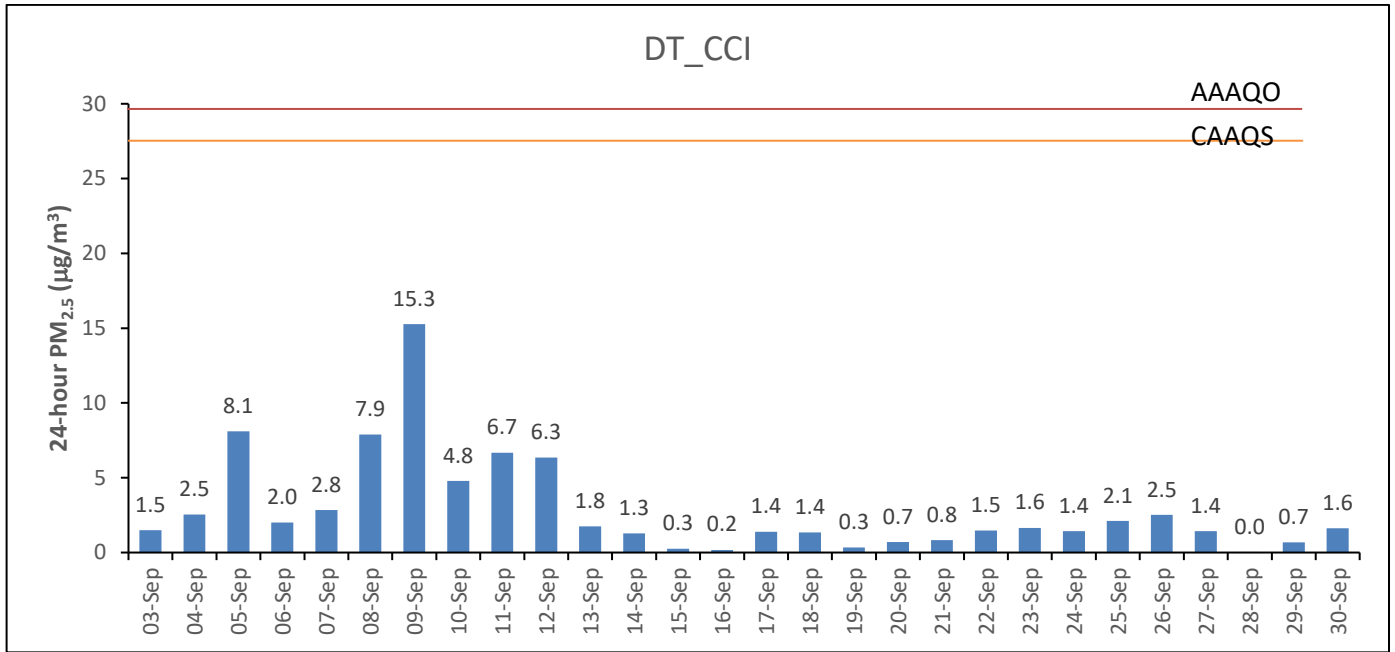


Figure 2: 24-hour PM_{2.5} Measurements at North of the Pit (DT_CCI) for September and October 2021

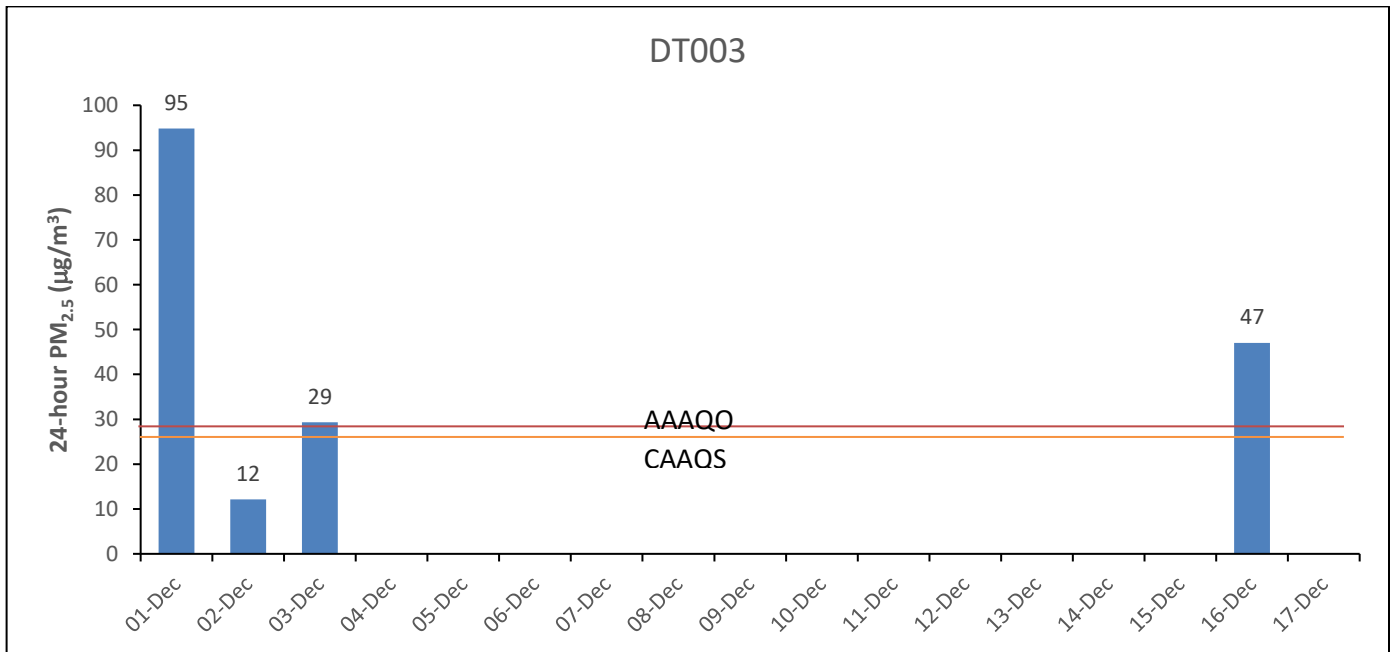
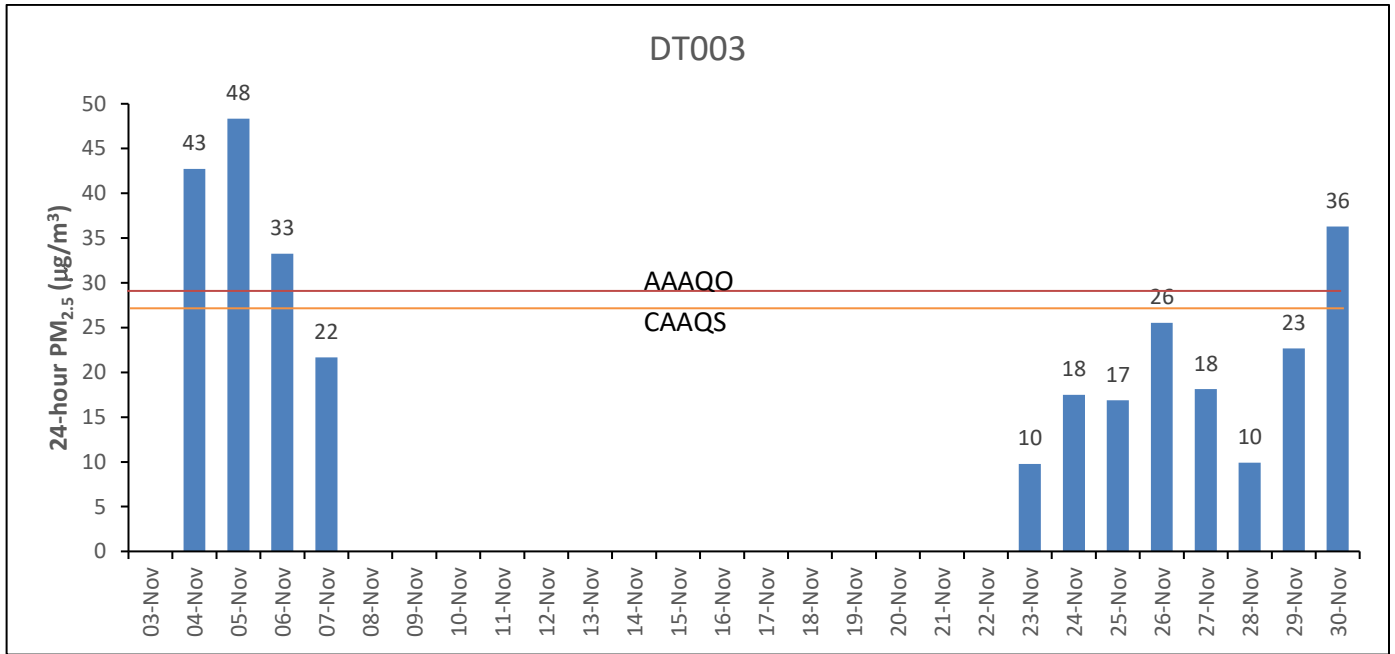


Figure 3: 24-hour PM_{2.5} Measurements at East of the Pit (DT003) for November and December 2021

Summary

Air Quality Monitoring at the Pit began in September 2021. During the first 2-month monitoring period of 2021 (September and October), 24-hour PM_{2.5} measurements at north of the Pit location (DT_CCI) had more than 93% data availability and indicated no exceedance of 24-hour AAAQO and CAAQS.

During November and December 2021, more than 60% of the 24-hour ambient data was missing at three monitoring locations due to poor network connectivity. During these two months, the valid one 24-hour PM_{2.5} measurement was 0.9 and 0.03 µg/m³ at west and north of Pit location, respectively.

At east of the Pit location (DT003), which was considered an “in pit” monitoring point, there were 7 days of values above guidelines over total 16 days of valid 24-hour PM_{2.5} measurements. The location provided results as expected for monitoring so close to the active operations. The location of this unit was changed on June 3 to the east property line to provide better indications of off-site dust levels.

There was inconsistent data recorded for January to March 28, 2022 due to the technical difficulties mentioned above. Regular site visitation is recommended to verify the proper operation of the monitoring equipment and of data acquisition systems to ensure the collection of valid and complete data for the next year (CCME 2019).

References

- Alberta Environment and Parks (AEP). 2019. *Alberta Ambient Air Quality Objectives and Guidelines Summary*. Updated in January 2019. <https://open.alberta.ca/dataset/0d2ad470-117e-410f-ba4f-aa352cb02d4d/resource/4ddd8097-6787-43f3-bb4a-908e20f5e8f1/download/aaqo-summary-jan2019.pdf>
- Canadian Council of Ministers of the Environment (CCME). 2012. *Guidance Document on Achievement Determination Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone*. Document ID: PN 1483. https://publications.gc.ca/collections/collection_2013/ccme/En108-4-55-2012-eng.pdf
- Canadian Council of Ministers of the Environment (CCME). 2019. *Ambient Air Monitoring and Quality Assurance/Quality Control Guidelines*. Document ID: PN 1599. https://ccme.ca/en/res/ambientairmonitoringandqa-qcguidelines_ensecure.pdf



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EXTERNAL MEMO

To: Gustavo Rojas Company: Hillstone Aggregates

cc: Ellie Abootorabi, QuantumPlace Developments

From: Jennifer North Company: Millennium EMS Solutions Ltd.

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Re: Hillstone Aggregates Pit at NW-36-26-04-W5M - Noise Monitoring Report for 2021

Hillstone Aggregates c/o QuantumPlace Developments (QPD) engaged Millennium EMS Solutions (MEMS) in September 2021, to provide remote noise monitoring services for the Hillstone Aggregates Pit (the "Pit") in Big Hill Springs, Alberta. This memo summarizes the noise monitoring results from November to December 2021 at the Hillstone Aggregates Pit and adheres to the requirements within the Master Site Development Plan (MSDP) (Quantum Place Developments Ltd. [Quantum] 2021). The guidelines and recommendations according to the Alberta Energy Regulator (AER) Directive 038: Noise Control were referenced for the purpose of this memo (AER 2007).

Noise Level Standards

As outlined in the MSDP, the noise levels generated by operations of the Pit will be at or below the 65 dBA L_{eq} (one hour) threshold adopted by Hillstone Aggregates at each receptor location (Quantum 2021). Furthermore, Hillstone Aggregates has committed to mitigate and manage noise levels using the guidelines and recommendations outlined in AER Directive 038: Noise Control (Quantum 2021).

Noise Monitoring

Noise monitoring at the Hillstone Aggregates Pit began in November 2021 using a multi-parameter near-reference level station in three locations within the pit boundary (DT001, DT002 and DT003). Figure 1 outlines the locations where the monitoring devices were set up in the Pit during the assessment.

- DT001 is located to the west of pit operations in an open field and is considered an ambient monitoring station. It is located between the active pit and the nearest resident and receptor.
- DT002 is located to the north of pit operations approximately 1/3 of the way up the berm and is the closest monitoring station to Highway 567, which is the main source of noise in the area.
- DT003 is located to the east of pit operations and is considered an “in pit” monitoring point.



Figure 1 Monitoring Locations at Hillstone Aggregates Pit at NW-36-26-04-W5M

Availability of Noise Measurement Data

Table 1 summarizes the data availability of the noise measurements at the Pit for the period from November to December 2021.

Table 1 Data Availability of the 2021 Noise Measurements			
Monitoring Station	Monitoring Period	Average Counts Per Day	Data Availability (%)
DT001	November 2021	88	56%
	December 2021	524	16%
DT002	November 2021	44	50%
	December 2021	219	7%
DT003 ¹	November 2021	43	52%
	December 2021	33	13%

1 Denotes monitoring from within the active pit area

Data availability was above 50% during November and less than 16% in December at all three locations. Several factors including low temperatures, fluctuating power demand and network connectivity were considered as possible sources of data collection inconsistency. Through multiple site visits and tests, it was determined that network connectivity, poor cell phone coverage, was the leading cause of data inconsistency.

Noise Measurement Results

Table 2 provides a summary of the maximum and minimum Sound Pressure Level (SPL) noise measurement results collected during the November and December 2021 monitoring period, comparing to the County's threshold limit of 65 dBA. In addition, Figures 2 to 4 show the SPL measurement results collected at monitoring stations DT001, DT002 and DT003, respectively.

The three locations are in close proximity to the operations area and are expected to be lower at the closest receptor site (adjacent residents). For the purpose of this report, the value of 65 dBA will be used for comparison purposes. The values above 65 dBA are identified in the results and summary below and are still within the expected range as per the modelling data in the Noise Impact Assessment – Hillstone Aggregates Gravel Pit Facility NW-36-26-04 W5M (Patching Associates Acoustical Engineering Ltd. 2020).

Monitoring Station	Monitoring Period	Data Availability (%)	Minimum SPL (dBA)	Maximum SPL (dBA)	Percentage of values >65 dBA (%)
DT001	Nov. 2021	56 %	31.9	72.2	1%
	Dec. 2021	16%	57.5	85	0.1%
DT002	Nov. 2021	50%	32.1	76.1	7%
	Dec. 2021	7%	32.1	71.7	16%
DT003	Nov. 2021	52%	32.0	77.2	32%
	Dec. 2021	13%	32.0	89.7	54%

The noise monitoring data collected at each monitoring station indicate the following:

- DT001 – At the monitoring station located west of the Pit, the noise level values ranged from 31.9 dBA to 85 dBA. A total of 15 noise level readings collected over the monitoring period were above 65 dBA (ranging from 65.1 dBA to 85 dBA of which four measurements were above 67.7 dBA). Specifically, the days that experienced exceedances were:

- November 22, 2021 (65.6 dBA, 66.0 dBA, 65.8 dBA at 5:35 pm, 5:36 pm and 5:50 pm, respectively);
 - November 25, 2021 (66.7 dBA at 5:30 pm);
 - November 26, 2021 (71.9 dBA and 67.4 dBA at 3:00 am and 4:00 am, respectively);
 - November 30, 2021 (65.6 dBA, 65.2 dBA, 65.1 dBA, 72.2 dBA, 65.3 dBA and 66.7 dBA at 7:00 pm, 7:30 pm, 8:00 pm, 9:00 pm, 9:30 pm and 11:30 pm, respectively); and
 - December 1, 2021 (72.7 dBA, 67.7 dBA and 85.0 dBA at 12:00 am, 12:30 am and 1:00 am, respectively).
- DT002 – At the monitoring station located north of the Pit, the noise level values ranged from 32.1 dBA to 76.1 dBA. There were levels slightly above 65 dBA for 10% of the monitoring period (ranging from 65 dBA to 76.1 dBA of which six measurements were above 69.9 dBA). The slight increase in noise levels could be a result of the proximity of Highway 567.
 - DT003 – At the monitoring station located east of the Pit, which was considered an “in pit” monitoring point, the noise levels ranged from 32.0 dBA to 89.7 dBA. There were levels above 65 dBA each day (ranging from 65.1 dBA to 89.7 dBA of which 77 measurements were above 69.9 dBA).

Noise Modeling and Receptors

Predictive noise modeling was completed for the Pit in advance of the development. The entire development area has Sound Power Levels (SPLs) predicted to be >58 dBA which is consistent with the actual measured noise values. The predicted SPLs are shown on Figure 5.

A noise level threshold of 65 dBA was established for the receptor locations. The receptors are shown on Figure 6. The predicted SPLs for R04 was 46-48 dBA, R6 was 52-54 dBA and for R11 was 50-52 dBA. The predictions appear to be consistent with the actual noise data measure near the pit development.



Figure 2 Sound Pressure Level (SPL) Measurements at Noise Monitoring Station DT001 for November and December 2021

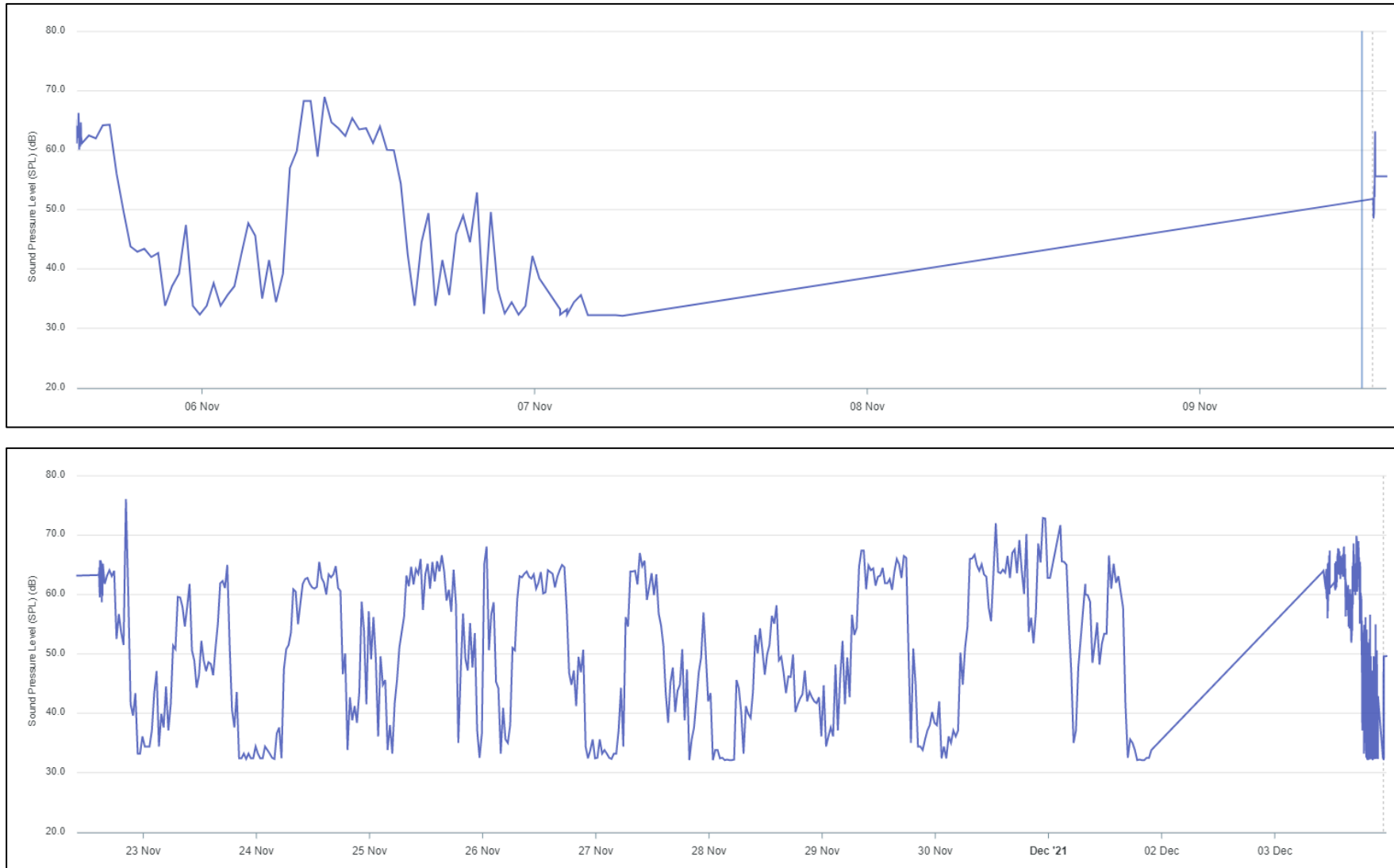


Figure 3 Sound Pressure Level (SPL) Measurements at Noise Monitoring Station DT002 for November and December 2021

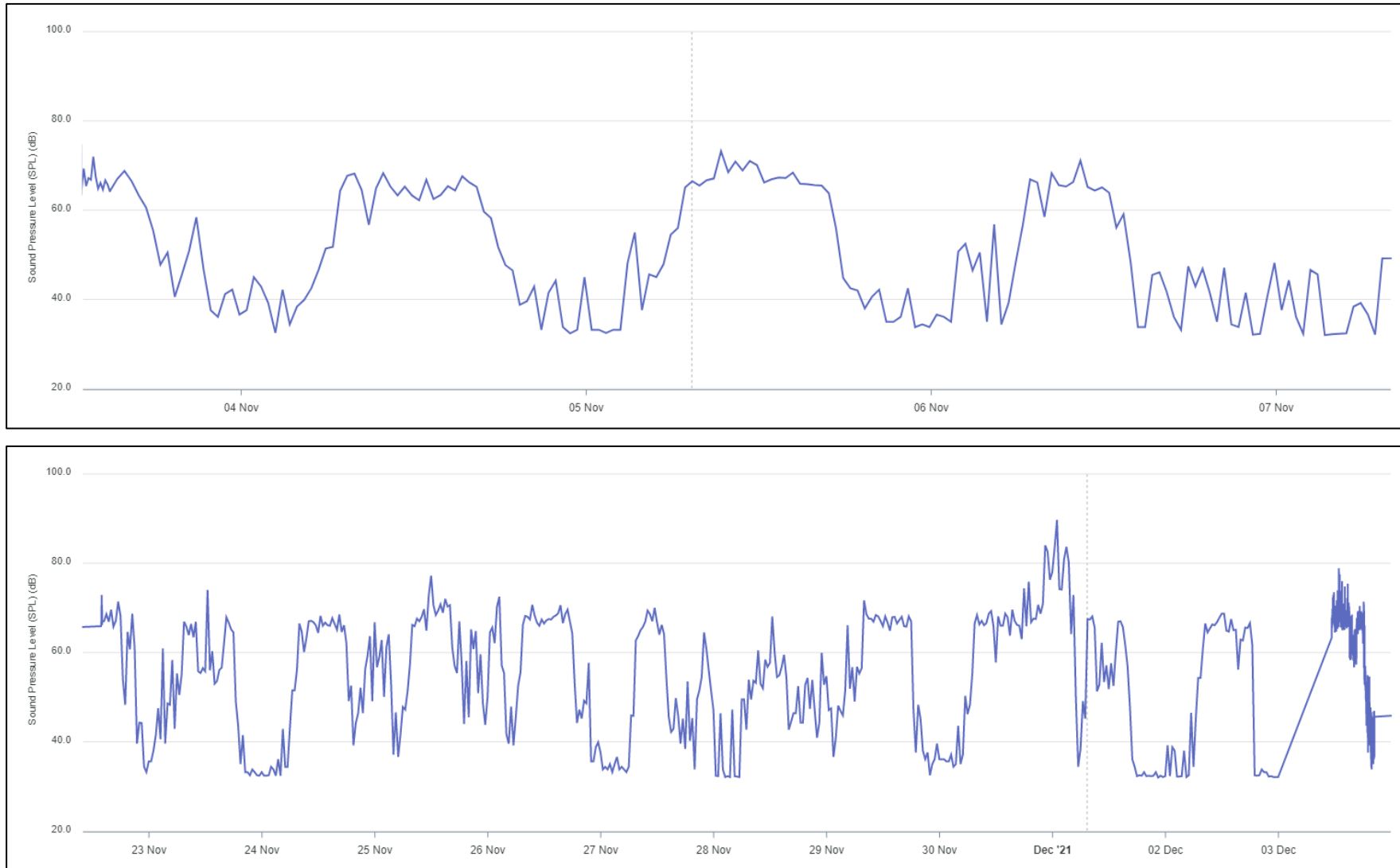


Figure 4 Sound Pressure Level (SPL) Measurements at Noise Monitoring Station DT003 for November and December 2021

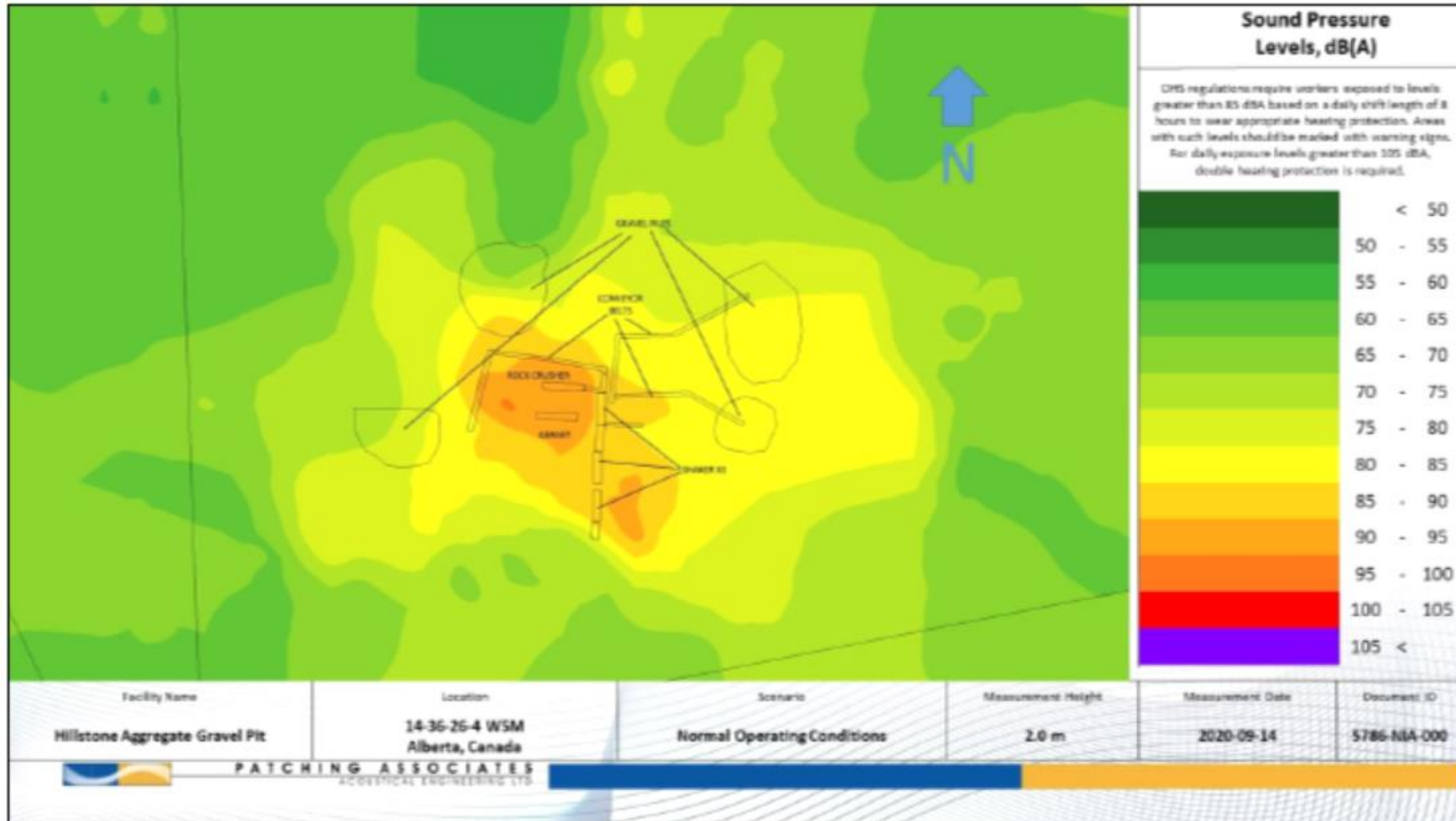


Figure 5 Near-Field Noise Map. (Patching Associates Acoustical Engineering Ltd., 2020)

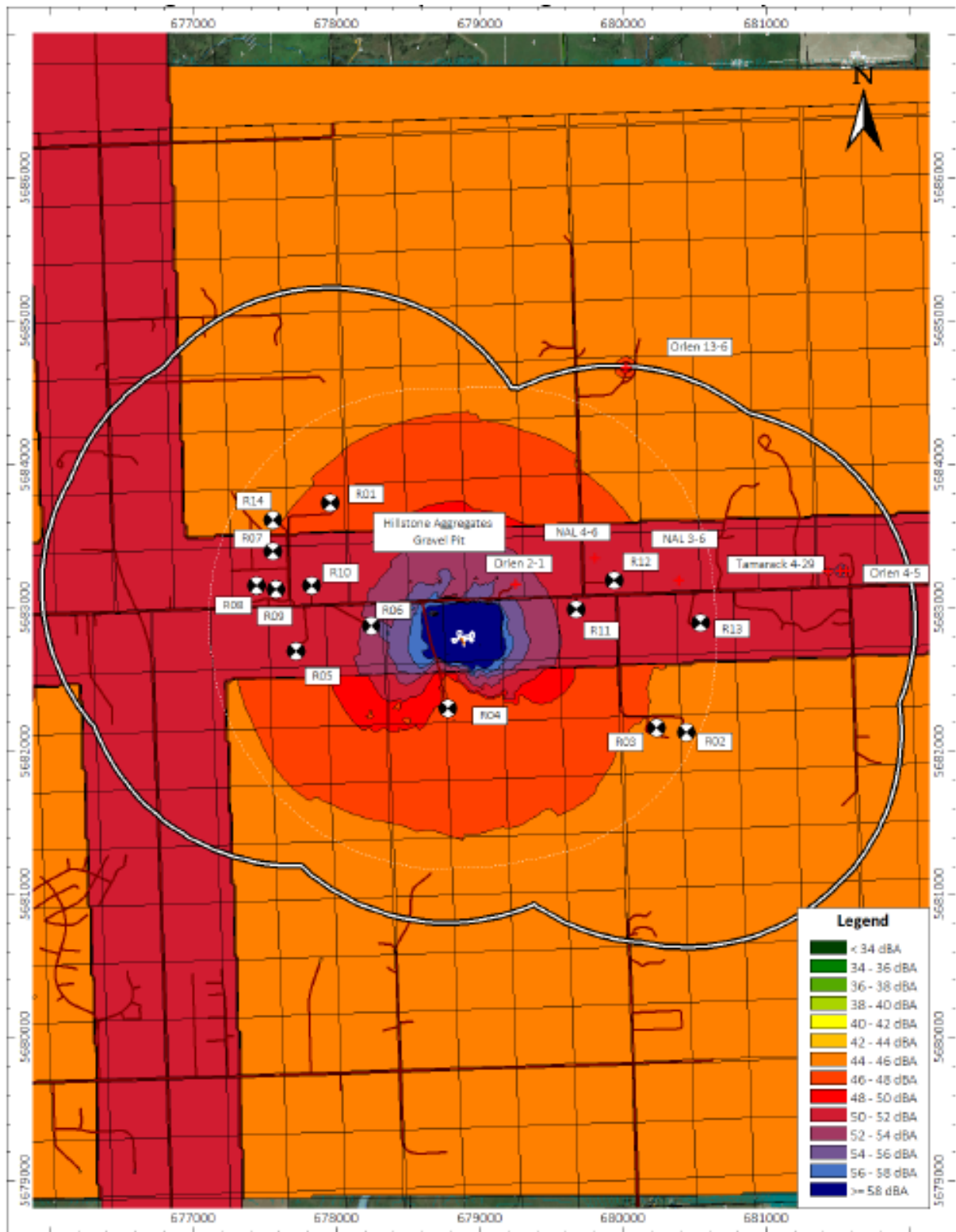


Figure 6 Noise Contour Map – As Existing – Cumulative SPL – Daytime (Patching Associates Acoustical Engineering Ltd., 2020)

Summary

Noise monitoring at the Pit was conducted from November 3, 2021 to December 5, 2021. Due to poor network connectivity, each monitoring station had an extended period where no data was recorded in November, resulting in > 60% missing data at each station. The date ranges for this data gap are:

- from November 10 to 21, 2021 for DT001;
- from November 7 to 21, 2021 for DT002; and
- from November 8 to 21, 2021 for DT003.

At monitoring station DT001, located west of the Pit, most noise level readings collected over the monitoring period were below the 65 dBA. A total of 15 measurements ranging from 65.1 dBA to 85 dBA were recorded above 65 dBA, which aligned with the modelling data, including:

- 9 Readings were less than 3% above 65 dBA
- 6 readings ranging from 65.1 dBA to 65.8 dBA;
- 3 readings ranging from 66.0 dBA to 66.7 dBA;
- 2 readings of 67.4 dBA and 67.7 dBA;
- 3 readings ranging from 71.9 dBA to 72.7 dBA; and
- 1 reading of 85 dBA.

Noise measurement readings at monitoring station DT002, located north of the Pit, ranged from 32.1 dBA to 76.1 dBA. A total of 144 measurements ranging from 65.1 dBA to 76.1 dBA were above 65 dBA, which aligned with the modelling data, including:

- 111 readings were less than 3% above 65 dBA
- 67 readings ranged from 65.1 dBA to 65.9 dBA;
- 34 readings ranged from 66.0 dBA to 66.9 dBA;
- 19 readings ranged from 67.0 dBA to 67.9 dBA;
- 10 readings ranged from 68.1 dBA to 68.9 dBA;
- 8 readings ranged from 69.0 dBA to 69.9 dBA; and
- 6 readings ranged from 70.2 dBA to 76.1 dBA.

Proximity of Highway 567 to this monitoring station could explain the slight increase in noise levels during the monitoring period.

Noise measurement readings at monitoring station DT003 located east of the Pit, which was considered an “in pit” monitoring point, ranged from 32.0 dBA to 89.7 dBA. The location provided results as expected for monitoring so close to the active operations. There were levels above the

65 dBA each day. A total of 547 noise level readings were above 65 dBA with 234 of those having readings between 65 dBA to 67 dBA, including:

- 88 readings ranged from 65.1 dBA to 65.9 dBA;
- 146 readings ranged from 66.0 dBA to 66.9 dBA;
- 123 readings ranged from 67.0 dBA to 67.9 dBA;
- 84 readings ranged from 68.0 dBA to 68.9 dBA;
- 29 readings ranged from 69.0 dBA to 69.9 dBA;
- 61 readings ranged from 70.0 dBA to 74.8 dBA;
- 9 readings ranged from 75.4 dBA to 78.9 dBA; and
- 7 readings ranged from 80.2 dBA to 89.7 dBA.

The SPL threshold of 65 dBA was determined for project receptor locations and not for the monitoring locations. The predicted SPLs for the development area are consistent with the modeling data and it can be assumed that the modeling data for the receptors would also be consistent. All receptors would remain well below the threshold values.

For future noise monitoring activities at the Pit, regular site visits are recommended to verify the proper operation of the monitoring equipment and of data acquisition systems to ensure the collection of valid and complete data.

Recommendations

The following recommendations are for noise monitoring for the future of the development:

- Continue to conduct noise monitoring for the duration of the operation of the Pit.
- Relocate one unit (DT001) to the west property line during and after the construction of the access road.
- Relocate unit DT002 to the north of the Pit, outside of the operational area.
- Relocate unit DT003 to the east property line, outside of the operational area.

References

- Alberta Energy Regulator (AER). 2007). Directive 038: Noise Control. February 16, 2007. 57 pp. [PDF]. URL: Directive 038: Noise Control (Revised edition, February 16, 2007) (aer.ca)
- QuantumPlace Developments Ltd. 2021. Master Site Development Plan: Hillstone Aggregates NW-36-26-04-W5M. Amendment: February 2021. 36 pp. [PDF]. URL: MSDP-Hillstone-Aggregates.pdf (rockyview.ca)
- Patching Associates Acoustical Engineering Ltd. 2020. Noise Impact Assessment – Hillstone Aggregates Gravel Pit Facility NW-36-26-04 W5M. September 18, 2020.