

8 May 2020

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Subject: **Carter Park Amphitheater**
Update to Music Noise Measurement Results and Analysis
Salter Project: 19-0486

Dear Mark:

We visited both Carter Park and Mac Dutra Plaza on 24 August 2019 to study the sites and conduct noise measurements during the concert and play that night. The purpose of our measurements was to quantify noise from a Mac Dutra Plaza concert and estimate future similar concert noise levels at the to-be-expanded Carter Park Amphitheater. This letter summarizes our findings, estimates of future Carter Park noise from similar concerts, and comments.

SUMMARY

We were directed to measure a “typical” concert in Mac Dutra Plaza’ summer concert series as well as a Shakespeare in the Park play in Carter Park. Concerts that are amplified in Carter Park Amphitheater will be intermittently audible at the closest residential property line. The closest multi-family residence is located between Patrick Way and Stone Pine Road, approximately 400 ft North of the future stage location. There is also a single-family home on the Northeast corner of Mill Street and Johnson Street, approximately 400 ft south of the future stage location.

Due to the future location and orientation of the proposed stage, we predict that the multi-family residence(s) between Patrick Way and Stone Pine Road as the most noise sensitive area. We approximate the levels to be between 60 and 65 dB(A)¹ at the closest property line. These noise levels are based on the concert we measured in Mac Dutra Plaza. If a different type of music/concert is to happen, noise levels may vary.

CRITERIA – HALF MOON BAY NOISE ORDINANCE AND GENERAL PLAN NOISE ELEMENT

Property Line Noise Ordinance

Chapter 9.23 Noise states: *"No person shall between the hours of ten p.m. and eight a.m. make, cause, suffer or permit to be made any offensive noise (1) which is made within one hundred feet of*

¹ A-Weighted Sound Level – The A-weighted sound pressure level, expressed in decibels (dB). Sometimes the unit of sound level is written as dB(A). A weighting is a standard weighting that accounts for the sensitivity of human hearing to the range of audible frequencies. People perceive a 10 dB increase in sound level to be twice as loud. (Decibel) – A unit that describes the magnitude of a sound with respect to a reference sound level near the threshold of hearing. Decibels are based on a logarithmic scale and therefore cannot be added arithmetically.

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any building or place regularly used for sleeping purposes, or (2) which disturbs, or would tend to disturb, any person within hearing distance of such noise.”

General Plan Noise Element

Exhibit 13 from the City of Half Moon Bay Noise Element of the General Plan describes the current interior and exterior CNEL² standards for single family and multi-family residences. The following table outlines the CNEL standards as listed in the Noise Element of the General Plan.

Table 1: Half Moon Bay Interior and Exterior CNEL Standards

Residential Use	Interior CNEL (dBA)	Exterior CNEL (dBA)
Single Family, Duplex	40	60
Multiple Family	40	-

ACOUSTICAL MEASUREMENTS

As per your request, we measured a concert in Mac Dutra Plaza that was described to us as being similar to future concerts at the proposed Carter Park Amphitheater. The concert in Mac Dutra Plaza included the band Alpha Rhythm Kings (4 pm to 6 pm, August 24). This band included amplified music with horns (e.g., trumpet and saxophone) and amplified vocals being the main source of noise. We conducted short-term noise measurements at various locations around the performance (see **Figure 1**). The concert produced noise levels from 65 dB to 90 dB. The August 24th measurements showed that concert music was being played for approximately 2/3rd of the hour that was measured, yielding an L_{eq}^3 of approximately 83 dBA within Mac Dutra Plaza.

The second performance measured was Shakespeare in the Park at Carter Park (7 pm to 9 pm, August 24). This was not amplified, and the main source of noise was speech. We performed noise measurements at various locations around the performance space (see **Figure 2**). The performance produced noise levels from 50 dB to 67 dB. The ambient noise level at LT-1 during the performance was 61 dB while the typical ambient (no performance) was 60 dB. The ambient at LT-2 during the performance was 51 dB and the typical ambient noise level (no performance) was also 51 dB.

We conducted two long-term noise measurements bordering the site between 23 and 27 August 2019, noted as LT-1 and LT-2 on the attached **Figure 2**. The meters measured continuous noise levels and recorded “loud” noise events allowing us to identify the source of the noise (e.g., sirens, traffic and

² CNEL (Community Noise Equivalent Level) – A descriptor for a 24-hour A-weighted average noise level. CNEL accounts for the increased acoustical sensitivity of people to noise during the evening and nighttime hours. CNEL penalizes sound levels by 5 dB during the hours from 7 PM to 10 PM and by 10 dB during the hours from 10 PM to 7 AM. For practical purposes, the CNEL and DNL are usually interchangeable.

³ L_{eq} – The equivalent steady-state A-weighted sound level that, in a stated period of time, would contain the same acoustic energy as the time-varying sound level during the same period.

aircraft flyovers). The meters were attached to utility poles and trees at an approximate height of 12 feet above grade. The measurements from 23 to 25 August 2019 were on weekend days (Friday, Saturday, and Sunday).

Short-term noise levels of these performances and their measurement locations are summarized in Appendix A.

ANALYSIS – MUNICIPAL NOISE ORDINANCE COMPLIANCE

We understand that there is currently one annual amplified music concert at Carter Park, and a maximum of 6 more amplified concerts may be added with the future stage in place. We also understand that the concerts will most likely be scheduled on weekend days and will last between 3 to 4 hours on a given afternoon or evening. Given these details, we were able to predict the acoustical impact at the nearest residential property line.

Based on the measurement results, we have the following comments:

1. If a concert like the one at Mac Dutra Plaza were to occur in Carter Park, maximum noise levels would be approximately 60 to 65 dB at the closest property line. This would be 5 to 10 dB above the ambient levels during the same time of day as a potential future concert, and therefore may be intermittently audible at the property line.

If a different type of concert were to occur (i.e., different instruments, louder PA system, etc.), the noise levels could potentially be louder. While there is no official noise level to stay under according to the Noise Ordinance, complaints may still arise.

2. The music sound spectrum was generally in the mid-range frequencies. Certain types of music can be more “bass heavy”, which have more sound power in the lower frequencies. Low frequencies are attenuated less from atmospheric affects and therefore may be perceived at the property line as a “bump” or “thump”.

ANALYSIS – GENERAL PLAN NOISE ELEMENT

From our long-term measurements taken between 23 to 27 August 2019, we estimated the CNEL for each day at the closest multi-family residence. These levels measured on the weekend days are listed in the table below.

Table 2: Nearest Multi-Family Residence CNEL Levels

Date	Measured CNEL (dBA)	Carter Park Shakespeare Event (Yes/No)?
23 August 2019	58	No
24 August 2019	59	Yes
25 August 2019	58	No

From the Mac Dutra Plaza measurements taken on 24 August, the measured hourly Leq of solely "concert noise" was 84 dBA at 35-feet away from the stage. The nearest multi-family residence to Carter Park is 400 feet away. Given that our long-term measurements were taken at approximately the property line, we calculated the sound reduction from 35 feet to 400 feet. The resulting attenuated levels were then supplemented for 4 afternoon/evening hours of our initial long-term noise data, since that was the given time duration of future concerts at the park. From this, we were able to estimate the expected CNEL for a given concert day. These estimated levels are listed in the table below.

Table 3: Estimated CNEL at Residential Property Line with Amplified Concert Noise

Date	Current CNEL (dBA)	Estimated CNEL with Amplified Concert Music (dBA)	Change in CNEL (dBA)
23 August 2019	58 dBA	58 dBA	<+1 dB
24 August 2019	59 dBA	58 dBA	-1 dB
25 August 2019	58 dBA	58 dBA	<+1 dB

As the table above shows, concerts at Carter Park similar to those at Mac Dutra Plaza are predicted to increase the CNEL at the nearest receivers by 1 dB or less on the weekend dates. This would be characterized as a less than significant change in CNEL. Since the concerts are planned for weekend dates, we predict that hosting amplified concerts at Carter Park will have a less-than-significant impact on the overall noise environment at the nearby residences.

We do not have any understanding of exterior façade and window assemblies of the nearby multi-family residences. As such, we estimated their potential capabilities using our experience and database of acoustical test information. A 1/8-inch thick single-paned window assembly can block about 25 dB of noise (a "conservative" estimate because of the common use of dual-paned windows for thermal efficiency purposes). Based on this conservative assumption, we estimate that CNEL levels inside the nearby residences would be below 40 dB due to the proposed Carter Park project (levels in the table above minus 25 dB for window sound isolation).

* * *

Should you have any questions please call. We are available to discuss our comments in greater detail. Sincerely,

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APPENDIX A:

The following table summarizes short-term Mac Dutra Plaza noise levels during the “Alpha Rhythm Kings” concert:

Time	Locations	Measured Sound Pressure Levels (dBA)
4:28 pm	B1	80
4:36 pm	B1	82
5:21 pm	B1	76
4:26 pm	B2	84
4:39 pm	B2	85
5:18 pm	B2	85
5:27 pm	B2	86
5:28 pm	B2	90
5:29 pm	B2	87
4:25 pm	B3	82
4:33 pm	B3	82
4:44 pm	B3	81
5:23 pm	B3	75
4:25 pm	B4	78
4:29 pm	B4	77
4:35 pm	B4	70
4:40 pm	B4	77

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4:43 pm	B4	76
5:31 pm	B4	78
4:31 pm	B5	74
4:40 pm	B5	74
5:16 pm	B5	74
4:28 pm	B6	73
4:33 pm	B6	81
4:43 pm	B6	76
5:23 pm	B6	77
5:25 pm	B6	78
4:29 pm	B7	73
4:39 pm	B7	74
5:28 pm	B7	79
4:36 pm	B8	71
4:44 pm	B8	71
5:17 pm	B8	74
5:26 pm	B8	74
4:31 pm	B9	71
4:37 pm	B9	74
4:45 pm	B9	73
5:30 pm	B9	65

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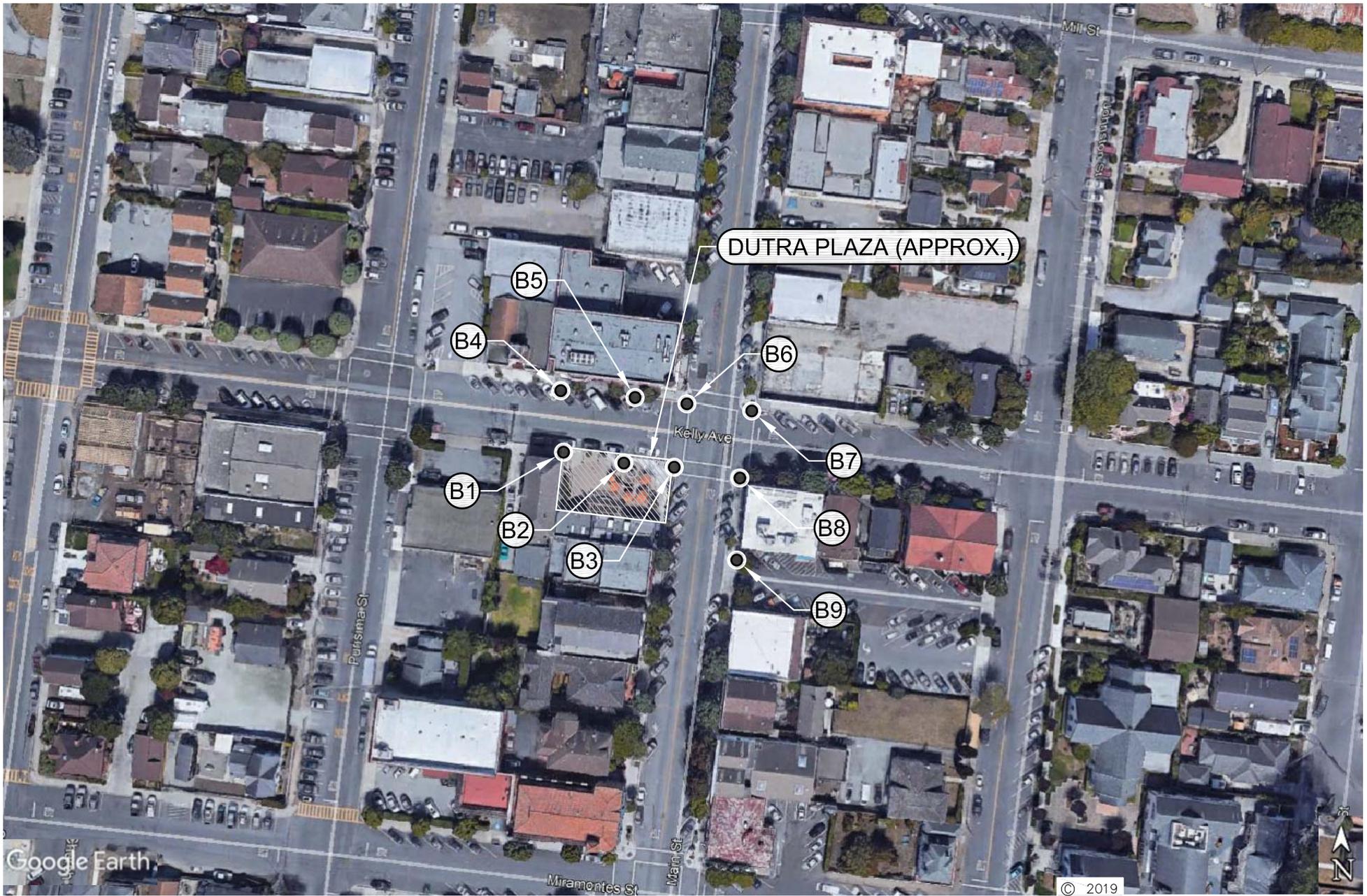
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The following table summarizes Carter Park noise levels during the "Shakespeare in the Park" performance:

Start Time	Location	Measured Sound Pressure Levels (dBA)
7:17 pm	A1	63
7:31 pm	A1	52
7:19 pm	A2	56
7:27 pm	A2	50
7:22 pm	A3	62
7:25 pm	A3	67
7:17 pm	A4	57
7:38 pm	A4	52
7:19 pm	A5	55
7:41 pm	A5	52
7:22 pm	A6	63
7:25 pm	A7	64
7:41 pm	A7	50
7:28 pm	A8	49
7:30 pm	A9	49
7:43 pm	A9	51

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CARTER PARK AMPHITHEATER NOISE MEASUREMENT LOCATIONS (CONCERT IN DUTRA PARK)

FIGURE 1

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09.27.19



Google Earth

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CARTER PARK AMPHITHEATER
NOISE MEASUREMENT LOCATIONS
(SHAKESPEARE IN THE PARK AT CARTER PARK)

FIGURE 2

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