APPENDIX B
ENVIRONMENTAL NOISE ASSESSMENT

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THE GREAT AMERICA THEME PARK MASTER PLAN PROJECT – NOISE STUDY SANTA CLARA, CA

Draft

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Executive Summary

Noise levels associated with the proposed Master Planned Development (PD) Zoning for the Great America Theme Park have been estimated and assessed in accordance with the requirements of the California Environmental Quality Act (CEQA). The noise level estimates have been made using information provided by the project applicant, data from technical literature, past project data, and measurements made at Great America specifically for this environmental assessment. The assessment thresholds are based on standards from the City of Santa Clara General Plan, Municipal Code, previous environmental impact reports (EIRs) that the City has certified, and generally accepted practices. Some of the thresholds, in accordance with the Municipal Code, take existing environmental noise levels into account, and these were determined by direct measurement in the area surrounding Great America.

The proposed zoning contemplates altering current operations in three ways: adding more rides and amenities, extending the operating season to be year-round, and extending the daily operating hours. For this analysis, these three elements of operational changes are grouped as follows in accordance with the desires of the project sponsor to roll out planned changes:

1. More rides (same season, same hours)
2. More rides and extended season (same hours)
3. More rides, extended season, extended hours

Noise from rides – the most characteristic noise emanating from the park – was assessed using a threshold that considers the total amount of noise produced during the day and by a threshold that considers the maximum noise levels. On a daily basis, neither adding more rides nor extending the season to be year-round will cause any significant noise impacts. On the other hand, extending the operating hours past 10 PM will cause significant noise impacts at nearby residences and at some commercial parcels. This is because noise levels after 10 PM are heavily weighted in the daily noise metric calculation to reflect the fact that people are more sensitive to noise at night. The maximum noise levels from rides are also expected to cause significant noise impacts at both residences and nearby commercially zoned properties.

Noise from the proposed new live entertainment venue, the new commercial amenities, and general park attendance (other than rides) are not expected to cause any significant noise impacts.

Construction noise is specifically exempted from noise limits by the City of Santa Clara Municipal Code, but in the interest of disclosure, noise levels have been estimated. Construction of new rides very close to the eastern or southern boundaries of the park may exceed the operational noise significance thresholds at the nearest receivers if it is not possible to employ any noise control measures whatsoever. If even modest noise control measures can be employed, construction noise levels would not exceed the operational noise significance thresholds.

The many approved and pending projects in Santa Clara and San Jose are expected to cause cumulative traffic noise impacts. However, the contribution of project traffic to these impact will not be considerable.

1 Introduction

Cedar Fair is proposing a Master Planned Development (PD) Zoning covering the 167-acre Great America Theme Park site that would allow all existing attractions and operating practices to continue and provides flexibility for the development of new attractions and practices over the next 20 years. The proposed PD Zoning would allow installation of new rides, replacement of existing rides and attractions, extension of the operating season, extension of the operating hours of both the park and the amphitheater, and development of the employee parking lot and maintenance area.

The project would also include a commercial/entertainment district. The existing, 10,000 seat Redwood Amphitheater would be part of the commercial/entertainment district, continuing in its current use. Additional theater space currently within Great America could be repurposed. A new, small-scale outdoor stage near the Redwood Amphitheater is planned. Special events of a non-concert nature would also be allowed in some sections of the park. A total of 100,000 square feet of new commercial space is proposed. The proposed commercial/entertainment district would contribute to an increase in both visitors and employees to the site. The current number of parking spaces would be maintained.

2 Establishment of Significance Criteria

2.1 Environmental Noise – Fundamental Concepts

Noise is usually defined as unwanted sound. It is an undesirable byproduct of human society's normal day-to-day activities. Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm, or when it has adverse effects on health. The definition of noise as unwanted sound implies that it has an adverse effect on people and their environment.

The decibel scale. Noise is measured using a logarithmic scale of sound pressure level known as a decibel (dB). One of the main reasons that sound level measurements lend themselves to a logarithmic scale is that human perception of sound levels is also logarithmic in nature.

The human ear does not respond uniformly to sounds at all frequencies, being less sensitive to low and high frequencies than to mid-range frequencies that correspond with human speech. To better evaluate noise levels as perceived by people, the A-weighted noise level (or scale) was developed. A-weighting filters the total noise pressure measured by the microphone in a manner similar to the filtering done by the human ear to produce a noise level that corresponds fairly well with people's subjective judgment of sound levels. A-weighted decibels are denoted by "dBA."

Because noise is measured on a logarithmic scale, a doubling of sound energy results in a 3 dBA increase in noise levels. A second doubling of sound energy (a quadrupling of the original amount) results in an additional 3 dBA increase in noise levels.

Noise attenuation. Most noise sources can be classified as either point sources, such as stationary equipment, or line sources, such as a roadway. Sound generated by a point source nominally diminishes (attenuates) at a rate of 6 dBA for each doubling of distance away from the source. For example, a 60 dBA noise level measured at 50 feet from a point source would be 54 dBA at 100 feet

from the source and 48 dBA at 200 feet from the source. Noise from a line source nominally attenuates at 3 dBA per doubling of distance. Figure 1 shows examples of various noise source levels.

Sound levels can also be attenuated by man-made or natural barriers. Solid walls, berms, or elevation differences typically reduce noise levels by 5 to 10 dBA. Partially open windows reduce exterior noise levels around 15 dBA, and closed windows can reduce exterior levels anywhere from 20 to 40 dBA (or higher for very specialized windows).

Some sources, such as people speaking or loudspeakers are directional, meaning that the sound level in front of the source is (typically) higher than the sound level behind the source. Thoughtful orientation of sound sources is one means of reducing noise levels at noise-sensitive receptors.

Characterizing fluctuating noise levels. Environmental or community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources that creates a relatively steady background in which no particular source is identifiable plus local, identifiable sources such as cars, airplanes, and trains.

One basic descriptor used to characterize fluctuating sound levels is the equivalent sound level (L_{eq}). The L_{eq} is the energy-average sound level during a measured time interval. It is the 'equivalent' constant sound level that would produce the same amount of sound energy as measured in the fluctuating level.

The most important noise metric used in this assessment is the Day-Night Average Level (L_{dn}) which is a single-number descriptor used to characterize the noise environment over an entire day. The L_{dn} is an L_{eq} calculated over a 24-hour period with the noise levels between 10 PM and 7 AM increased for the calculation by 10 dBA. This "nighttime noise penalty" represents the higher sensitivity of most people to noise during normal sleeping hours.

Closely related to the L_{dn} is the Community Noise Equivalence Level (CNEL). The CNEL is the similar to the L_{dn} except that the noise levels between the hours of 7 PM and 10 PM are increased by 5 dBA for the calculations. Typically, the CNEL and L_{dn} are within 1 dB of each other and, in practice, are used interchangeably.

Characteristics of vibration. Vibration is the physical manifestation of energy carried through the earth and structures. Vibration is generally felt rather than heard, however, some vibration effects can be caused by noise (for example, the rattling of windows from truck exhaust), and some noise effects can be caused by vibration (for example, the "noise" from a subway train in a room above the tunnel is generated by the vibrating walls and floor).

Community response to noise. Whether or not a community notices and responds to changes in noise levels depends on many factors including the size of the change, the rate of change, the noise levels before and after the change, and the community's feelings about the noise source. At typical noise levels from sources which are accepted by the community, changes in community noise levels less than 3 dB do not usually solicit an adverse reaction from the community, changes from 3 to 5 dB may solicit a reaction, and changes greater than 5 dB will likely invoke a reaction.

2.2 Effects of Noise

Hearing Loss. Exposure to a single, very loud noise or prolonged exposure to relatively high noise levels can result in hearing loss. However, below a certain exposure threshold, hearing loss does not occur regardless of the duration of exposure. The Occupational Safety and Health Administration (OSHA) has determined that the threshold of hearing loss is 90 dBA averaged over eight hours. Noise levels resulting from this project are not expected to approach this threshold.

Sleep Disturbance. Much research has been done on the effect of noise on sleep. Sleep disturbance begins at levels as low as 45 dBA for transient sounds such as are produced by Great America and aircraft flights. Typical, suburban homes provide 15 dB of noise attenuation with the windows partially open and anywhere from 20 to 40 dB with the windows closed. With the windows open, sleep disturbance could occur when the exterior noise levels exceed 60 dBA.

Speech Interference. At an average background noise level of 50 dBA, a normal voice level may be used to communicate up to 20 feet (not accounting for room-to-room attenuation indoors). At 60 dBA background level, a normal voice may be used for communication up to 7 feet, a fairly typical distance between people in the same room. Therefore, for indoor speech, a background noise level above 55 dBA may be used as the threshold for speech interference. Noise levels are generally higher outdoors and people are, therefore, more accustomed to speaking louder outdoors. Outdoors, noise levels above 70 dBA begin to adversely affect normal speech.

Annoyance. The most common effect of noise is annoyance, and most city municipal noise ordinances and general plan noise elements are designed to keep noise levels to those found acceptable by the majority of the population. Noise sensitivity, like all human traits, varies among the population, and some people find noise annoying even when the level does comply with the applicable regulations. Meanwhile, other people are not bothered even by noise levels above noise ordinance limits and noise element guidelines.

2.3 Regulatory Framework

The following provides a discussion of the regulatory background established by the State of California and the City of Santa Clara with regard to limiting noise exposure at noise sensitive land uses.

2.3.1 State CEQA Guidelines

The California Environmental Quality Act (CEQA) establishes guidelines to evaluate the significance of environmental effects due to a proposed project. CEQA does not define what noise level increase would be considered substantial. Many environmental impact reports in California utilize thresholds similar to the following:

1. If the area noise level including the project noise remains “Compatible” with the land use according to the General Plan, an increase of 5 dBA Ldn or greater would be considered significant.

2. If the area noise level after implementation of the project would be in the range that "Requires design and insulation to reduce noise levels" according to the General Plan, an increase of 3 dBA Ldn or greater would be considered significant.

3. If the area noise level including the project noise would be "Incompatible" with the land use according to the General Plan, an increase of 1 dBA Ldn or greater would be considered significant.

These thresholds are based on the widely held notions that a 1 dB change in noise level is "not perceptible", a 3 dB change is "barely perceptible", and a 5 dB change is "clearly perceptible". These thresholds are consistent with those adopted by the City of Santa Clara for the 49ers Santa Clara Stadium Project (later renamed Levi's Stadium) [DEIR, July 2009, p. 235]. They are also consistent with the CEQA thresholds specifically adopted by the City of Los Angeles in *L. A. CEQA Thresholds Guide* [2006, p. I.2-3].

2.3.2 Santa Clara County Airport Land Use Commission Land Use Plan

Comprehensive Land Use Plan for the Santa Clara County Norman Y. Mineta San Jose International Airport adopted by Santa Clara County Airport Land Use Commission dated May 25, 2011 discusses noise exposure due to the airport and policy regarding land use compatibility. Airport noise contour charts illustrate noise exposure due to airport operations and provide an indication of the level of noise exposure for areas near Great America. Section 4.3.2 discusses noise compatibility criteria to minimize the number of people exposed to frequent and/or high levels of aircraft noise.

2.3.3 City of Santa Clara General Plan

The City of Santa Clara Goals and Policies with respect to noise are discussed in Chapter 5.10.6 Noise Goals and Policies and Appendix 8.14 Noise. Chapter 5 includes charts that illustrate noise exposure due to San Jose Airport operations and due to vehicular traffic along major arterials.

The General Plan outlines noise policies, including the following which are relevant to the project:

Policy 5.10.6-P-1 establishes that all land use and development proposals be reviewed for consistency with the General Plan compatibility standards and acceptable noise exposure levels defined in Table 5.10-1.

Policy 5.10.6-P2 is to incorporate noise attenuation measures for all projects that have noise exposure levels greater than General Plan "normally acceptable" levels, per Table 5.10-1.

The general plan noise standards are found in Appendix 8.14 of the plan and are reproduced below in Table 1. For residential land use, outdoor noise exposure up to 55 L_{dn} is compatible and up to 70 L_{dn} is conditionally acceptable requiring design and insulation to reduce noise levels. Noise exposure above 70 Ldn is considered incompatible for residences. The noise standards for other land uses are similarly shown in Table 1.

Table 1 Santa Clara General Plan Noise Standards

TABLE 8.14-1: GENERAL PLAN NOISE STANDARDS

Noise and Land Use Compatibility (Ldn & CNEL)								
Land Use	50	55	60	65	70	75	80	85
Residential								
Educational								
Recreational								
Commercial								
Industrial								
Open Space								

Compatible

Require Design and insulation to reduce noise levels

Incompatible. Avoid land use except when entirely indoors and an interior noise level of 45 Ldn can be maintained

Policy 5.10.6-P3 states that new development should include noise control techniques to reduce noise to acceptable levels, including site layout (setbacks, separation, and shielding), building treatments (mechanical ventilation system, sound-rated windows, solid core doors and baffling) and structural measures (earthen berms and sound walls).

Policy 5.10.6-P4 is to encourage the control of the noise at the source through site design, building design, landscaping, hours of operation and other techniques.

Policy 5.10.6-P5 requires noise-generating uses near residential neighborhoods to include solid walls and heavy landscaping along common property lines, and to place compressors and mechanical equipment in sound-proof enclosures.

Policy 5.10.6-P8 encourages safe and compatible land uses within the Norman Y. Mineta International Airport Noise Restriction Area.

2.3.4 City of Santa Clara Municipal Code

Chapter 9.10 of the City of Santa Clara Municipal Code includes noise limits that apply for "fixed" noise, sound or vibration sources and do not apply to "mobile" noise, sound or vibration sources.

Section 9.10.040 of the municipal code establishes the baseline maximum noise levels by land use. That section states:

> It shall be unlawful for any person to operate or cause to allow to be operated, any fixed source of disturbing, excessive or offensive sound or noise on property owned, leased, occupied or otherwise controlled by such person, such that the sound or noise originating from that source causes the sound or noise level on any other property to exceed the maximum noise or sound levels which are set forth in Schedule A (*reproduced as Table 2)*.

Table 2 City of Santa Clara Municipal Code – Exterior Noise Limits for Fixed Sources

Receiving Zoning Category	Time Period	Noise Level (dBA)
Category 1		
Single-family and duplex residential (R1, R2)	7:00 AM to 10:00 PM	55
	10:00 PM to 7:00 AM	50
Category 2		
Multiple-family residential, public space	7:00 AM to 10:00 PM	55
	10:00 PM to 7:00 AM	50
Category 3		
Commercial, Office	7:00 AM to 10:00 PM	65
	10:00 PM to 7:00 AM	60
Category 4		
Light Industrial	Anytime	70
Heavy Industrial	Anytime	75

The ordinance defines "Fixed noise, sound, or vibration source" as "a stationary device which creates sound or vibration while operating in a fixed or stationary position, including, but not limited to, residential, agricultural, industrial, and commercial machinery and equipment, pumps, fans, compressors, air conditioners, and refrigeration equipment." This noise study takes roller coasters and other park attractions to be fixed noise sources.

The ordinance defines "Mobile noise, sound, or vibration source" as "any noise, sound, or vibration source, other than a fixed noise, sound or vibration source, including but not limited to vehicles, hand-held power equipment, and portable music amplifiers. Certain mobile noise, sound or vibration sources, such as aircraft are preempted from City regulation."

Considerations for evaluation criteria per 9.10.060(a) include:

1. Volume level of the noise or amplitude of the vibration;
2. Whether the nature of the noise or vibration is usual or unusual;
3. Whether the origin of the noise or vibration is from a natural source of mechanical source;
4. The level of the ambient noise;
5. The proximity of the noise or vibration to sleeping facilities;
6. The nature and zoning of the area from which the noise or vibration emanates and the area where it is received;
7. The time of day or night the noise or vibration occurs;
8. The duration of the noise or vibration; and
9. Whether the noise or vibration is recurrent, intermittent, or constant.

With regard to ambient noise, the ordinance states at Section 9.10. 060(c) that "if the measured ambient noise level at any given location differs from those levels set forth in SCCC 9.10.040, Schedule A, the allowable noise exposure standard shall be adjusted in five dBA increments in each category as appropriate to encompass or reflect said ambient noise level."

With regard to speech content, the ordinance at Section 9.10.060(d) states that "in the event the alleged offensive sound or noise contains music or speech conveying informational content, the limits

for the applicable zoning category set forth in SCCC 9.10.040, Schedule A, shall be reduced by five dBA."

One of the exceptions to noise regulations as established in Section 9.10.070(c) is "outdoor events which are conducted pursuant to a valid permit or license issued by the City relative to the staging of said events."

Section 9.10.070(e) exempts "construction activities which occur during allowed hours, as otherwise specified in the Code." In Section 9.10.230, the allowed hours, including delivery of materials within 300 feet of any residentially zoned property, are limited to the hours of 7:00 A.M. to 6:00 P.M. weekdays that are not holidays; and 9:00 A.M. to 6:00 P.M. on Saturdays that are not holidays.

2.4 Existing Noise in the Vicinity of Great America

A noise survey was performed in the vicinity of Great America to document existing noise conditions at locations representative of noise sensitive receptors. The survey included long-term unattended 24-hour measurements at five locations for a period of eight days starting midday Tuesday, 15 April 2014 and ending midday Wednesday, 23 April 2014. During this time, Great America was operating for 5½ days and closed for 2½ days. No major changes are known to have occurred since that time that would measurably alter the noise environment, so the ambient noise levels today are taken to be the same as in 2014. The five locations for the long-term measurements are shown in Figure 4 and discussed further below.

Short-term attended measurements were also performed at each of the five locations on Wednesday, 23 April, prior to removing the long-term noise monitors. The purpose of the short-term measurements was to observe environmental noise sources at each location and attempt to quantify the relative contribution of any audible Great America ride noise as well as other noise such as airplane flyovers which are a prominent feature of the noise environment in the area.

Instrumentation for the long-term measurements consisted of Type I Larson Davis Model 820 sound level meters. The meters were typically mounted to utility poles approximately 12 feet above the ground, which provides measurements that are representative of what someone would experience standing in their front yard. Instrumentation for the short-term noise measurements consisted of a Brüel & Kjær Model 2230 Type 1 sound level meter with audio output recorded on a Sony PCM-D50 digital data recorder for later analysis. Microphone height for the short-term measurements was either 5 feet and/or 15 feet above the ground depending on the location. All instrumentation was calibrated before and after measurements using a NIST-traceable acoustic calibration signal.

Table 3 presents the day-night noise levels (L_{dn}) measured at each location.

Table 3 Long-Term Noise Measurement Results (L_{dn})

Location ID	Description	Wed 16-Apr	Thu 17-Apr	Fri 18-Apr	Sat 19-Apr	Sun 20-Apr	Mon 21-Apr	Tue 22-Apr	Wed 23-Apr
LT-1	Patrick Henry Drive	65	65	65	63	63	64	65	64
LT-2	S. Boundary Road, behind Grizzly Ride	68	69	68	67	66	65	64	65
LT-3	Lake Santa Clara Drive	64	65	65	63	63	63	64	62
LT-4	Klune Court	67	67	71	66	64	65	65	64
LT-5	Fuller Street Park	65	67	66	64	64	65	65	64

The hourly statistical noise data are shown in Appendix A. Each plot in Appendix A shows a particular acoustical metric for all days of the survey at a particular location. For example, the first plot shows the hourly L_{max} data from midnight to midnight for Location LT-1.

Table 4 presents the results of the short-term noise measurements at each of the five locations and notes about the noise sources observed at the time of the measurement.

Table 4 Short-Term Noise Measurement Results

Location ID	Description	L_{eq} (15-min) dBA	Observed Noise Sources
ST-1	Patrick Henry Drive (5 feet height)	61 dBA	Airplanes, Roller Coaster, Rider Screams, Local Traffic
ST-2	S. Boundary Road, behind Grizzly Ride (5 feet)	67 dBA	Airplanes, Roller Coaster, Rider Screams
ST-3	Lake Santa Clara Drive (15 feet height)	61 dBA	Airplanes, Local Traffic, Great America PA, Rider Screams
ST-4a	Klune Court (5 feet height)	58 dBA	Airplanes, Great America PA, Rider Screams, Train Horn
ST-4b	Klune Court (15 feet height)	63 dBA	Airplanes, Great America PA, Rider Screams, Train horn
ST-5	Fuller Street Park (5 feet height)	66 dBA	Airplanes, Local Traffic, Great America PA

Notes:

1) Measurements performed on 23 April 2014.
2) Nominal sample duration is 15 minutes.

Influence of Great America Operations on Environmental Noise Data

The noise survey spanned days both with and without the Park in operation. The park was closed on Tuesday, 15 April, Monday, 21 April, and Tuesday, 22 April. The park was open on Wednesday, 16 April, Thursday, 17 April, Friday, 18 April, Saturday, 19 April, Sunday, 20 April, and Wednesday, 23 April. The hours of operation on the particular days with the Park open were as follows: 10 AM to 6 PM (Wed, Thu, Fri), 10 AM to 8PM (Sat) and 10 AM to 7PM (Sun). There was some maintenance and construction activity in the park on the days when the park was closed.

Table 5 compares the average L_{dn} for each location both with and without operation of Great America.

Table 5 Comparison of Existing L_{dn} at Measurement Locations with Park Open and Closed

Location ID	Description	Weekday Average Ldn	Weekend Average Ldn	Weekday Average Ldn w/ GA	Weekday Average Ldn w/out GA	Relative Difference (dBA)
LT-1	Patrick Henry Drive	64.6	62.8	64.7	64.6	0.1
LT-2	South Boundary of Great America behind Grizzly Ride	66.3	66.7	67.4	64.2	3.2
LT-3	Lake Santa Clara Drive	63.6	62.9	63.8	63.2	0.6
LT-4	Klune Court	66.5	65.1	67.3	64.9	2.4
LT-5	Fuller Street Park	65.3	64.1	65.4	64.9	0.5

The weekend average L_{dn} was lower than the weekday average by 1 to 2 dB at four out of five locations. This probably reflects fewer flights leaving San Jose Mineta International Airport on the weekends, though this has not been verified. The measured data are very consistent with the 2022 Airport Noise Contours presented in Figure 7.10-5 of the Santa Clara General Plan. Pervasive noise levels of 63 to 67 dBA over the area covered by the noise survey could only be attributable to aircraft, especially since locations LT-3 to LT-5 are in otherwise quiet residential areas.

At Locations LT-1, LT-3, and LT-5, the difference in the L_{dn} level with and without Great America is less than 1 dB, the measurement margin of error. Therefore, it is evident that Great America operations do not currently affect the L_{dn} in these locations.

At location LT-4 the L_{dn} was 2.4 dBA higher with the park open. However, careful study of the hourly L_{eq} noise levels (see Figure A-19) indicates that this difference is partly attributable to high noise levels on Friday, April 18, between 5 and 6 AM when the park was not open. Considering all of the hourly equivalent noise levels shown in Figure A-19, park operational noise is not apparent. In fact, the lowest measured weekday noise level was 64 L_{dn} on Wednesday, April 23, a day when the park

was open. Therefore, we do not believe that Great America operations currently affect the L_{dn} at Location LT-4.

Unlike the other locations, the L_{dn} level at Location LT-2 did increase as a result of park operations. As Table 5 shows, the L_{dn} was 3.2 dBA higher when the park was open compared to when it was closed. The park noise influence is readily evident in the hourly L_{eq} levels shown in Figure A-17 between 10AM and the time the park closed on the individual days.

The measured acoustical data and existing environmental noise exposure at each measurement location are discussed in more detail below.

Location LT-1 / ST-1 – Patrick Henry Drive

Noise measurements were made on Patrick Henry Drive near the western boundary of the Great America Park near the Office/R&D buildings as shown in Figure 4. 24-hour noise levels measured in the range of 63 to 65 L_{dn} as shown in Table 3. The noise environment at this location is influenced by airplane flyovers, roller coaster operation, and local roadway traffic. As shown in Table 4, short-term noise levels measured 61 dBA L_{eq} with maximum noise levels of 74 dBA due to airplanes and 60 to 70 dBA due to roller coaster noise. Rider screams were audible at this location.

Location LT-2 / ST-2 – South Boundary of Great America

Noise measurement location LT-2 was at the southern boundary of the Great America Park and dominated by ride noise from the Grizzly roller coaster as well as airplane flyover noise. As shown in Table 4, short-term noise levels measured 67 dBA L_{eq} with maximum noise levels of 74 dBA due to airplanes and on the order of 78 to 80 dBA due to transient mechanical noise from the Grizzly roller coaster. Rider screams were audible at this location.

Location LT-3 / ST-3 – Lake Santa Clara Drive

Noise measurements were made on Lake Santa Clara Drive in the residential area southeast of Great America as shown in Figure 4. 24-hour noise levels measured in the range of 63 to 64 L_{dn} as shown in Table 3. The noise environment at this location was dominated by airplane flyovers and local roadway traffic. As shown in Table 4, short-term noise levels measured 61 dBA L_{eq} with maximum noise levels of 73 dBA due to airplanes and 80 dBA from local roadway vehicle engine noise. Great America operational noise were audible (50 to 60 dBA for example coaster events). Rider screams were audible as were some PA announcements (55 dBA in one instance). PA announcements typically hawk rides and other park attractions.

Location LT-4 / ST-4 – Klune Court

Noise measurements were also made on Klune Court in the residential area east of Great America shown in Figure 4. 24-hour noise levels measured in the range of 65 to 67 L_{dn} as shown in Table 3. The noise environment at this location was dominated by airplane flyovers and local roadway traffic. As shown in Table 4, short-term noise levels at the 5 feet height measured 58 dBA L_{eq} with maximum noise levels of 71 to 75 dBA due to airplanes. Great America coaster noise samples measured in the 50 to 62 dBA range and rider screams and PA announcements were audible. At the 15 feet height,

environmental noise measured 63 dBA L_{eq}, with train horns 58 to 61 dBA, coaster noise in the 60 to 71 dBA range and airplanes up to 77 dBA.

Location LT-5 / ST-5 – Fuller Street Park

Noise measurements were made at Fuller Street Park in the residential area further east of Klune Court as shown in Figure 4. 24-hour noise levels measured in the range of 64 to 65 L_{dn} as shown in Table 3. The noise environment at this location was dominated by airplane flyovers and local roadway traffic. As shown in Table 4, short-term noise levels measured 66 dBA L_{eq} with maximum noise levels of 77 to 86 dBA due to airplanes. Great America ride noise measured 50 to 60 dBA. PA announcements were audible and on the order of 50 dBA.

3 Noise Assessment

3.1 Existing Rides and Attractions

Table 6 provides a summary of the major existing rides and attractions at Great America. The theme park is currently organized into approximately eight different park areas. There are a total of 49 rides of all Thrill Levels (1 to 5). Of these rides, there are 7 rides that are Thrill Level 5 and 17 rides that are Thrill Level 4. The rest of the rides are Level 3 (7 rides), Level 2 (13 rides), or Level 1 (11 rides).

Table 6 Summary of Existing Rides and Attractions

Amusement	Example	Thrill Level	Current Total
Thrill Rides	Gold Striker, Flight Deck	4 to 5	13
Family Rides	Carousel Columbia, Rip Roaring Rapids	1 to 5	11
Children's Rides (Planet Snoopy)	Snoopy's Space Race, Woodstock Express	1 to 3	15
Water Park (Boomerang Bay)	Boomerang Lagoon, Didgeridoo Falls	1 to 4	10
Live Entertainment	Peanuts Showplace, Redwood Amphitheater	N/A	7

Source: Great America, 2015.

3.2 Roller Coaster Noise Measurements

Noise measurements were made in March 2014 to quantify mechanical and other non-rider noise levels from existing rides. Rides with high thrill levels (e.g., 4 and 5) were the focus of the measurements since new rides are likely to be high thrill rides which tend to produce more noise due to various factors such as size, height, and excitement of riders. Table 7 lists the rides documented and their primary noise characteristics. The defining noise characteristics of the higher thrill rides generally consists of a combination of a) mechanical noise, b) music and/or sound effects, and c) rider screams. The measurements made in March 2014 only measured the mechanical noise, music, and

sound effects as the cars were loaded with dead weight at the time for pre-season testing. The screaming noise component was added to the analysis using published data and in-house roller coaster screaming noise data.

Table 7 Rides Documented at Great America

Ride	Park Area	Thrill Level	Ride Type	Max. Height (ft)	Max. Speed (mph)	Cycles per hour	Primary Noise Characteristics
Vortex	Celebration Plaza	5	Modern roller coaster with steel track structure; Loop, corkscrew, ride standing up	91	45	27	mechanical noise; screams
Gold Striker	Celebration Plaza	4	Modern twister wooden roller coaster	108	54	35	mechanical noise; screams
Flight Deck	Orleans Place	5	Modern inverted roller coaster with steel track; riders suspended, 360 vertical loop, 2 270 turns, full-circle wingover, zero gravity roll	113	50	34	mechanical noise; screams
(Orleans) Orbit	All American Corners	4	Spinning buckets on mechanical arm, goes vertical	80	n/a	14	mechanical noise
Firefall	All American Corners	5	40-rider apparatus on large pendulum machine	60	n/a	12	mechanical noise; music/effects; screams
Centrifuge	Action Zone	3	Carousel/rotating plate on incline with spinning buckets	Flat ride	n/a	12	mechanical noise; screams
Psycho Mouse	Action Zone	4	Smaller roller coaster, steel rails structure; curves up high with 14 twists and turns along 1,257 feet of track	58	30	100	mechanical noise; screams
Drop Tower	Action Zone	4	Freefall 22-story drop in 4 seconds	224	62	25	mechanical noise; screams
The Grizzly	Action Zone	4	Wooden roller coaster with steel wheels	91	55	24	mechanical noise; screams

The noise measurements were conducted throughout the day on Saturday, 22 March 2014 and Sunday, 23 March 2014 between the hours of 10:00 AM and 5:00 PM. At the time of the measurements, the rides were being continuously cycled for testing prior to the park opening for the season. This consisted of repeated cycling of the rides loaded with dead weight, not riders.

The ride noise measurement positions were all nominally 100 feet from the ride and at a microphone height of 15 feet above the ground. Figure 3 shows the typical field instrumentation setup for the noise measurements. The procedure consisted of continuously recording the entire audio sample of numerous ride cycles for each position and observing the dominant ride noise characteristics. The

recorded data were later post-processed to isolate the ride cycle noise only and exclude samples that were contaminated by noise from airplane flyovers or other park noise.

In terms of the noise projections, the ride cycle time includes one full cycle of the ride (not including time for unloading and loading of passengers).

The ride noise measurements are summarized in Table 8. The data presented for each ride are the energy average noise level (L_{eq}) and maximum noise level (L_{max}). For each acoustical metric, the arithmetic average, range, and standard deviation are shown. The statistics were calculated using only data from runs during which there were no other, interfering noise sources.

Table 8 Ride Noise Measurement Results (Average and Range)

Ride	Position Description	Nominal Distance (ft)	L_{eq} (dBA)				L_{max} (dBA)			
			Avg	Low	High	Std Dev	Avg	Low	High	Std Dev
Vortex	Sweet Tooth / 1st Drop & 1st Loop	100	72	72	73	0.3	83	83	84	0.3
	American Café / Corkscrew	100	77	76	78	0.7	86	86	87	0.3
Gold Striker	Between Turns 1 & 4	100	70	68	71	1.0	80	80	81	0.3
	Between Turns 2 & 5	100	71	71	72	0.3	78	77	79	0.5
Flight Deck	By Retention Pond	100	73	73	73	0.2	85	85	86	0.3
	By Pavilion	100	75	75	76	0.2	87	86	87	0.3
	By Showtime Theater	100	78	78	78	0.1	89	89	90	0.3
(Orleans) Orbit	Between Gametime and Flying Eagles	100	73	71	73	0.5	87	84	89	1.2
Firefall	Near Flying Eagles (with Firefall music)	100	77	76	77	0.4	87	86	88	0.9
	Near Flying Eagles (without music)	100	71	71	72	0.6	87	86	88	0.9
Centrifuge	Near Bridge 452	100	68	67	69	0.7	83	81	86	1.6
Psycho Mouse	By Great American Hot Dog	100	64	61	70	2.7	70	63	75	3.6
Drop Tower	Between Coke Shack and Game Gallery "M"	100	64	63	65	0.6	76	74	77	1.2
The Grizzly	By Turn 2	100	71	68	72	1.4	84	73	86	4.1
	Between Turn 1 & 3	100	68	67	68	0.4	76	75	77	0.6

3.3 Operational Noise

For purposes of the Master Planned Development (PD) Zoning, the Great America property has been divided into four zones with varying types of allowed uses in each zone. The zones are identified as Zone 1 to Zone 4 as shown in Table 9 and Figure 2.

Table 9 Proposed Uses by Zone

Proposed Uses by Zone				
Use	**Master Planned Zones**			
	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**
Permitted Use				
Rides and Attractions	●	●	●	
Amphitheaters/Theaters[1]	●	●		
Light/Firework Shows[2]	●	●		
Eating/Drinking Establishments	●	●	●	
Retail/Commercial Stores	●	●	●	
Water Parks, Slides, Other Water Rides	●	●	●	
Carnival Games	●	●	●	
Arcades	●	●	●	
Admin. Office/Maintenance Facilities				●
Surface Parking and Parking Structure	●			●
Paid Event Parking Lot/Structure				●
Accessory Theme Park Buildings	●	●	●	●
Special Attractions/Events[3]	●	●	●	
Lounge/Bar/Tavern/Night Club	●	●	●	

[1]Use allows for amplified sound.
[2]Fireworks and light shows shall not originate from within 100 feet of the eastern property line.
[3]Includes seasonal/holiday events and outdoor movies.

3.3.1 Proposed Ride Attractions

The PD Zoning would allow for the following maximum total of exterior ride and slide attractions such as large coasters, thrill rides, tower rides, family rides, and slide towers at the following heights:

- 16 at heights of 50-100 feet (which is 8 new attractions without replacement of existing)
- 11 at heights of 100-200 feet (which is 8 new attractions without replacement of existing)
- 8 at heights of 200 feet to FAA Limit (which is 6 new attractions without replacement of existing)

For reference, the existing rides and slides in these height ranges are as follows in Table 10:

Table 10 Existing Rides with Height Greater than 45 feet

Height Range	Ride Name	Height (feet)
50 to 100 ft	Waterslide tower and stairs (for 3 slides)	55
	Loggers Run (log ride)	55
	Whitewater Falls	45
	Psycho Mouse coaster	58
	Firefall	60
	Delirium	64
	Columbia Carousel	71
	H.M.B. Endeavor	76
	Orbit	80
	Skyride (gondola tramway)	82
	Grizzly coaster	82
	Vortex coaster	91
	Demon coaster	96
100 to 200 ft range	Gold Striker coaster	110
	Flight Deck coaster	113
	Xtreme Flyer	174
200 ft to FAA max range	Star Tower	206
	Drop Tower	224

3.3.1.1 Day-Night Average Noise Exposure

Noise Level Estimate Methodology Each ride has been assigned a level of mechanical noise based on its thrill level and height using the existing ride source noise data as the reference. We have included a contribution for scream noise in the total noise output based on published roller coaster scream noise data (Menge, 1999) and data collected in 2013 during commissioning of the Gold Striker coaster. The "per ride" reference noise has been combined with the run time (based on the existing ride cycle times) to calculate the total noise emission over the course of an hour. For each ride, the noise has been adjusted for distance to each receptor and then all the ride noise has been energy-summed to evaluate the total noise exposure on an L_{dn} basis.

Noise estimates for future park noise from rides have been made based on three illustrative site plans provided by Cedar Fair. In these example site plans, rides were distributed in the zones where new attractions would be permitted (Development Zone 1 – Entertainment and Theme Park; Development Zone 2 – Theme Park; and Development Zone 3 – Water Park and Kids Zone) observing the proposed height limits. The scenarios are only used as representative samples of the many different scenarios and combinations that could be possible in the future. The highest noise level of the three scenarios is used in this assessment, but all are fairly similar.

The proposed planned development zoning would potentially increase the noise exposure of nearby receptors in three ways: by adding more rides, by extending the operating season to be year-round,

and by lengthening the park operating day from 12 hours (10 AM to 10 PM) to 15 hours (10 AM to 1 AM) and the amphitheater hours from 12 hours (10 AM to 10 PM) to 13 hours (10 AM to 11 PM). For noise assessment purposes, these three factors are considered in the following groupings:

1. By adding more rides (assuming the same operating hours and schedule as now)

2. By adding more rides and extending the operating schedule to be year-round (same hours)

3. By adding more rides, extending the schedule, and extending the operating hours.

Significance criteria and assessment As discussed above, if the area noise level including the project noise remains "Compatible" with the land use according to the General Plan, an increase of 5 dBA Ldn or greater would be considered significant. If the area noise level after implementation of the project would be in the range that "Requires design and insulation to reduce noise levels" according to the General Plan, an increase of 3 dBA Ldn or greater would be considered significant. If the area noise level including the project noise would be "Incompatible" with the land use according to the General Plan, an increase of 1 dBA Ldn or greater would be considered significant.

Noise Level Estimates and Assessment

Adding more rides (assuming the same operating hours and schedule as now)

Table 11 summarizes the analysis for the first situation, adding more rides to the park while maintaining the same season duration and operating hours. In this case, the future additional noise is the additional noise from new rides. The future additional noise is added to the existing noise level (the average level over all days measured when the park was open) to get the future total noise level. The increase is then compared to the significance threshold to assess whether or not there is a noise impact. For this more-rides-only situation, the largest increase at the nearest receptor is 1.3 dB and the largest increase at the nearest residential receptor is 1.2 dB. None of the increases exceed their respective significance threshold, so this situation would not result in any significant noise impacts based on the day-night average noise level criterion.

Table 11 Day-Night Average Noise Level Assessment: More Rides Only

ID	Analysis Receptor Location	Zone	Existing w/ Park	Future Add'l	Future Total	Incr	Sig Thresh	Sig Impact
A	4778 Gillmor St	Res	67.3	59.2	67.9	0.6	3 dB	No
B	2393 Klune St	Res	67.3	60.5	68.1	0.8	3 dB	No
C	4486 Lakeshore Dr	Res	67.3	59.9	68.0	0.7	3 dB	No
D	4298 Dry Bed Ct	Res	63.8	58.9	65.0	1.2	3 dB	No
E	4949 GA Pkwy (Hilton)	Ind	64.7	54.2	65.1	0.4	5 dB	No
F	Prudential Building	Ind	64.7	60	66.0	1.3	5 dB	No
G	4604 Fuller St	Res	65.4	56.7	65.9	0.5	3 dB	No
H	Broadcom Corp	Ind	67.4	62.4	68.6	1.2	5 dB	No

Adding more rides and extending the operating schedule to be year-round (same hours)

Table 12 summarizes the analysis for the second situation, adding more rides to the park and extending the season to be year-round while maintaining the same operating hours. In this case, the existing noise excludes the existing park noise (by using data that was collected when the park was not operating) and the future noise includes the noise from both existing and new rides. The future park noise is added to the existing noise level to get the future total noise level. The increase is then compared to the significance threshold to assess whether or not there is a noise impact. For this situation, the largest increase at any representative receptor is 2.9 dB and the largest increase at any residential receptor is 1.8 dB. None of the increases exceed their respective significance threshold, so this situation would not result in any significant noise impacts based on the day-night average noise level criterion.

Table 12 Day-Night Average Noise Level Assessment: More Rides, Extended Season (Same Hours)

ID	Analysis Receptor Location	Zone	Existing w/o Park	Future Add'l	Future Total	Incr	Sig Thresh	Sig Impact
A	4778 Gillmor St	Res	64.9	60.8	66.3	1.4	3 dB	No
B	2393 Klune St	Res	64.9	61.7	66.6	1.7	3 dB	No
C	4486 Lakeshore Dr	Res	64.9	60.8	66.3	1.4	3 dB	No
D	4298 Dry Bed Ct	Res	63.2	60.2	65.0	1.8	3 dB	No
E	4949 GA Pkwy (Hilton)	Ind	64.0	56.0	64.6	0.6	3 dB	No
F	Prudential Building	Ind	64.0	61.9	66.1	2.1	5 dB	No
G	4604 Fuller St	Res	64.9	58.2	65.7	0.8	3 dB	No
H	Broadcom Corp	Ind	64.2	63.9	67.1	2.9	5 dB	No

Adding more rides, extending the schedule, and extending the operating hours

Table 13 summarizes the analysis for the third situation which represents full build-out under the proposed plan. In this situation, more rides are added to the park, the season is extended to be year-round, and the operating hours are lengthened to 1 AM (still starting at 10 AM). In this case, the existing noise excludes the existing park noise (by using data that was collected when the park was not operating) and the future noise includes the noise from both existing and new rides. The noise levels during the additional three hours (10 PM until 1 AM) are all increased by 10 dB for L_{dn} calculations purposes because they occur during the most sensitive "nighttime" time period. The future park noise is added to the existing noise level to get the future total noise level. The increase is then compared to the significance threshold to assess whether or not there is a noise impact.

For this situation, the noise level increase at a number of the representative receptors would result in a significant noise impact. The increases at the residences on Gillmor, Klune, Lakeshore, and Dry Bed range from 3.7 to 4.4 dB which exceed the 3.0 dB significance threshold. The increase at the

residence on Fuller Drive is 2.4 dB which is under the threshold. The increase at the Broadcom Corp building is the highest estimate at 6.3 dB which is over the building's significance threshold of 5.0 dB, therefore, the noise exposure at this Planned Industrial zoned site would be significant. The noise level increases at the Hilton Hotel (commercial zoning) and the Prudential Building (planned development / light industrial zoning) are below their respective significance thresholds.

Table 13 Day-Night Average Noise Level Assessment: More Rides, Extended Season, Extended Hours

ID	Analysis Receptor Location	Zone	Existing w/o Park	Future Add'l	Future Total	Incr	Sig Thresh	Sig Impact
A	4778 Gillmor St	Res	64.9	66.2	68.6	3.7	3 dB	Yes
B	2393 Klune St	Res	64.9	67.1	69.1	4.2	3 dB	Yes
C	4486 Lakeshore Dr	Res	64.9	66.2	68.6	3.7	3 dB	Yes
D	4298 Dry Bed Ct	Res	63.2	65.6	67.6	4.4	3 dB	Yes
E	4949 GA Pkwy (Hilton)	Ind	64.6	61.4	66.3	1.7	3 dB	No
F	Prudential Building	Ind	64.6	67.3	69.2	4.6	5 dB	No
G	4604 Fuller St	Res	64.9	63.6	67.3	2.4	3 dB	No
H	Broadcom Corp	Ind	64.2	69.3	70.5	6.3	5 dB	Yes

3.3.1.2 Maximum Noise Levels

Noise Level Estimate Methodology The maximum mechanical noise level from each ride was calculated using the reference noise level data collected in the park and accounting for attenuation with distance to the receiver. The attenuation with distance was calculated using either 4.5 or 6.0 dB per doubling of distance depending on the physical extent of the ride itself. For example, long roller coasters such as Flight Deck were attenuated at 4.5 dB per doubling of distance because they are pseudo-line sources whereas "short" rides such as Drop Tower were attenuated at 6.0 dB per doubling of distance because they are point sources.

The maximum screaming noise level from each ride was based on published roller coaster scream noise level data (Menge, 1999) and data collected in 2013 during commissioning of the Gold Striker coaster. The basic scream reference levels used were 88 dBA for Thrill Level 5 rides, 87 dBA for Thrill Level 4 rides, 86 dBA for Thrill Level 3 rides, etc. These levels assume that the riders are out in the open and positioned so that they are not directly facing the nearest noise sensitive receptor. In other words, so that the major drops are oriented so that the riders are looking away from the boundary of the park. This has been Great America's practice on recent roller coaster design.

The maximum estimated mechanical noise level and the maximum estimated screaming noise level at each receptor were combined. In general, the mechanical noise was louder than the screaming noise, and the addition of the latter caused the combined level to be 0.3 to 2.1 dB louder than the mechanical noise alone. This is consistent with measurements made during the commissioning of the Gold Striker coaster.

Significance criteria and assessment The baseline exterior noise limits for various land uses in Santa Clara are presented in Schedule A of Section 9.10.040 of the municipal code (reproduced herein as Table 2). In areas that already experience noise levels in excess of these limits, Section 9.10.060(c) provides that "the allowable noise exposure standard shall be adjusted in five dBA increments in each category as appropriate to encompass or reflect said ambient noise level." One key characteristic of the project site and the surrounding area is that they are directly in line with the normal departing flight path of jet aircraft from San Jose Mineta International Airport (SJMIA). As such, the area already routinely experiences high noise levels. Strictly speaking, the limits in Schedule A apply to the maximum noise level, and these levels on an hourly basis at the field measurement locations may be seen in Figures A-1 to A-5. As can be seen, this metric is highly volatile because it is simply the loudest 1 second of each hour. A more stable metric to consider the existing ambient maximum noise levels is the statistical L_1 level, the sound level exceeded 1% of the time or, in the case of hourly data, the level exceeded 36 seconds out of each hour. These levels are shown in Figures A-6 to A-10. In most of the area surrounding the park, this level is currently determined by aircraft noise even when Great America is operating. The one exception is at the south boundary where a somewhat noisy ride is very close to the boundary.

Table 14 summarizes the existing L_1 noise levels at each measurement location during three time periods during the day:

10 AM to 10 PM	the current Great America operating hours
10 PM to Midnight	part of the proposed new hours; within normal SJMIA hours
Midnight to 1 AM	part of the proposed new hours; outside normal SJMIA hours

In addition to adjusting the allowable limit for the existing ambient, the noise ordinance also provides for an adjustment if the "noise contains music or speech conveying informational content". Most coaster noise is low frequency and broadband in nature, which makes it similar to aircraft noise, so this adjustment would not apply to that. Whether or not screaming qualifies as speech is debatable. The fundamental reason that noise limits for music or speech is lower than for other sounds is that people tend to begin to listen more intently to music or speech to try to understand the lyrics or what is being said. This is essentially a natural reflex that people do unconsciously. In the case of roller coaster riders screaming, there is not much informational content for listeners to try to understand. On the other hand, one could argue that screaming is an unusual noise, so the speech penalty should apply, though this noise has now been audible in the area around Great America for four decades. Nonetheless, in the interest of being conservative, the five decibel downward adjustment is being made to establish the final significance thresholds for the determining if the park maximum noise levels create a significant noise impact. The significance thresholds are summarized in Table 14.

Table 14 Establishment of Significance Thresholds for Maximum Noise Levels

Loc. ID	Description	10 AM – 10 PM			10 PM – Midnight			Midnight – 1 AM		
		Existing	Ambient-Adjusted Limit	**Sig. Threshold**	Existing	Ambient-Adjusted Limit	**Sig. Threshold**	Existing	Ambient-Adjusted Limit	**Sig. Threshold**
LT-1	Patrick Henry Dr	70 to 80	75	**70**	62 to 72	70	**65**	54 to 61	70	**65**
N/A	Hilton Hotel	70 to 80	75	**65**	62 to 72	65	**60**	54 to 61	60	**55**
LT-2	S Boundary of Great America	70 to 80	70	**65**	61 to 72	70	**65**	54 to 60	70	**65**
			75	**70**						
LT-3	Lake Santa Clara Dr	70 to 80	70	**65**	70 to 75	70	**65**	45 to 60	50	**45**
LT-4	Klune Ct	70 to 80	75	**70**	70 to 75	70	**65**	50 to 60	50	**45**
LT-5	Fuller Street	70 to 80	75	**70**	70 to 75	70	**65**	50 to 60	55	**50**

Notes:

1. For all but LT-2, the existing ambient is determined by aircraft, so no distinction is made regarding whether or not the park was opened or closed. For LT-2, the lower significance threshold, 65 dBA, applies to times when the park is now closed (but will be open in the future) and the higher threshold, 70 dBA, applies to times when the park is already operating.

2. The Schedule A noise limit for the Planned Industrial measurement locations (LT-1 and LT-2) are already higher than the existing ambient. Therefore, ambient-based adjustment was made to those limits. The limit at LT-1 and LT-2 during the 10 AM to 10 PM timeframe and at all other locations in all timeframes were adjusted upward to reflect the existing ambient noise levels.

3. All limits have been adjusted downward by 5 dB to reflect that scream noise is somewhat akin to speech.

4. The significance thresholds based on LT-1 apply to the Prudential Building (ID F). The significance threshold for the Hilton Hotel are based on the measurements at LT-1 (ID E).

5. The significance thresholds based on LT-2 apply to the Broadcom Corp Building (ID H).

6. The significance threshold based on LT-3 apply to 4298 Dry Bed Court (ID D).

7. The significance thresholds based on LT-4 apply to 4778 Gillmor St (ID A), 2393 Klune St (ID B), and 4486 Lakeshore Dr (ID C).

8. The significance thresholds based on LT-5 apply to 4604 Fuller St (ID G).

Noise Level Estimates and Assessment

Table 15 summarizes the maximum noise level assessment. For all of the modeled future site plans, the future maximum noise level exceeds the existing maximum noise level. In the future, the maximum noise levels are expected to exceed the significance thresholds at almost all locations in almost every time period.

Table 15 Maximum Noise Level Assessment

			10 AM – 10 PM		10 PM – Midnight		Midnight – 1 AM	
ID	Analysis Receptor Location	Future Lmax (dBA)	Sig. Thresh.	Impact?	Sig. Thresh.	Impact?	Sig. Thresh.	Impact?
A	4778 Gillmor St	75.0	70	Yes	65	Yes	45	Yes
B	2393 Klune St	74.8	70	Yes	65	Yes	45	Yes
C	4486 Lakeshore Dr	73.9	70	Yes	65	Yes	45	Yes
D	4298 Dry Bed Ct	72.7	65	Yes	65	Yes	45	Yes
E	Hilton Hotel	67.6	65	Yes	60	Yes	55	Yes
F	Prudential Building	75.7	70	Yes	65	Yes	65	Yes
G	4604 Fuller St	69.6	70	No	65	Yes	50	Yes
H	Broadcom Corp [1]	77.6	65	Yes	65	Yes	65	Yes
	Broadcom Corp [2]	77.6	70	Yes	65	Yes	65	Yes

Notes:
1. This line applies to periods when the park is not currently open (longer season, 10PM-1AM).
2. This line applies to periods when the park is currently open (current season, 10AM-10PM).

3.3.2 Proposed New Live Entertainment

Zone 1 is allowed up to 10,000 seats for an amphitheater and an outdoor stage facility. The 10,000 seats are for the existing Redwood Amphitheater only and do not require an expansion of the existing concert venue. The proposed plan does include the concept of a new, smaller stage area next to the amphitheater to serve the Pavilion events area. This would be a small area where the audience is seated on grass or standing.

The nearest residential receptors to the east of the proposed new stage are approximately 1,200 feet away. At this distance, the hourly average (L_{eq}) noise level at the venue would need to be 92 dBA in the audience area (about 64 dBA at the residences) *all day long* (from 10 AM to 11 PM) to cause the L_{dn} to increase more than the 3 dB significance threshold. The expected sound levels during performances are well below this, therefore, the increase in the L_{dn} will be less than 3 dB at the nearest residential receptors and not significant.

The light industrial-zoned Office/R&D receptors to the west are approximately 775 feet or more from the proposed new stage. At this distance, the hourly average noise levels at the venue would need to be greater than 92 dBA all day long (10 AM to 11 PM) to cause the L_{dn} to increase by more than the significance threshold of 5 dB. Again, these levels are well above the sound levels at which

entertainers will perform at the new stage. Therefore, the increase in the L_{dn} will be less than 5 dB at these receptors and not significant.

Depending on the type of entertainment, the maximum noise level would typically range from 85 to 100 dBA in the audience area, and at the nearest residences, this would result in maximum noise levels on the order of 57 to 72 dBA; at the offices to the west, the maximum noise level would correspondingly be 63 to 78 dBA. Thus, these events would potentially exceed the noise limits outlined in Table 14 and 15.

3.3.3 Park Attendance

The intent of the proposed project is a greater level of attendance throughout the year. However, peak attendance is not forecast to increase. Thus, the peak noise levels associated with the number of people in the park at a given time is not expected to increase. The effect on noise exposure due to the proposed extended hours of operation are discussed elsewhere.

3.3.4 Proposed Marketplace Area

The proposed master plan for the Great America property includes a commercial district in Zone 1 which is currently being called the "Marketplace". The Marketplace will include restaurants, retail shops, bars with live entertainment, and an indoor theater and event facility. The planned hours for the Marketplace are 6:00 AM to 1:00 AM.

With the possible exception of outdoor seating at some of the restaurants, the activity at all of these facilities will occur indoors. Therefore, through proper design and construction, activity noise levels will be minimal. The noise from any external HVAC or other mechanical equipment may likewise be controlled to meet the noise ordinance limits through the use of strategic siting, equipment selection, and, if necessary, noise control equipment and barriers.

3.3.5 Swim-Up Bar in Boomerang Bay

One outdoor amenity that is being considered is a swim-up bar in Boomerang Bay. While this concept is somewhat novel, the noises associated with this amenity will be primarily swimming noise and music, neither of which are expected to be unusually loud. Background music broadcast from the speakers would typically range from 50 to 70 dBA at the deck area. The specific sound levels the nearby residential area would depend on speaker placement, distribution and sound level (quiet background or active background). An omnidirectional speaker, placed at the far eastern edge of the park, could be expected to generate sound levels between 50 to 70 dBA at 15 ft. distance.

At a distance of 50 ft, the music would thus range from 40 to 60 dBA, and at a distance of 100 ft, the music would range from 34 to 54 dBA. Thus, beyond a buffer distance of 100 ft, the music from each speaker would comply with the daytime noise ordinance limit of 65 dBA listed in Table 14. As the nearest residences would be greater than 200 ft. away, the music from the swim-up bar is not expected to exceed the ordinance thresholds. The buffer distance to reach 65 dBA is 28 ft. and the buffer distance to achieve 45 dBA is 260 ft.

Thus, over a 24-hour period, music at these levels constantly broadcast through the speakers during existing operating hours (10 AM to 10 PM) at these levels would generate a long-term noise level of 45 Ldn at a distance of 200 ft. This would be well below the existing and future park long-term noise

levels as listed above in Table13, and would thus have no effect on changing the project long-term noise.

3.3.6 Other Amplified Entertainment

Per the Master Plan, within Zone 1 and 2 amplified entertainment would be allowed beyond 100 feet of the project property line to the east (residences to the east) and beyond 50 feet of the southern or western property lines (nearby commercial office building areas to the south and west). Such broadcasts are expected to be episodic in nature, occurring for no more than a few hours in any day. All amplified entertainment would be directed away from the nearest property line. A directional speaker[1] could be expected to generate sound levels between 52 to 67 dBA at 50 ft. distance to the rear of the speaker, and 46 to 61 dBA at a distance of 100 ft distance to the rear of the speaker.

The closest residential properties are an additional 210 ft from the project property line, and at a total distance of 310 ft, the sound from the amplified entertainment would thus range from 36 to 51 dBA. Thus, at the residential neighbors, each speaker would comply with the noise ordinance limit of 65 dBA for residences listed in Table 14. The noise at commercial office buildings would exceed the 65 dBA noise limit at the property line. With the proposed extended hours, after 12 AM the amplified entertainment would exceed the noise ordinance limit of 45 dBA at the residential area; the noise limit is unchanged at office and commercial areas. Evaluated against the ambient-adjusted noise limits summarized in Table 15, the buffer distance to reach 65 dBA is 60 ft. and the buffer distance to achieve 45 dBA is 565 ft.

If the amplified music were played at these typical sound levels for an aggregate duration up to 6 hours during existing operating hours (10 AM to 10 PM) at a 61 dBA at 100 ft distance it would generate a long-term noise level of 55 Ldn. At the nearest residences, the corresponding long-term noise level would be 45 Ldn.

If the amplified entertainment were to operate during extended hours from 10 PM to 1 AM, the sound would have to be reduced by 6 dBA between 12 AM to 1 AM to comply with the Table 14 noise limit. With extended hours and the sound controlled to the 45 dBA limit between 12 and 1AM, the long-term noise level would be 52 Ldn. These are well within acceptable standards for residential land use compatibility and less than or comparable to the existing noise levels. These levels would have no effect on changing the project long-term noise.

Likewise, for the commercial office properties, amplified entertainment broadcast for up to 6 hours through the speakers during existing operating hours (10 AM to 10 PM) at a 67 dBA level during the daytime would generate a long-term noise level of 61 Ldn at a distance of 50 ft. This is well within acceptable standards for commercial land use compatibility and comparable to the existing noise levels; there would be no effect on the existing noise levels. Extending the hours from 10 PM to 1 AM during the existing season and limiting noise after midnight as listed in Table 15, would increase the long-term noise level to 68 Ldn. This would be well within acceptable standards for commercial land

[1] The typical directional speaker provides 8 dBA less sound at the rear of the speaker compared to the front. This effect is frequency dependent, and while subwoofers are generally omnidirectional, directional subwoofers can also be obtained.

use compatibility, and it would be comparable to the existing in-season noise level and it would increase the noise environment by 3 dBA.

Reducing the noise level to comply with the extended season and extended hours limit in Table 15 for commercial neighbors, the long-term noise level would be 66 Ldn. This would be well within acceptable standards for commercial land use compatibility, but it would be higher than the existing non-season noise level and it would increase the noise environment by 3 dBA.

3.3.7 Fireworks

Based on recent measurements, fireworks could potentially generate a maximum sound level of 79 to 94 dBA Lmax at 1,700 ft (Wilson Ihrig, 2016)[2].

Fireworks are typically staged from one of two locations in Zone 1, at an approximate distance of 420 ft from residences to the east along Gillmor Street. The proposed Master Plan would allow for fireworks to originate from greater than 100 feet from the eastern property line for a total distance of 310 ft. Adjusting for distance, at 420 ft distance the fireworks could generate a sound level of 91 to 106 dBA Lmax and assuming a minimum 100-foot setback from the eastern property line, noise levels at 310 feet would be 94 to 109 dBA Lmax.

Evaluated against the ambient-adjusted noise limits summarized in Table 14, the buffer distance to reach 65 dBA is about 8,100 ft. and the buffer distance to achieve 45 dBA is well beyond several miles from the project.

A fireworks show could potentially generate an energy average noise level of 88 dBA Leq at 420 ft. Most commercial firework shows have a 15 to 20-minute duration, so the effect over an hour would be 83 dBA at 420 ft. The effect on the 24-hour Ldn would depend on the scheduling of the fireworks show, as a 20-minute show from 9:30 to 9:40 PM ("daytime") alone would generate an Ldn of 69 at 420 ft distance, which would result in a total environment of 70 to 71 Ldn at homes closest to the fireworks launch areas. A show that occurred after 10 PM ("nighttime") would generate an Ldn 79 at 420 ft distance, and the total long-term noise would also be 79 Ldn at the closest homes.

Such firework shows would not be compatible with the Santa Clara land use guidelines, exceeding the 70 Ldn threshold for conditionally acceptable conditions for residential land use, and neither would it be in compliance with the Santa Clara noise ordinance for stationary (launch site) noise sources, exceeding the thresholds for daytime (55 dBA) or nighttime (50 dBA) events.

3.4 Construction Noise and Vibration

The proposed project would allow for development and operation of the uses proposed for each zone over a period of 20 years (through 2036). Construction of each large amusement ride (rollercoasters, etc.) is anticipated to take approximately 12 to 18 months to complete. No specific schedule for ride development has been determined at this time.

When rides are built, they will be constructed with standard construction equipment. In keeping with the standard methodology established by the Federal Transit Administration's *Transit Noise and Vibration Impact Assessment* (May 2006) chapter on construction noise, noise level estimates have

[2] See the Appendix for more information

been made by considering the three loudest pieces of equipment that are anticipated to be operating. The maximum noise level is quantified by taking the highest maximum level of any one piece of equipment, and the hourly average (L_{eq}) level is quantified by summing the levels of all three pieces of equipment considering their typical hourly duty cycle. The calculations are for the single closest ride to the receptor in any of the three illustrative site plans provided by Great America *and assume no shielding*. The calculations are summarized in Table 16.

Table 16 Construction Noise Estimates

Receptor	No.	Duty	Reference Distance	Lmax @ Ref	Receptor Distance	Lmax @ Rec	Leq @ Rec
4778 Gilmor St							
Concrete saw or Hoe ram	1	20%	50 ft	90 dBA	696 ft	67 dBA	60 dBA
Backhoe	1	40%	50 ft	80 dBA	696 ft	57 dBA	53 dBA
Tower crane	1	25%	50 ft	81 dBA	696 ft	58 dBA	52 dBA
						67 dBA	**61 dBA**
2393 Klune St							
Concrete saw or Hoe ram	1	20%	50 ft	90 dBA	388 ft	72 dBA	65 dBA
Backhoe	1	40%	50 ft	80 dBA	388 ft	62 dBA	58 dBA
Tower crane	1	25%	50 ft	81 dBA	388 ft	63 dBA	57 dBA
						72 dBA	**67 dBA**
4486 Lakeshore Dr							
Concrete saw or Hoe ram	1	20%	50 ft	90 dBA	640 ft	68 dBA	61 dBA
Backhoe	1	40%	50 ft	80 dBA	640 ft	58 dBA	54 dBA
Tower crane	1	25%	50 ft	81 dBA	640 ft	59 dBA	53 dBA
						68 dBA	**62 dBA**
4298 Dry Bed Ct							
Concrete saw or Hoe ram	1	20%	50 ft	90 dBA	958 ft	64 dBA	57 dBA
Backhoe	1	40%	50 ft	80 dBA	958 ft	54 dBA	50 dBA
Tower crane	1	25%	50 ft	81 dBA	958 ft	55 dBA	49 dBA
						64 dBA	**59 dBA**
4949 Great America Pkwy (Hilton)							
Concrete saw or Hoe ram	1	20%	50 ft	90 dBA	2000 ft	58 dBA	51 dBA
Backhoe	1	40%	50 ft	80 dBA	2000 ft	48 dBA	44 dBA
Tower crane	1	25%	50 ft	81 dBA	2000 ft	49 dBA	43 dBA
						58 dBA	**52 dBA**
Prudential Building							
Concrete saw or Hoe ram	1	20%	50 ft	90 dBA	651 ft	68 dBA	61 dBA
Backhoe	1	40%	50 ft	80 dBA	651 ft	58 dBA	54 dBA
Tower crane	1	25%	50 ft	81 dBA	651 ft	59 dBA	53 dBA
						68 dBA	**62 dBA**
4604 Fuller St							
Concrete saw or Hoe ram	1	20%	50 ft	90 dBA	1135 ft	63 dBA	56 dBA
Backhoe	1	40%	50 ft	80 dBA	1135 ft	53 dBA	49 dBA
Tower crane	1	25%	50 ft	81 dBA	1135 ft	54 dBA	48 dBA
						63 dBA	**57 dBA**
Broadcom Corporation							
Concrete saw or Hoe ram	1	20%	50 ft	90 dBA	358 ft	73 dBA	66 dBA
Backhoe	1	40%	50 ft	80 dBA	358 ft	63 dBA	59 dBA
Tower crane	1	25%	50 ft	81 dBA	358 ft	64 dBA	58 dBA
						73 dBA	**67 dBA**

Section 9.10.070(e) exempts construction activities which occur during allowed hours from noise regulation. However, for full disclosure, the calculated construction noise levels are compared to the operational significance thresholds established for this study.

As may be seen in Table 17, the average noise level during construction of the closest envisioned ride would exceed the operational threshold at Klune Court if no shielding were provided. If modest shielding (1 dB) were provided by either existing structures or a purpose-built sound barrier wall, the operational threshold at Klune Court would not be exceeded. The hourly average noise level during construction of the second closest ride to Klune Court would not exceed the operational threshold even without shielding.

Table 17 Construction Noise: Hourly Average Level Comparison

ID	Analysis Receptor Location	Existing w/o Park	Constr. Noise	Total w/ Constr.	Incr.	Oper'nal Thresh	Exceed Thresh?
A	4778 Gillmor St	64.9	61.5	66.5	1.6	3 dB	No
B	2393 Klune Ct	64.9	66.5	68.8	3.9	3 dB	Yes
C	4486 Lakeshore Dr	64.9	62.2	66.8	1.9	3 dB	No
D	4298 Dry Bed Ct	63.2	58.7	64.5	1.3	3 dB	No
E	4949 G.A. Pkwy (Hilton)	64.6	52.3	64.8	0.2	3 dB	No
F	Prudential Building	64.6	62.0	66.5	1.9	5 dB	No
G	4604 Fuller St	64.9	57.2	65.6	0.7	3 dB	No
H	Broadcom Corp	64.2	67.2	69.0	4.8	5 dB	No

As may be seen in Table 18, the maximum noise level during construction of the closest ride would exceed the operational threshold at both Klune Court and at the Broadcom building if no shielding were provided. If modest shielding (2 dB) were provided for Klune Court by either existing structures or a purpose-built sound barrier wall, the operational threshold at Klune Court would not be exceeded. The maximum noise level during construction of the second closest ride to Klune Court would not exceed the operational threshold even without shielding. The maximum noise levels during construction of the five closest rides to the Broadcom building would exceed the operational threshold without shielding. The maximum noise level during construction of the sixth closest ride to the Broadcom building would not exceed the operational threshold without shielding. For the closest rides, it is unlikely that sufficient shielding could be provided to reduce the maximum noise to the operational threshold, so efforts should be made to communicate and coordinate the noisiest activities with Broadcom.

Table 18 Construction Noise: Maximum Level Comparison

			Daytime	
ID	Analysis Receptor Location	Constr. Lmax (dBA)	Oper'nal Thresh	Exceed Thresh?
A	4778 Gillmor St	67	70	No
B	2393 Klune St	72	70	Yes
C	4486 Lakeshore Dr	68	70	No
D	4298 Dry Bed Ct	64	65	No
E	Hilton Hotel	58	65	No
F	Prudential Building	68	70	No
G	4604 Fuller St	63	70	No
H	Broadcom Corp	73	65	Yes

4 Potential Noise Control Measures

4.1 Mechanical Noise from New Rides

Mechanical noise from rides may sometimes be controlled through design, though there are many other facets of ride design that must also be considered if they are to function as intended.

Most mechanical noise comes from rides that utilized rolling vehicles, e.g., roller coasters. For these rides, the following should be considered:

- Designing the ride such that the biggest drops are facing away from the nearest noise-sensitive receptor. This would be especially effective if the ride is associated with a tall structure than would provide shielding.
- Packing the steel framing with sand or other material that has a vibration damping effect, if structurally viable.
- Isolating the rails from the structure with resilient mounts.

4.2 Screaming & Mechanical Noise from New Rides

Screaming noise can only be controlled effectively by barriers. Barriers can also be used to reduce mechanical noise, often at the same time since high levels of mechanical noise and screaming often occur together. In some situations, it may be beneficial to add sound absorbing material to the face of the sound barrier. A major constraint to installing sound barriers is that they block the view of the riders, often an integral part of the ride experience. However, artfully designed sound barriers were included in the design of the Gold Striker roller coaster. The additional weight and the forces from wind loading must also be considered.

4.3 Amplified Entertainment

Noise from amplified entertainment could be controlled by any one or combination of the following:

- Use loudspeakers with a greater difference in the off-axis (rear) position. This analysis assumes that sound on the rear side of the loudspeaker is 8 dBA lower than the sound emitting from the front of the speaker. Select loudspeakers with radiation patterns that attenuate the sound more than 8 dBA at the rear of the loudspeaker.
- Increase the separation distance of the loudspeakers from the property line as necessary to comply with the noise ordinance
- Lower the sound level that is broadcast out of loudspeakers near the property line.
- Cease park shows by 10 PM; do not extend hours for amplified entertainment.

4.4 Fireworks

Noise from fireworks could be controlled by any one or combination of the following:

- Use compressed air launchers or other technologies that are demonstrated to be quieter than traditional gun powder
- Construct a retained berm 3 to 4 ft higher than the top of the launch rack and nominally 15 ft to 25 ft from the racks to provide about 9 dBA noise reduction of launch noise to the community
- Do not launch fireworks after 10 PM.

5 Cumulative Noise Analyses

5.1 Traffic Noise

The cumulative noise effects from the proposed project and others in the area will most likely come from increases in traffic noise. The traffic analysts for the Great America project, Hexagon Transportation Consultants, have estimated traffic volumes for key intersections around the park for various scenarios:

Existing, Approved Projects, Pending Projects, and Great America Project

A list of the approved and pending projects included in the traffic analysis may be found in Appendix B.

The traffic volumes for the Great America project only includes additional traffic that will be generated by the new businesses associated with the development that are not part of the theme park proper. These are collectively known as the Marketplace. The traffic analysis estimates how many peak hour AM and PM trips the new businesses would generate by themselves, and then adjusts for trips that are already associated with the park (internal trip capture) or general traffic (pass-by trip capture). The result is the net number of new trips that will be generated by the Marketplace. Please see the project traffic study for additional details.

The traffic study focuses on the movements at intersections. The traffic engineers estimate how many vehicles will be approaching from a given direction, and then the estimate how many of those vehicles will turn right, turn left, and proceed through the intersection. For the noise study, the pertinent numbers are the numbers of vehicles traveling along each road segment between intersections. These values have been calculated using the turning movement information (which includes people going straight). The number of cars going in both directions have been combined to arrive at the total number of vehicles on the road segment. This information is presented in Table 19 (AM peak) and Table 20 (PM peak).

Table 19 Categorical Traffic Volumes – Peak AM Hour

Roadway	From	To	Traffic Volumes			
			Exisiting	Approved	Pending	Project
Great America Pkwy	SR-237 SB Ramp	SR-237 NB Ramp	1,771	1,992	1,931	13
Great America Pkwy	SR-237 NB Ramp	Alviso Rd	1,392	1,253	778	18
Great America Pkwy	Alviso Rd	Bunker Hill Ln	1,284	1,210	1,622	24
Great America Pkwy	Bunker Hill Ln	Tasman Drive	1,517	1,364	607	23
Great America Pkwy	Tasman Drive	Old Glory Lane	1,816	1,483	703	11
Great America Pkwy	Old Glory Lane	Patrick Henry Dr	1,948	1,955	818	49
Great America Pkwy	Patrick Henry Dr	Mission College Blvd	2,685	2,902	758	50
Great America Pkwy	Mission College Blvd	US-101 NB Ramp	3,951	3,011	701	32
Great America Pkwy	US-101 NB Ramp	US-101 SB Ramp	3,385	2,623	809	21
Mission College Blvd	Montague Exprwy	Agnew Road	2,806	934	478	2
Mission College Blvd	Agnew Road	Great America Pkwy	707	106	379	5

Table 20 Categorical Traffic Volumes – Peak PM Hour

Roadway	From	To	Traffic Volumes			
			Exisiting	Approved	Pending	Project
Great America Pkwy	SR-237 SB Ramp	SR-237 NB Ramp	1,349	974	657	43
Great America Pkwy	SR-237 NB Ramp	Alviso Rd	2,063	1,899	834	46
Great America Pkwy	Alviso Rd	Bunker Hill Ln	1,746	1,285	985	66
Great America Pkwy	Bunker Hill Ln	Tasman Drive	1,983	1,398	1,060	66
Great America Pkwy	Tasman Drive	Old Glory Lane	2,571	1,645	1,505	31
Great America Pkwy	Old Glory Lane	Patrick Henry Dr	2,670	2,125	1,416	134
Great America Pkwy	Patrick Henry Dr	Mission College Blvd	3,199	3,190	1,469	135
Great America Pkwy	Mission College Blvd	US-101 NB Ramp	4,290	3,224	1,413	87
Great America Pkwy	US-101 NB Ramp	US-101 SB Ramp	3,723	3,417	762	59
Mission College Blvd	Montague Exprwy	Agnew Road	3,976	1,425	810	4
Mission College Blvd	Agnew Road	Great America Pkwy	899	327	523	11

The contribution from the three future categories of traffic (approved, pending, project) are then combined in various ways with the existing traffic volumes to get total traffic volumes for the following scenarios:

Future, Approved, w/o Project: Existing + Approved

Future, Approved, w/ Project: Existing + Approved + Project

Future, Potential, w/o Project: Existing + Approved + Pending

Future, Potential, w/ Project: Existing + Approved + Pending + Project

These combinations of traffic volumes are provided in Table 21 (AM peak) and Table 22 (PM peak).

Table 21 Total Traffic Volumes – AM Peak Hour

			Traffic Volumes				
Roadway	From	To	Exisiting	Future Approved w/o Proj	Future Approved w/ Proj	Future Potential, w/o Proj	Future, Potential, w/ Proj
Great America Pkwy	SR-237 SB Ramp	SR-237 NB Ramp	1,771	3,763	3,776	5,694	5,707
Great America Pkwy	SR-237 NB Ramp	Alviso Rd	1,392	2,645	2,663	3,423	3,441
Great America Pkwy	Alviso Rd	Bunker Hill Ln	1,284	2,494	2,518	4,116	4,140
Great America Pkwy	Bunker Hill Ln	Tasman Drive	1,517	2,881	2,904	2,904	2,927
Great America Pkwy	Tasman Drive	Old Glory Lane	1,816	3,299	3,310	3,310	3,321
Great America Pkwy	Old Glory Lane	Patrick Henry Dr	1,948	3,903	3,952	3,952	4,001
Great America Pkwy	Patrick Henry Dr	Mission College Blvd	2,685	5,587	5,637	5,637	5,687
Great America Pkwy	Mission College Blvd	US-101 NB Ramp	3,951	6,962	6,994	6,994	7,026
Great America Pkwy	US-101 NB Ramp	US-101 SB Ramp	3,385	6,008	6,029	6,029	6,050
Mission College Blvd	Montague Exprwy	Agnew Road	2,806	3,740	3,742	3,742	3,744
Mission College Blvd	Agnew Road	Great America Pkwy	707	813	818	818	823

Table 22 Total Traffic Volumes – PM Peak Hour

			Traffic Volumes				
Roadway	From	To	Exisiting	Future Approved w/o Proj	Future Approved w/ Proj	Future Potential, w/o Proj	Future, Potential, w/ Proj
Great America Pkwy	SR-237 SB Ramp	SR-237 NB Ramp	1,349	2,323	2,366	2,980	3,023
Great America Pkwy	SR-237 NB Ramp	Alviso Rd	2,063	3,962	4,008	4,796	4,842
Great America Pkwy	Alviso Rd	Bunker Hill Ln	1,746	3,031	3,097	4,016	4,082
Great America Pkwy	Bunker Hill Ln	Tasman Drive	1,983	3,381	3,447	3,447	3,513
Great America Pkwy	Tasman Drive	Old Glory Lane	2,571	4,216	4,247	4,247	4,278
Great America Pkwy	Old Glory Lane	Patrick Henry Dr	2,670	4,795	4,929	4,929	5,063
Great America Pkwy	Patrick Henry Dr	Mission College Blvd	3,199	6,389	6,524	6,524	6,659
Great America Pkwy	Mission College Blvd	US-101 NB Ramp	4,290	7,514	7,601	7,601	7,688
Great America Pkwy	US-101 NB Ramp	US-101 SB Ramp	3,723	7,140	7,199	7,199	7,258
Mission College Blvd	Montague Exprwy	Agnew Road	3,976	5,401	5,405	5,405	5,409
Mission College Blvd	Agnew Road	Great America Pkwy	899	1,226	1,237	1,237	1,248

The noise level change associate with a change in traffic volumes is calculated assuming that neither the traffic speed nor the mix of vehicles changes, only the number of vehicles (volume). The calculation also assumes that the condition of the pavement does not change in such a way as to either increase or decrease noise levels. The changes in noise level due to traffic are presented in Table 23 (AM peak) and Table 24 (PM peak).

Table 23 Changes in Traffic Noise Levels – AM Peak Hour

Roadway	From	To	Noise Level Increases, dB					
			Future, Approved, w/o Proj re: Exisiting	Future, Approved, w/ Proj re: Exisiting	Effect of Project on Future, Approved	Future, Potential, w/o Proj re: Exisiting	Future, Potential, w/ Proj re: Exisiting	Effect of Project on Future, Potential
			(A)	(B)	(B - A)	(C)	(D)	(D - C)
Great America Pkwy	SR-237 SB Ramp	SR-237 NB Ramp	3.3	3.3	0.0	5.1	5.1	0.0
Great America Pkwy	SR-237 NB Ramp	Alviso Rd	2.8	2.8	0.0	3.9	3.9	0.0
Great America Pkwy	Alviso Rd	Bunker Hill Ln	2.9	2.9	0.0	5.1	5.1	0.0
Great America Pkwy	Bunker Hill Ln	Tasman Drive	2.8	2.8	0.0	2.8	2.9	0.0
Great America Pkwy	Tasman Drive	Old Glory Lane	2.6	2.6	0.0	2.6	2.6	0.0
Great America Pkwy	Old Glory Lane	Patrick Henry Dr	3.0	3.1	0.1	3.1	3.1	0.1
Great America Pkwy	Patrick Henry Dr	Mission College Blvd	3.2	3.2	0.0	3.2	3.3	0.0
Great America Pkwy	Mission College Blvd	US-101 NB Ramp	2.5	2.5	0.0	2.5	2.5	0.0
Great America Pkwy	US-101 NB Ramp	US-101 SB Ramp	2.5	2.5	0.0	2.5	2.5	0.0
Mission College Blvd	Montague Exprwy	Agnew Road	1.2	1.3	0.0	1.3	1.3	0.0
Mission College Blvd	Agnew Road	Great America Pkwy	0.6	0.6	0.0	0.6	0.7	0.0

Note: Calculated values may be off by 0.1 dB due to rounding.

Table 24 Changes in Traffic Noise Levels – PM Peak Hour

Roadway	From	To	Noise Level Increases, dB					
			Future, Approved, w/o Proj re: Exisiting	Future, Approved, w/ Proj re: Exisiting	Effect of Project on Future, Approved	Future, Potential, w/o Proj re: Exisiting	Future, Potential, w/ Proj re: Exisiting	Effect of Project on Future, Potential
			(A)	(B)	(B - A)	(C)	(D)	(D - C)
Great America Pkwy	SR-237 SB Ramp	SR-237 NB Ramp	2.4	2.4	0.1	3.4	3.5	0.1
Great America Pkwy	SR-237 NB Ramp	Alviso Rd	2.8	2.9	0.1	3.7	3.7	0.0
Great America Pkwy	Alviso Rd	Bunker Hill Ln	2.4	2.5	0.1	3.6	3.7	0.1
Great America Pkwy	Bunker Hill Ln	Tasman Drive	2.3	2.4	0.1	2.4	2.5	0.1
Great America Pkwy	Tasman Drive	Old Glory Lane	2.1	2.2	0.0	2.2	2.2	0.0
Great America Pkwy	Old Glory Lane	Patrick Henry Dr	2.5	2.7	0.1	2.7	2.8	0.1
Great America Pkwy	Patrick Henry Dr	Mission College Blvd	3.0	3.1	0.1	3.1	3.2	0.1
Great America Pkwy	Mission College Blvd	US-101 NB Ramp	2.4	2.5	0.0	2.5	2.5	0.0
Great America Pkwy	US-101 NB Ramp	US-101 SB Ramp	2.8	2.9	0.0	2.9	2.9	0.0
Mission College Blvd	Montague Exprwy	Agnew Road	1.3	1.3	0.0	1.3	1.3	0.0
Mission College Blvd	Agnew Road	Great America Pkwy	1.3	1.4	0.0	1.4	1.4	0.0

Note: Calculated values may be off by 0.1 dB due to rounding.

According to measurements made for the City of Santa Clara 2010-2035 General Plan Environmental Impact Report, the CNEL along Great America Parkway is between 68 and 69. Depending on whether a parcel is zoned Commercial or Industrial, these levels are either already in the category that requires design or insulation to reduce noise levels or within 3 dB of that category. Regardless, the threshold of significance for a cumulative traffic noise impact is an increase of 3 dB or more. Noise data for Mission College Boulevard is not available, but it is conservatively assumed that a 3 dB increase along that roadway would also constitute a significant noise impact. As seen in Table 23 and Table 24, some future, cumulative noise increases do constitute significant cumulative impacts.

If significant cumulative impacts are identified as they are here, the project environmental analysis must then determine if the project makes a substantial contribution to that impact. In this case, the project itself contributes, at most, 0.1 dB, a negligible amount that is within the margin of error for noise level calculations. Therefore, the project itself does not contribute substantially to the cumulative traffic noise impacts.

5.2 Operational Noise

The project area is currently exposed to noise from the Norman Mineta San Jose International Airport that is less than 65 CNEL. (SJC, 2016) For the year 2027, airport noise is expected to reach 65 CNEL for homes on the south side of Klune Court. The average change in traffic noise was applied as a background growth factor to the non-airport, non-Park noise levels based on the traffic volume analysis presented above with the result that an increase of 2.6 dBA was used for Future Approved condition and 3.0 dBA was used for the Future Pending condition.

The contribution from the future background growth, airport and project were combined in various ways with the existing noise to calculated cumulative noise for the following scenarios:

Future, Approved, w/o Project:	Existing + Approved
Future, Approved, w/ Project:	Existing + Approved + Project
Future, Potential, w/o Project:	Existing + Approved + Pending
Future, Potential, w/ Project:	Existing + Approved + Pending + Project

The analysis also compares the cumulative effect compared to a 3-hour duration event at Levi's Stadium (e.g., concert or NFL game) from 8 PM to 11 PM. The threshold of significance for a cumulative noise impact is an increase of 3 dB or more. As seen in Table 25 through Table 28 for the total Project: more rides, extended season and extended hours, some future, cumulative noise increases would constitute significant cumulative impacts.

If significant cumulative impacts are identified as they are here, the project environmental analysis must then determine if the project makes a substantial contribution to that impact. Following is summary of the results for the project with More Rides, Extended Season and Extended Hours.

- Without a stadium event, the project itself contributes, 0.8 to 5.0 dB increase, with the largest increase at the closest receptor to the south (Broadcom) with 5.0 dB increase for the Future, Potential condition.
- The cumulative effect is similar when comparing an event at the Stadium, with only a 4.9 dB increase at Broadcom. Except at Broadcom, the Project increase is less than the non-Project cumulative noise increase.
- The project would contribute substantially to the cumulative noise impact at the Broadcom building for both the Future, Approved and Future, Pending conditions.

Table 25 Day-Night Average Noise Level Assessment: More Rides, Extended Season, Extended Hours, Controlled Amplified Entertainment with Other Projects (No Fireworks, No Levi's Stadium Event)

ID	Analysis Receptor Location	Zone	Existing w/park	Fut Approved w/o project	Fut Approved w/project	Fut Pending w/o project	Fut Pending w/project
A	4778 Gillmor St	Res	64.9	69.6	71.3	68.7	70.6
B	2393 Klune St	Res	64.9	69.6	71.6	68.7	71.0
C	4486 Lakeshore Dr	Res	64.9	69.6	71.3	68.7	70.6
D	4298 Dry Bed Ct	Res	63.2	67.4	69.6	67.3	69.5
E	4949 GA Pkwy (Hilton)	Ind	64.0	68.1	68.9	68.1	68.9
F	Prudential Building	Ind	64.0	67.5	70.4	67.5	70.4
G	4604 Fuller St	Res	64.9	68.6	69.8	68.7	69.8
H	Broadcom Corp	Ind	64.2	68.5	72.3	66.6	71.6

Table 26 Changes in Day-Night Average Noise Levels: More Rides, Extended Season, Extended Hours, Controlled Amplified Entertainment with Other Projects (No Fireworks, No Levi's Stadium Event)

ID	Analysis Receptor Location	Zone	Future, Approvd w/o Proj re: Existing	Future, Approved, w/ Proj re: Existing	Effect of Project on Future, Approved	Fut Pending w/o project	Fut Pending w/project	Effect of Project on Future, Potential
A	4778 Gillmor St	Res	4.7	6.4	1.6	3.8	5.7	2.0
B	2393 Klune St	Res	4.7	6.7	1.9	3.8	6.1	2.3
C	4486 Lakeshore Dr	Res	4.7	6.4	1.6	3.8	5.7	2.0
D	4298 Dry Bed Ct	Res	4.2	6.4	2.2	4.1	6.3	2.3
E	4949 GA Pkwy (Hilton)	Ind	4.1	4.9	0.8	4.1	4.9	0.8
F	Prudential Building	Ind	3.5	6.4	2.9	3.5	6.4	2.9
G	4604 Fuller St	Res	3.7	4.9	1.2	3.8	4.9	1.2
H	Broadcom Corp	Ind	4.3	8.1	3.8	2.4	7.4	5.0

Note: Calculated values may be off by 0.1 dB due to rounding.

Table 27 Day-Night Average Noise Level Assessment: More Rides, Extended Season, Extended Hours with Other Projects (No Fireworks, With Levi's Stadium Event)

ID	Analysis Receptor Location	Zone	Existing w/park w/Event	Fut Approved w/o project	Fut Approved w/project	Fut Pending w/o project	Fut Pending w/project
A	4778 Gillmor St	Res	66.4	70.2	71.7	69.4	71.1
B	2393 Klune St	Res	65.5	69.8	71.7	68.9	71.1
C	4486 Lakeshore Dr	Res	65.2	69.7	71.3	68.8	70.7
D	4298 Dry Bed Ct	Res	63.4	67.4	69.6	67.4	69.6
E	4949 GA Pkwy (Hilton)	Ind	64.7	68.4	69.2	68.3	69.1
F	Prudential Building	Ind	64.3	67.7	70.5	67.7	70.5
G	4604 Fuller St	Res	65.3	68.8	69.9	68.8	70.0
H	Broadcom Corp	Ind	64.3	68.5	72.3	66.6	71.6

Table 28 Changes in Day-Night Average Noise Levels: More Rides, Extended Season, Extended Hours with Other Projects (No Fireworks, With Levi's Stadium Event)

ID	Analysis Receptor Location	Zone	Future, Approvd w/o Proj re: Existing w/Event	Future, Approved, w/ Proj re: Existing w/Event	Effect of Project on Future, Approved	Fut Pending w/o project	Fut Pending w/project	Effect of Project on Future, Potential
A	4778 Gillmor St	Res	3.8	5.2	1.4	2.9	4.6	1.7
B	2393 Klune St	Res	4.4	6.2	1.8	3.4	5.6	2.2
C	4486 Lakeshore Dr	Res	4.6	6.2	1.6	3.6	5.5	1.9
D	4298 Dry Bed Ct	Res	4.0	6.2	2.2	3.9	6.2	2.2
E	4949 GA Pkwy (Hilton)	Ind	3.7	4.5	0.8	3.7	4.5	0.8
F	Prudential Building	Ind	3.4	6.2	2.8	3.4	6.2	2.8
G	4604 Fuller St	Res	3.5	4.7	1.1	3.6	4.7	1.1
H	Broadcom Corp	Ind	4.2	8.1	3.7	2.3	7.3	4.9

Note: Calculated values may be off by 0.1 dB due to rounding.

6 References

1. California's Great America Master Plan (Summary Document), 3 November 2015.

2. The 49ers Stadium Project City of Santa Clara, Draft EIR, July 2009; including Section 4.10 Noise and Appendix K, 49ers Stadium Project Environmental Noise Assessment, 2/24/09.

3. Menge, Christopher W., *Noise from amusement park attractions: Sound level data and abatement strategies*, Noise Control Eng. J. **47** (5), 1999 Sep-Oct.

4. 2010-2035 General Plan ADEIR Noise Section Report, Illingworth & Rodkin, Inc., 30 April 2010.

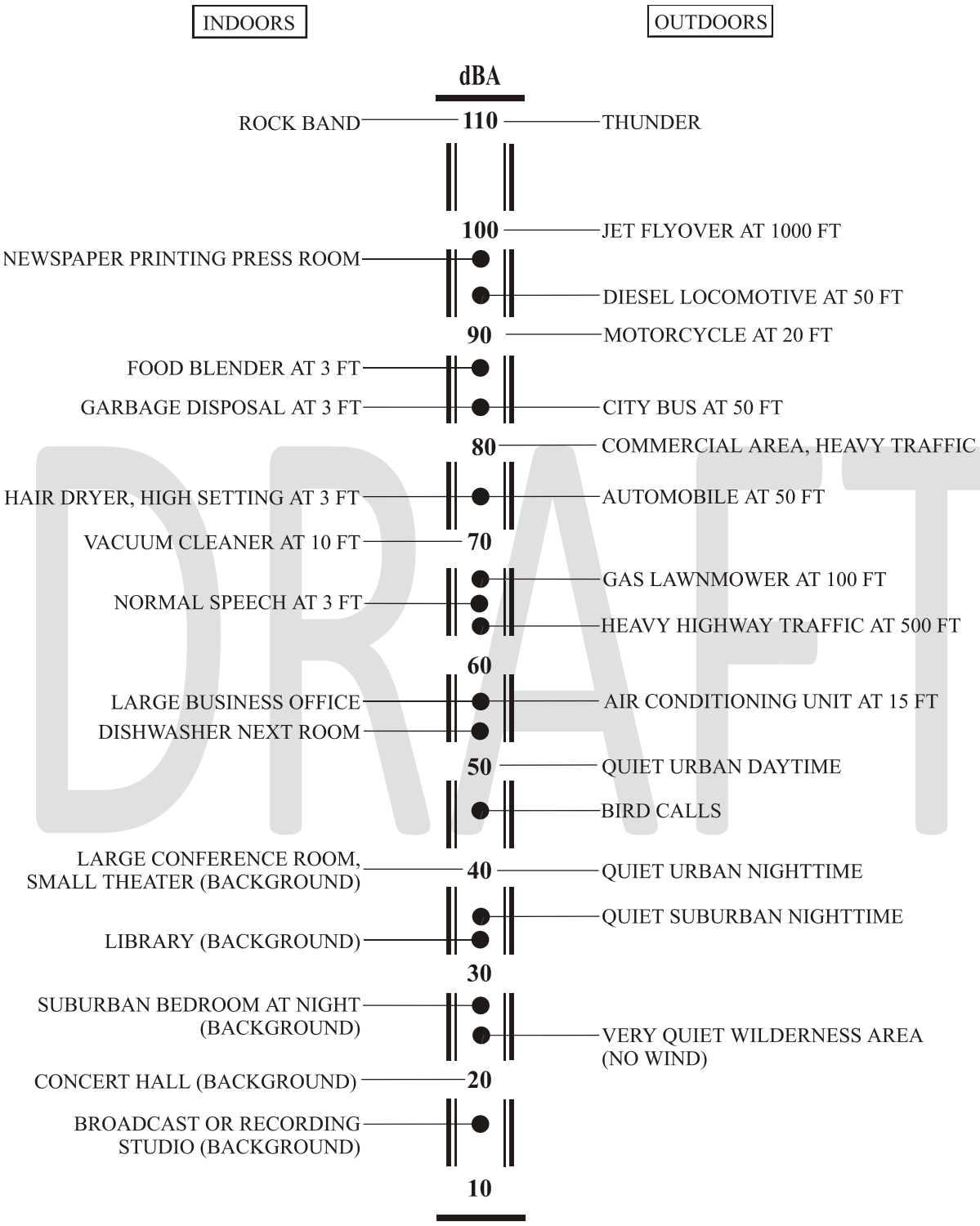

Figure 1 Typical Environmental Noise Levels

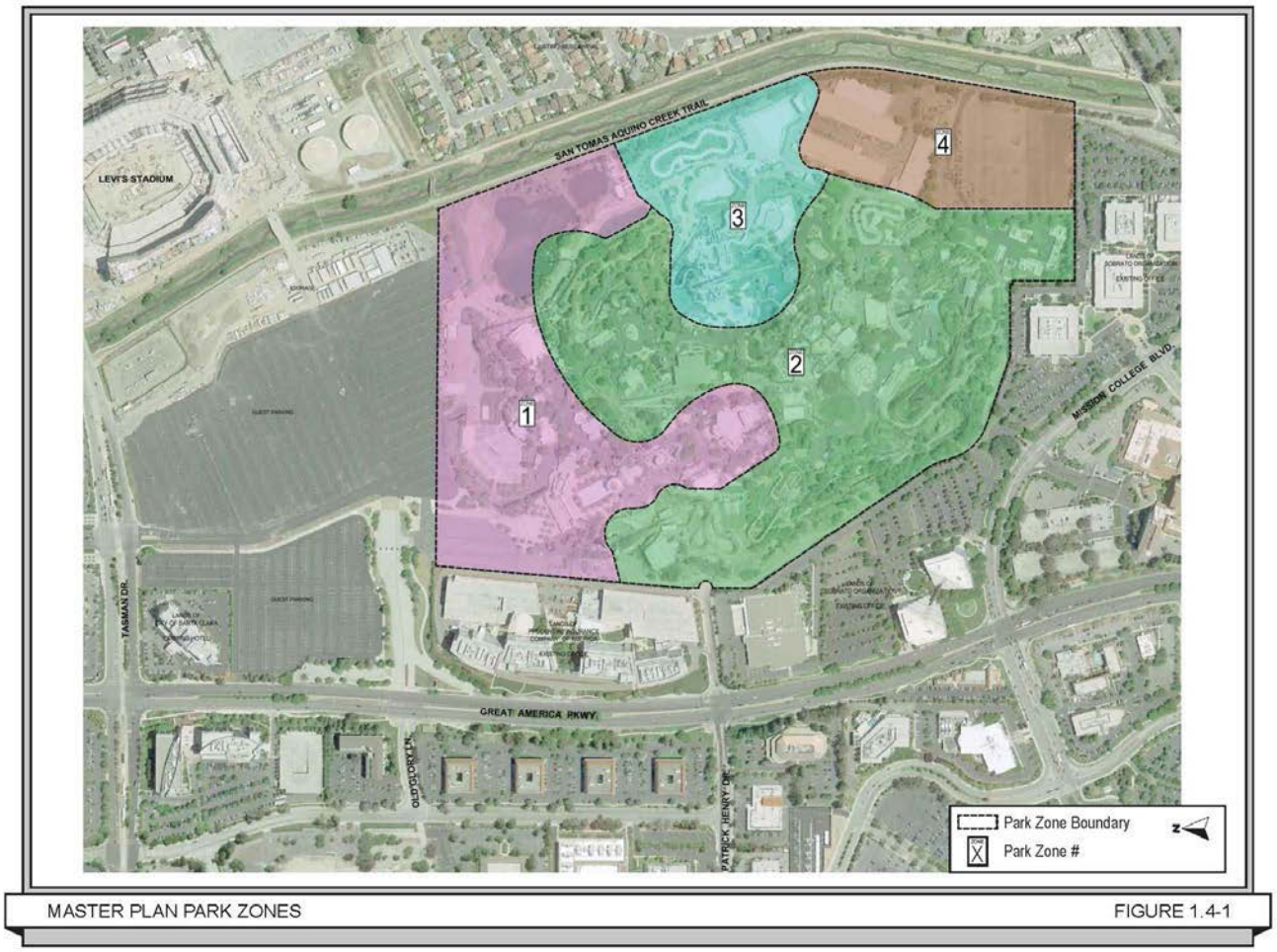

Figure 2 Proposed Master Plan Use Zones

Figure 3 Photo of Typical Field Measurement Setup

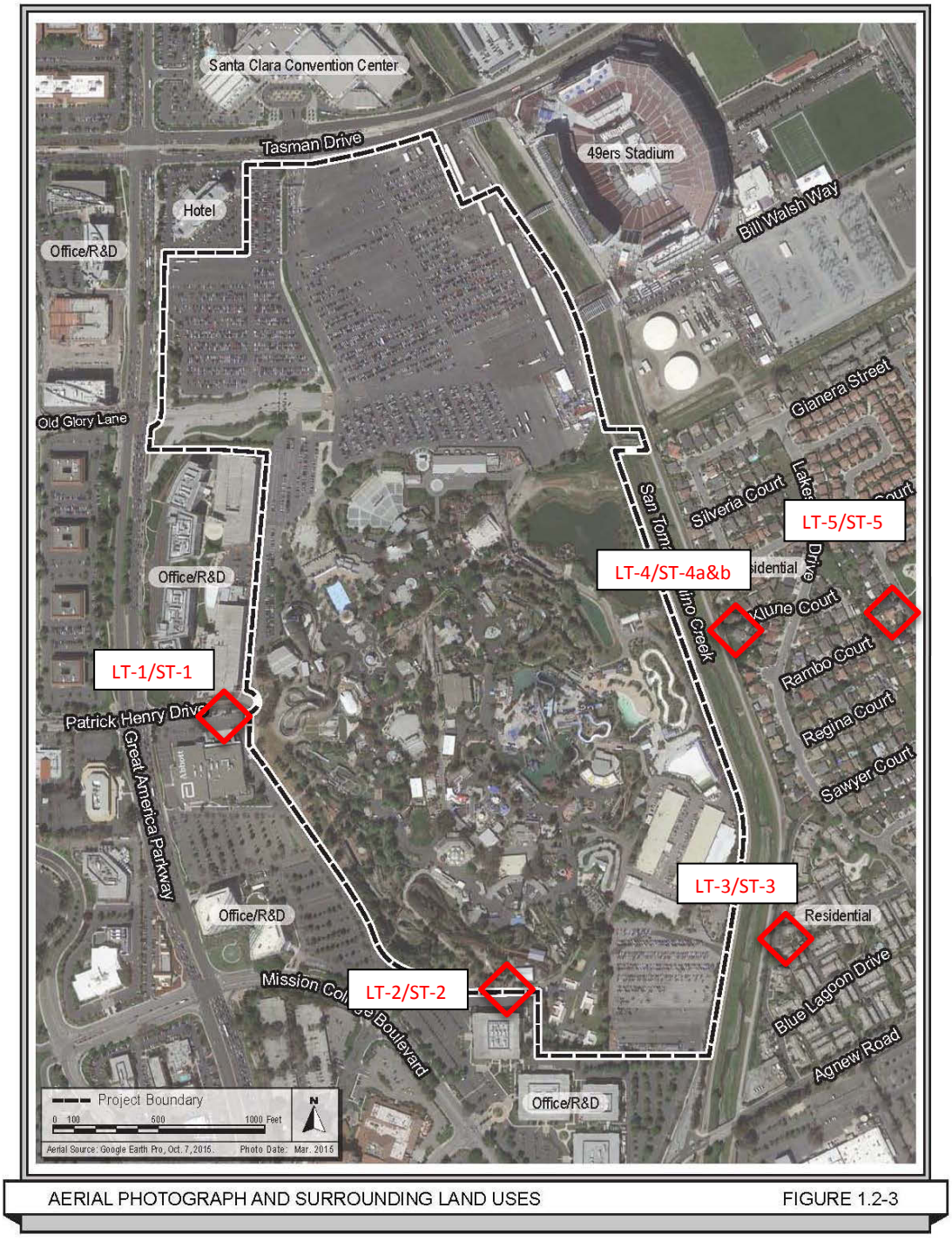

Figure 4 Noise Measurement Locations in the Vicinity of Great America

Figure 5 Noise Analysis Receptor Locations in the Vicinity of Great America

APPENDIX A

EXISTING STATISTICAL HOURLY NOISE LEVELS

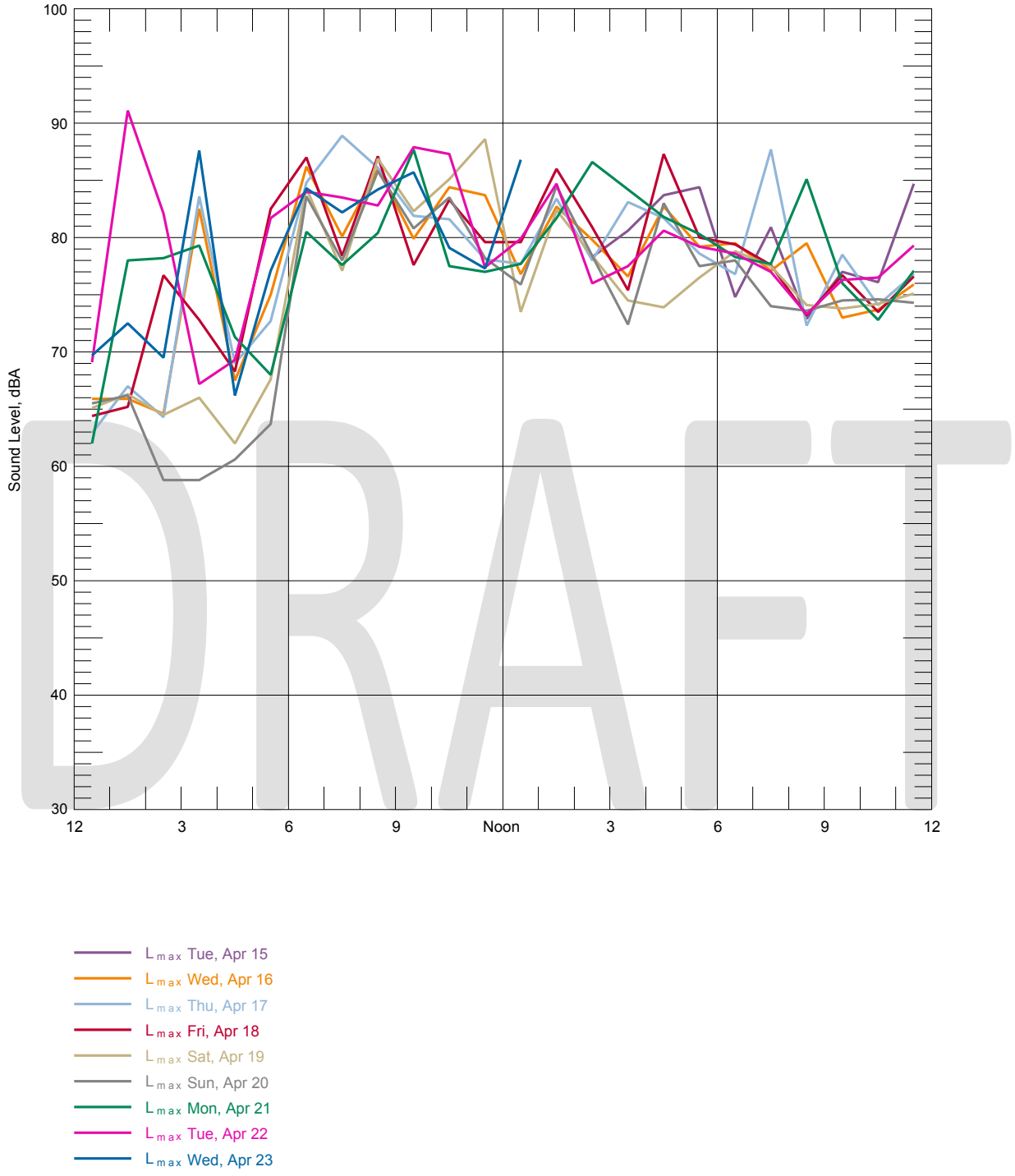

Figure A-1 L_{max} Comparison at LT-1

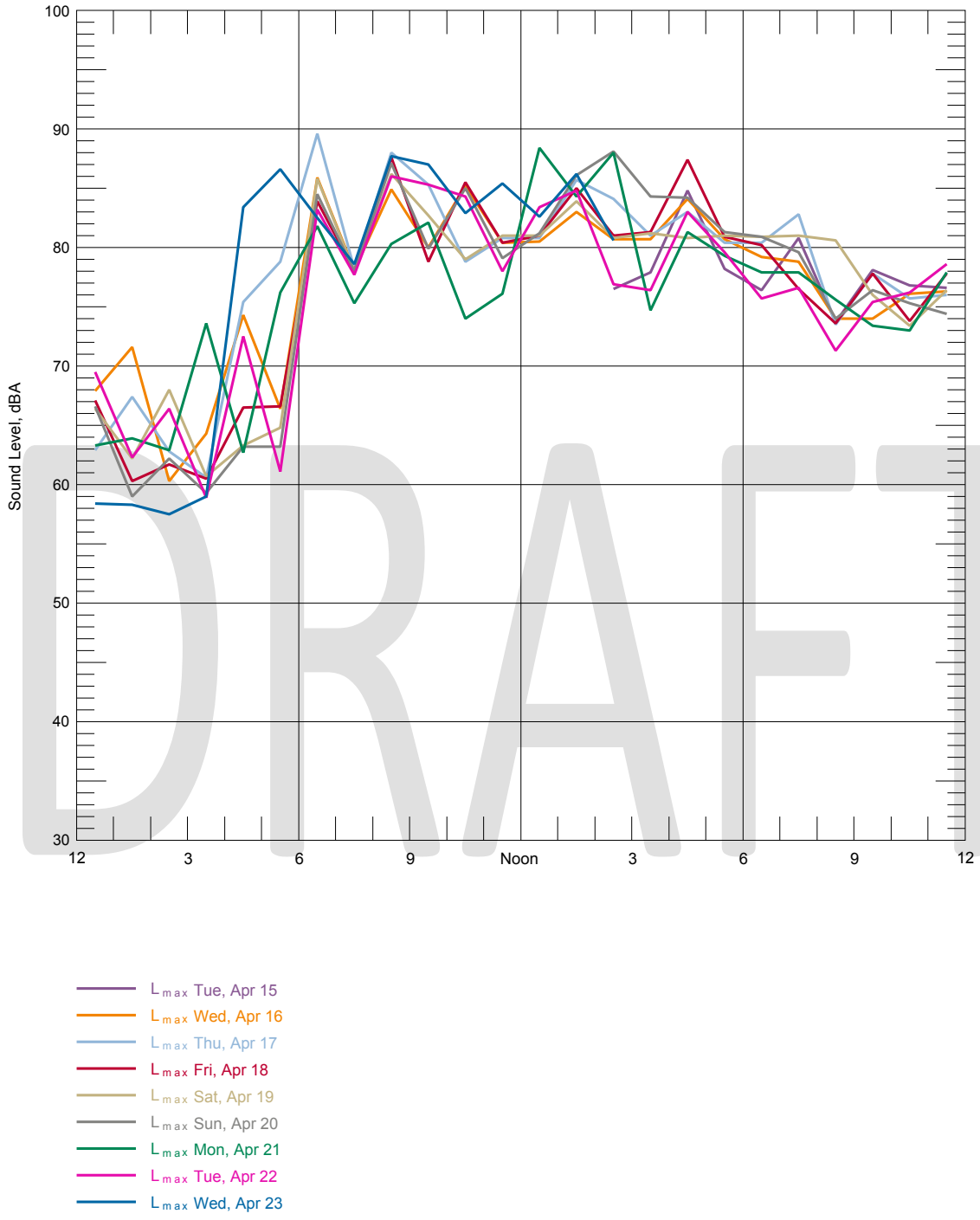

Figure A-2 L_{max} Comparison at LT-2

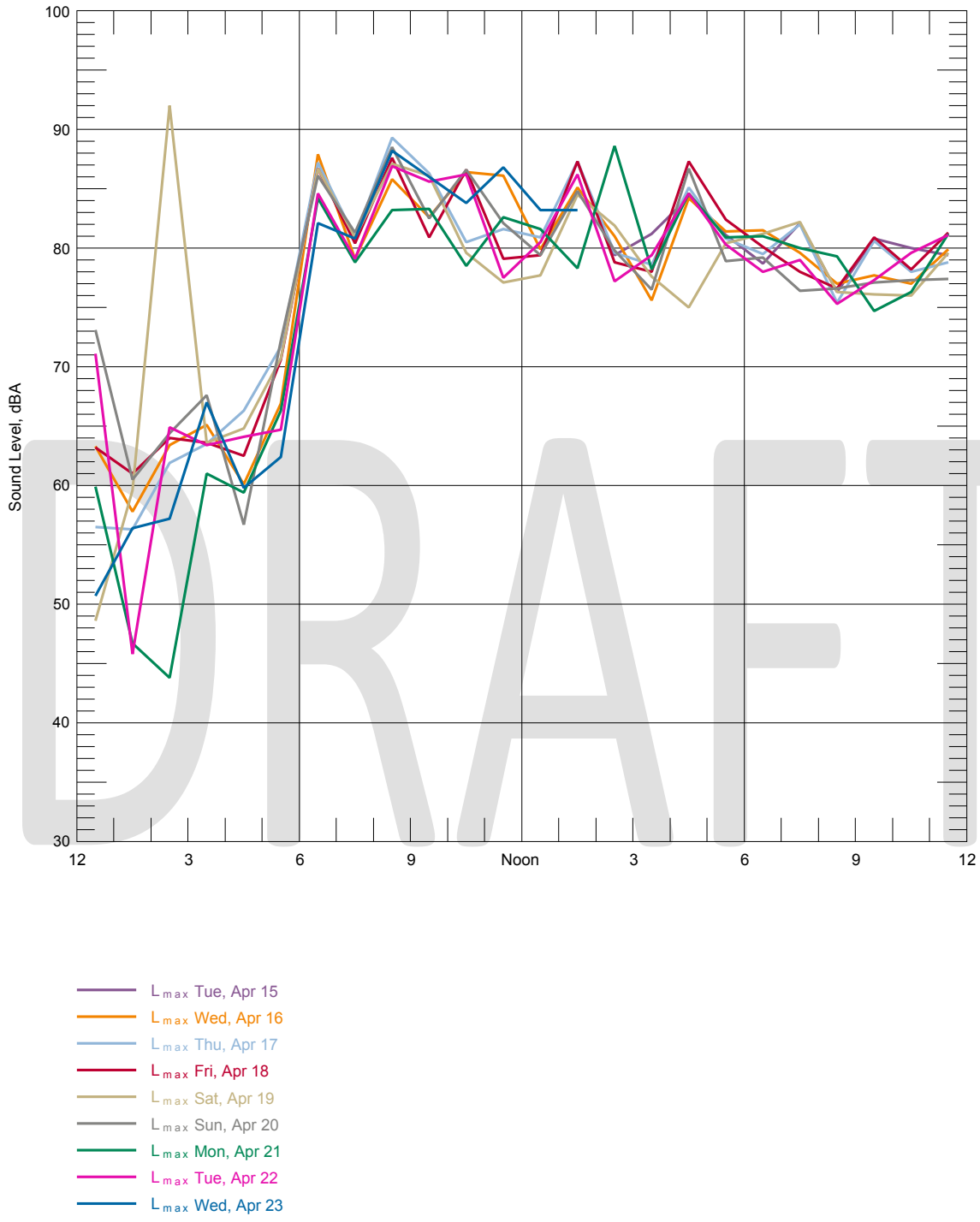

Figure A-3 L_{max} Comparison at LT-3

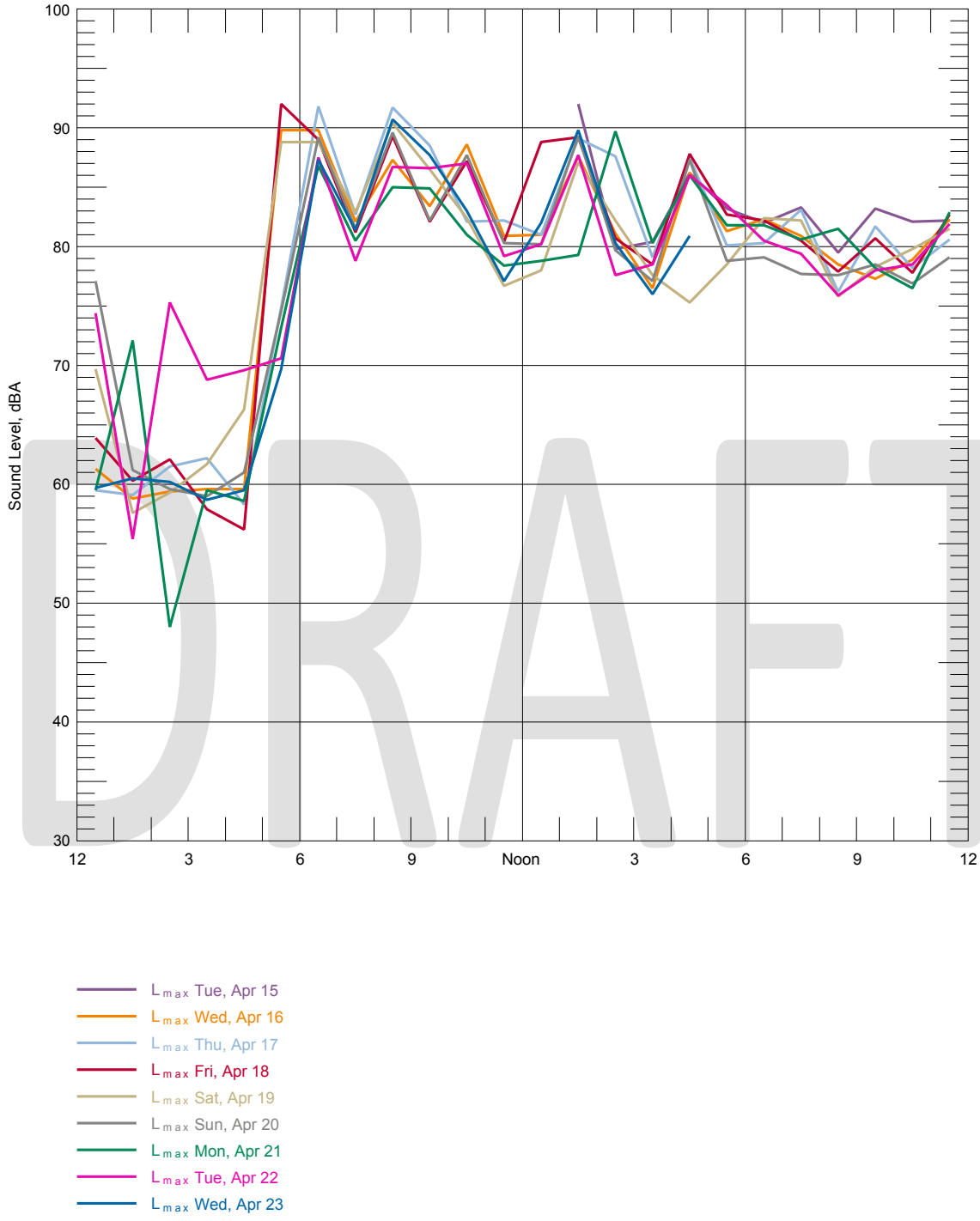

Figure A-4 L_{max} Comparison at LT-4

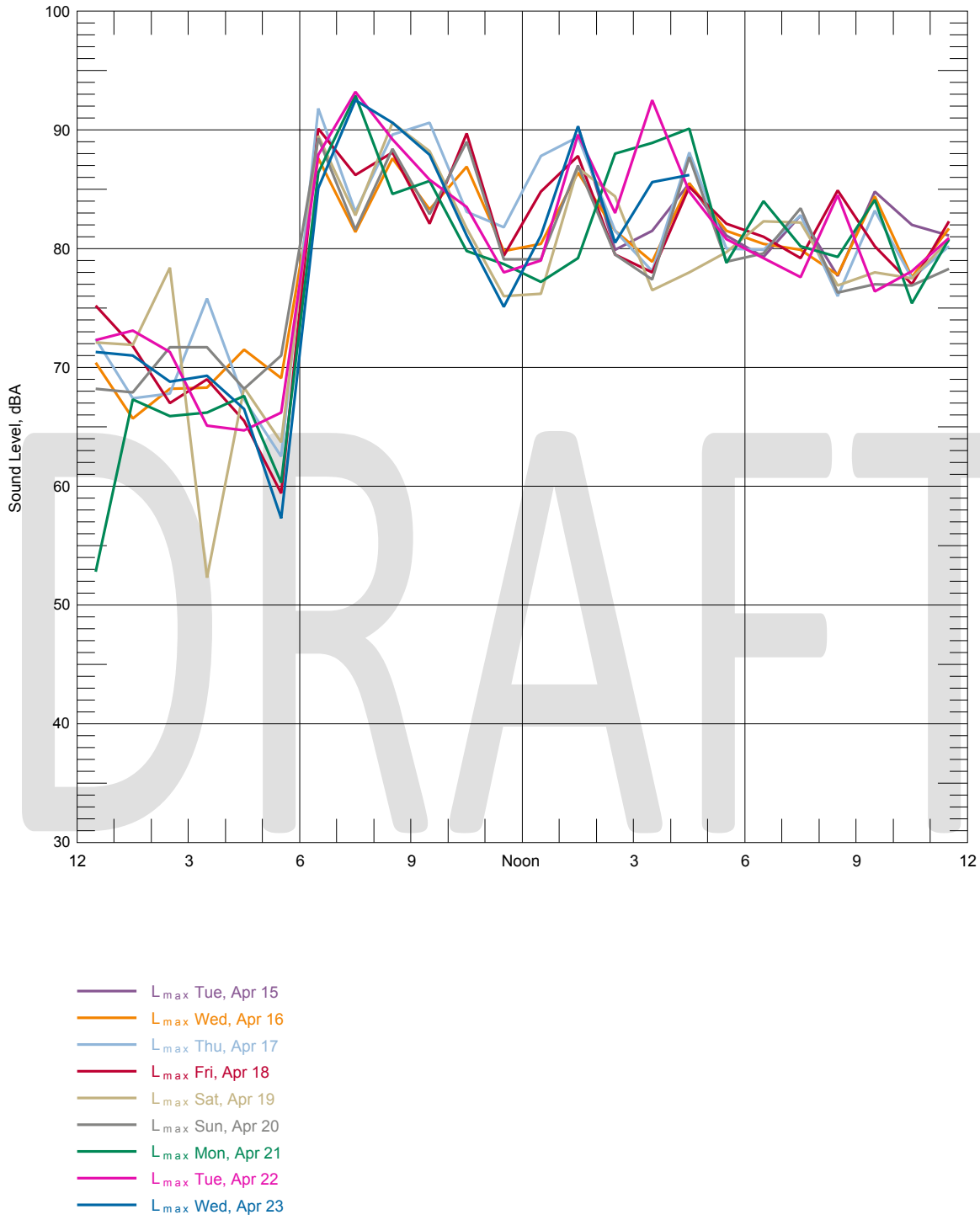

Figure A-5 L_{max} Comparison at LT-5

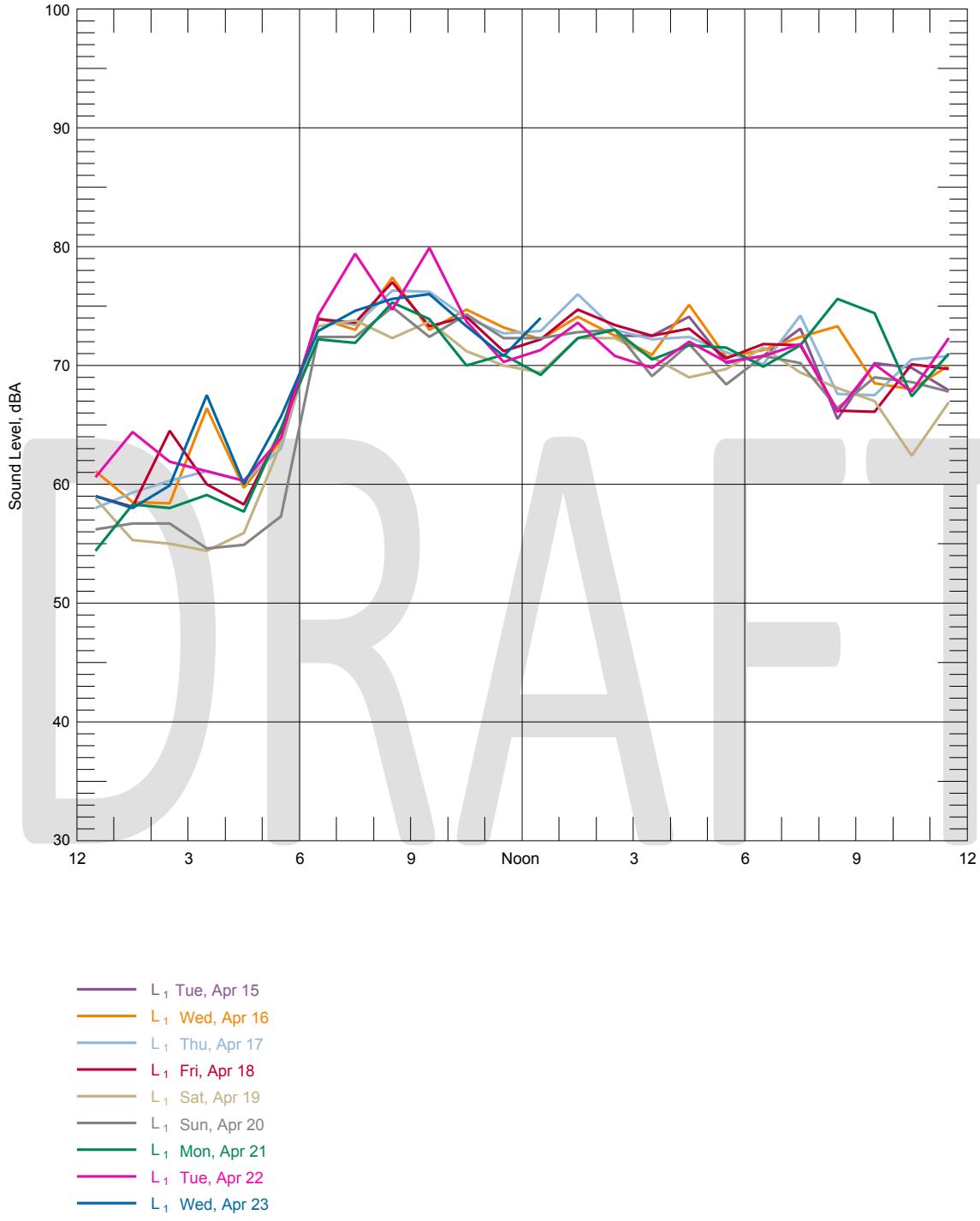

Figure A-6 L_1 Comparison at LT-1

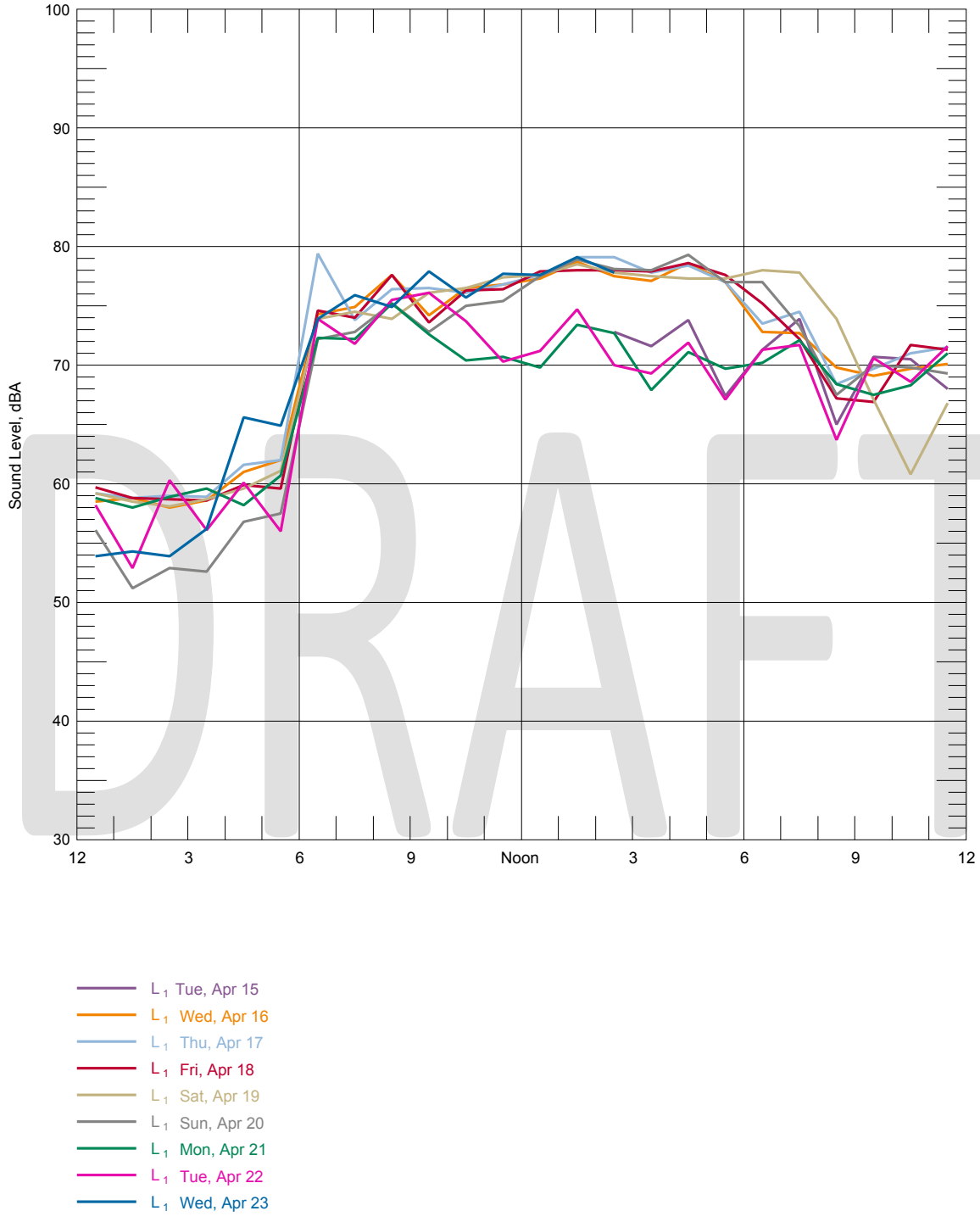

Figure A-7 L_1 Comparison at LT-2

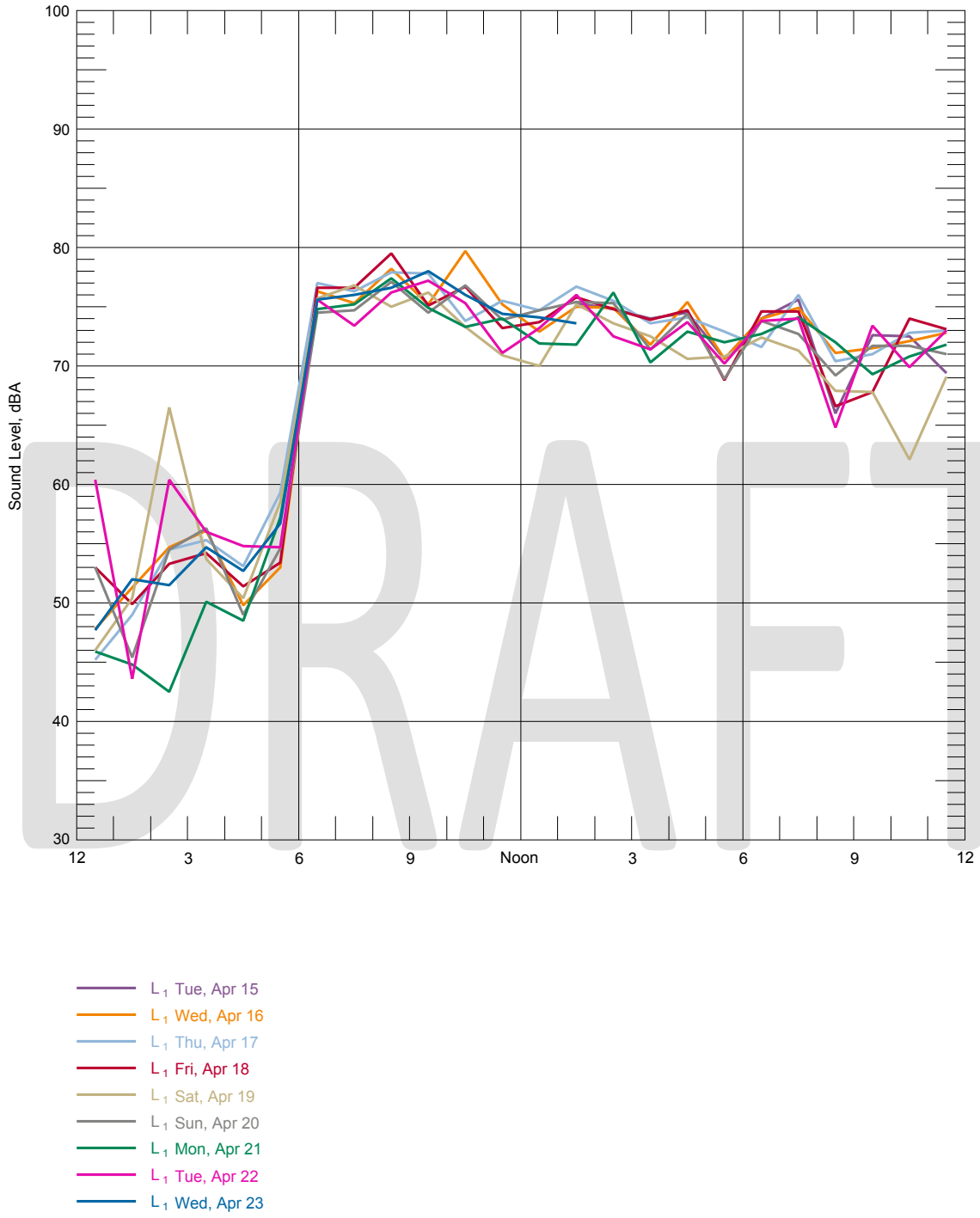

Figure A-8 L_1 Comparison at LT-3

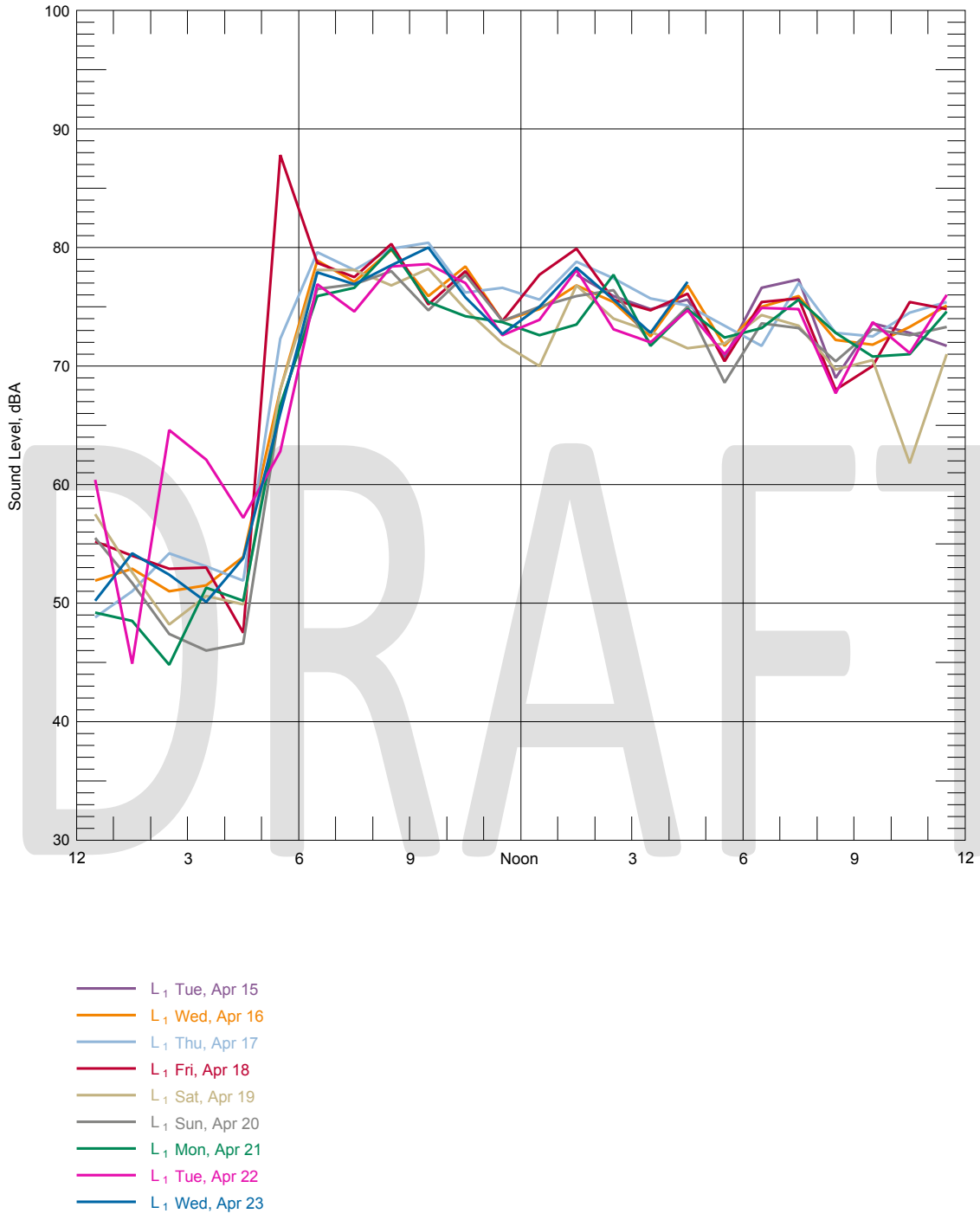

Figure A-9 L_1 Comparison at LT-4

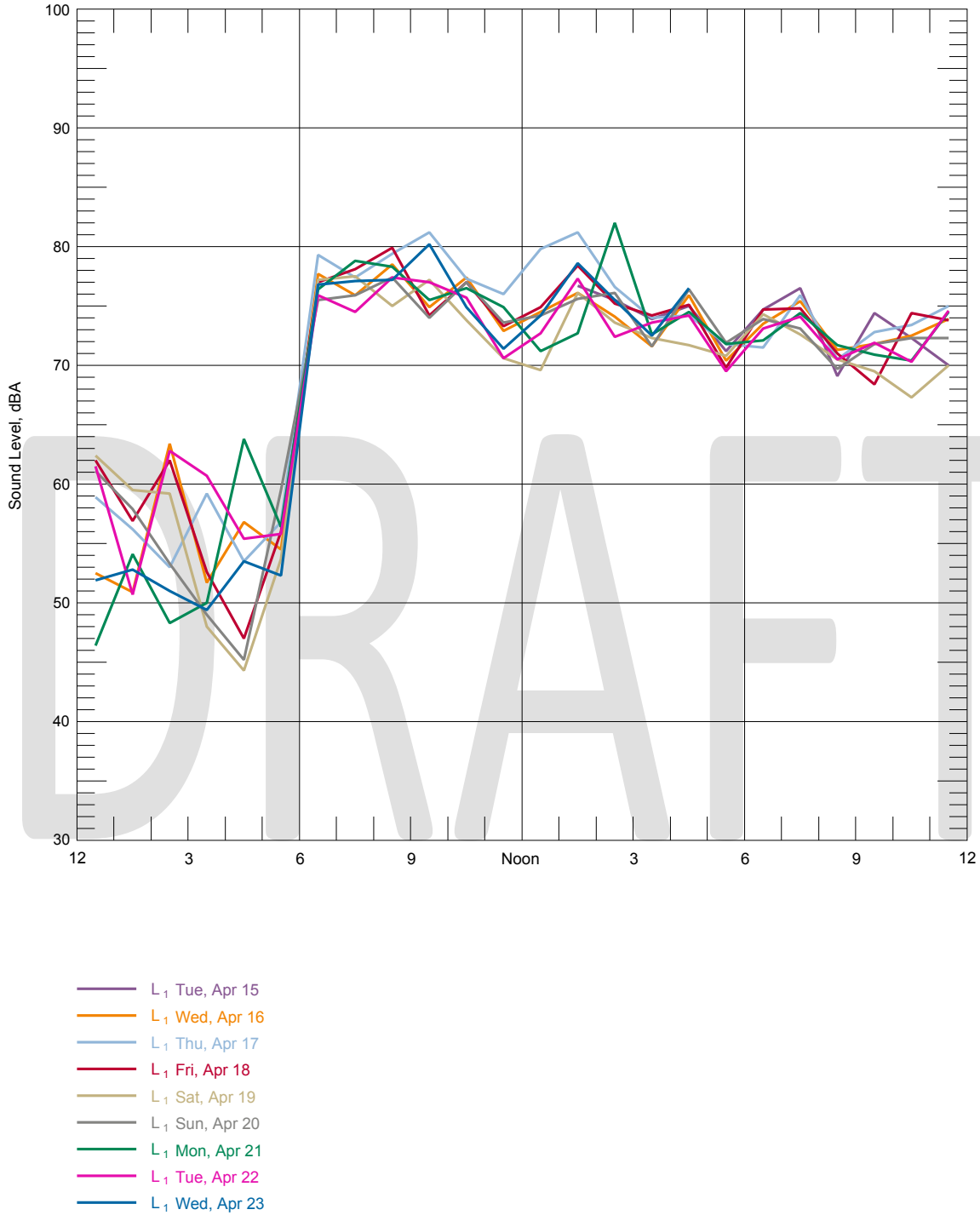

Figure A-10 L_1 Comparison at LT-5

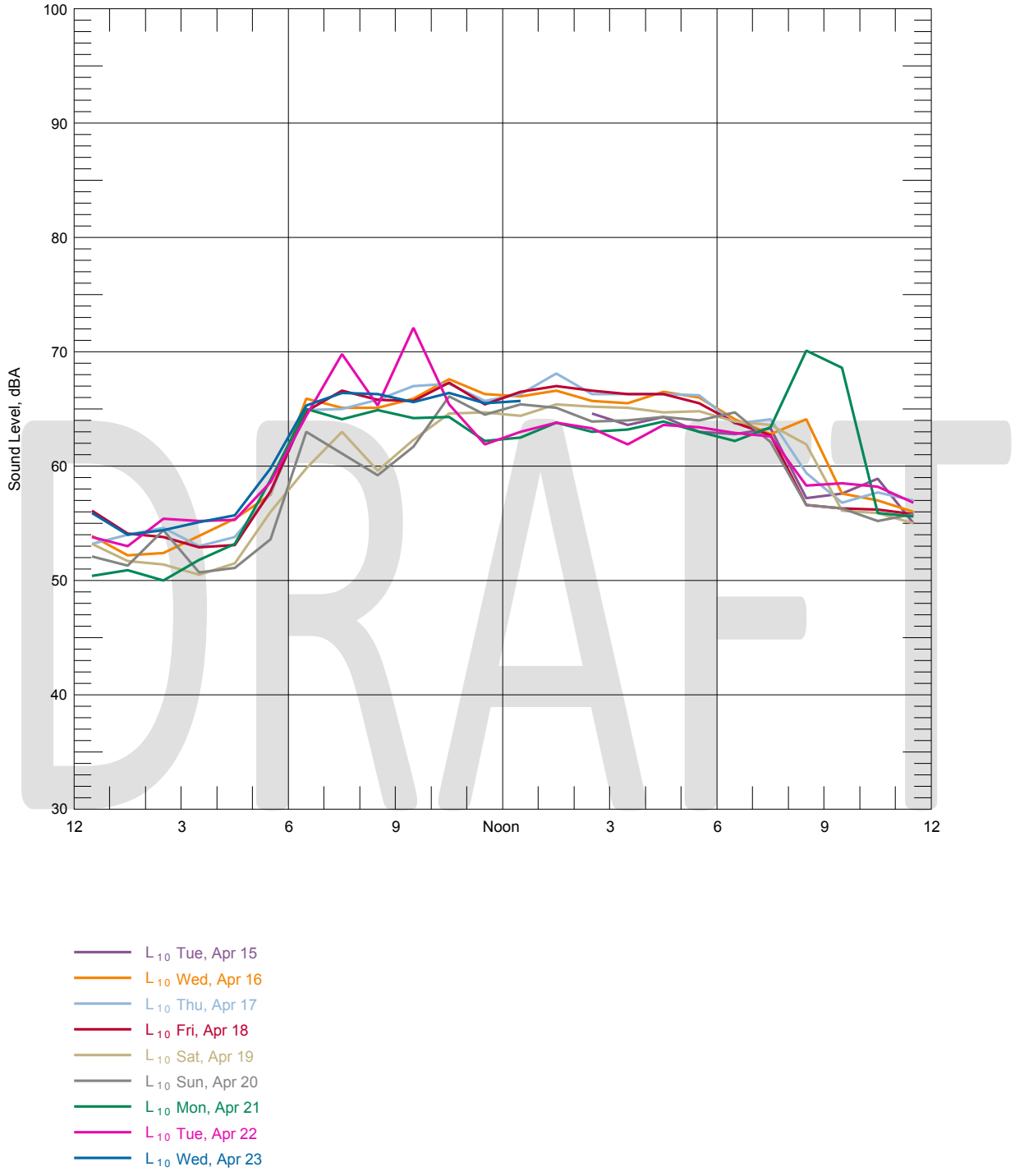

Figure A-11 L_{10} Comparison at LT-1

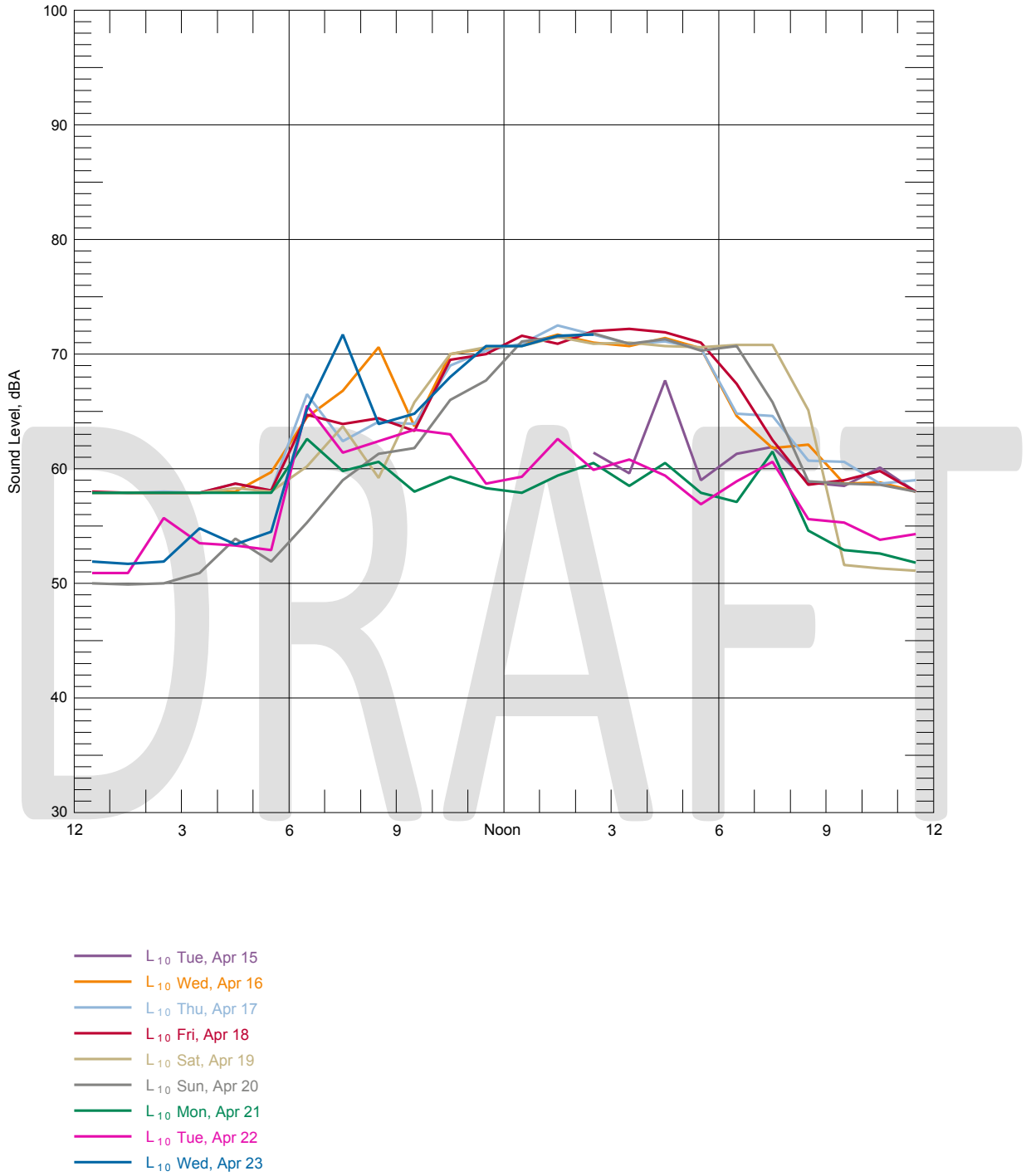

Figure A-12 L_{10} Comparison at LT-2

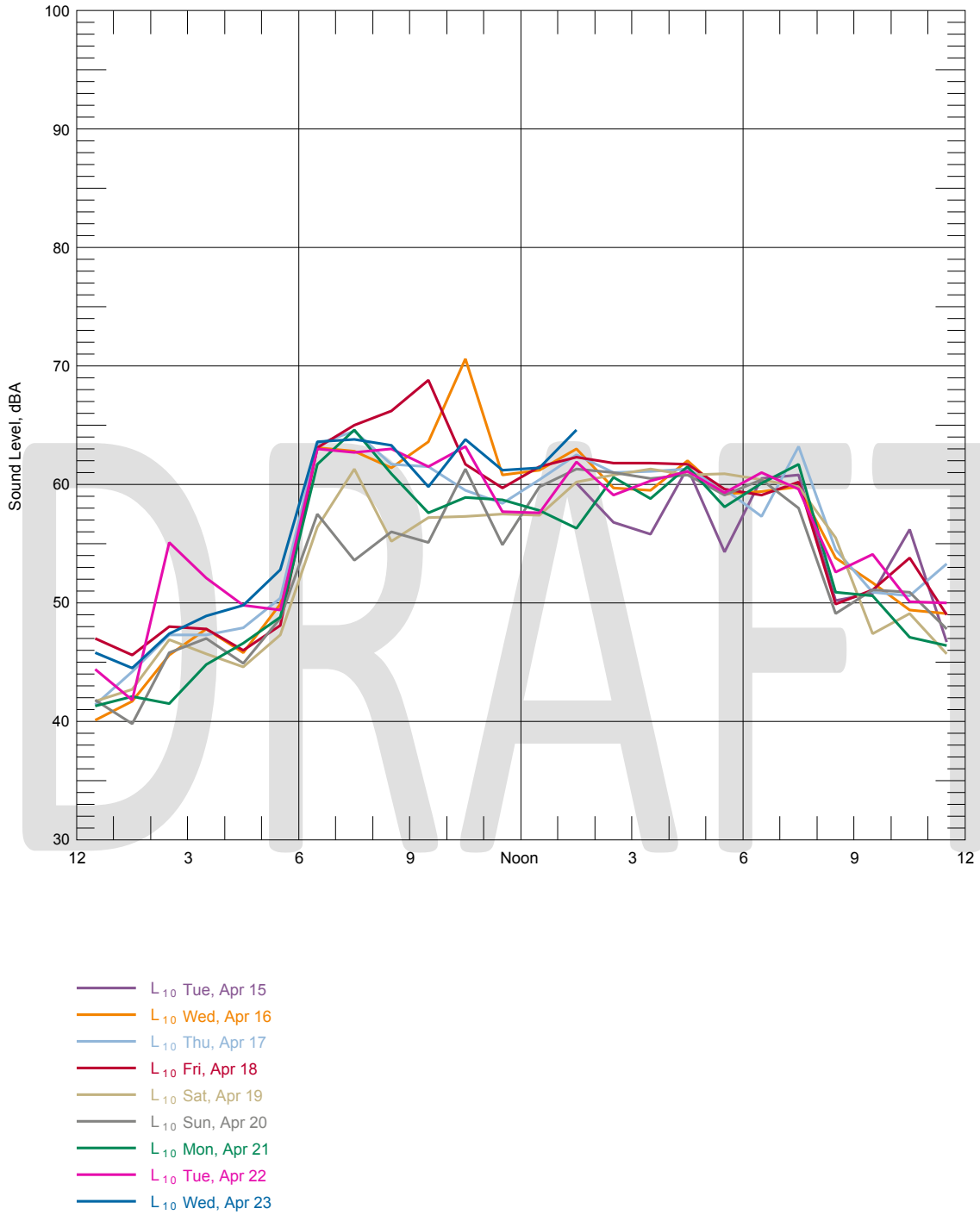

Figure A-13 L_{10} Comparison at LT-3

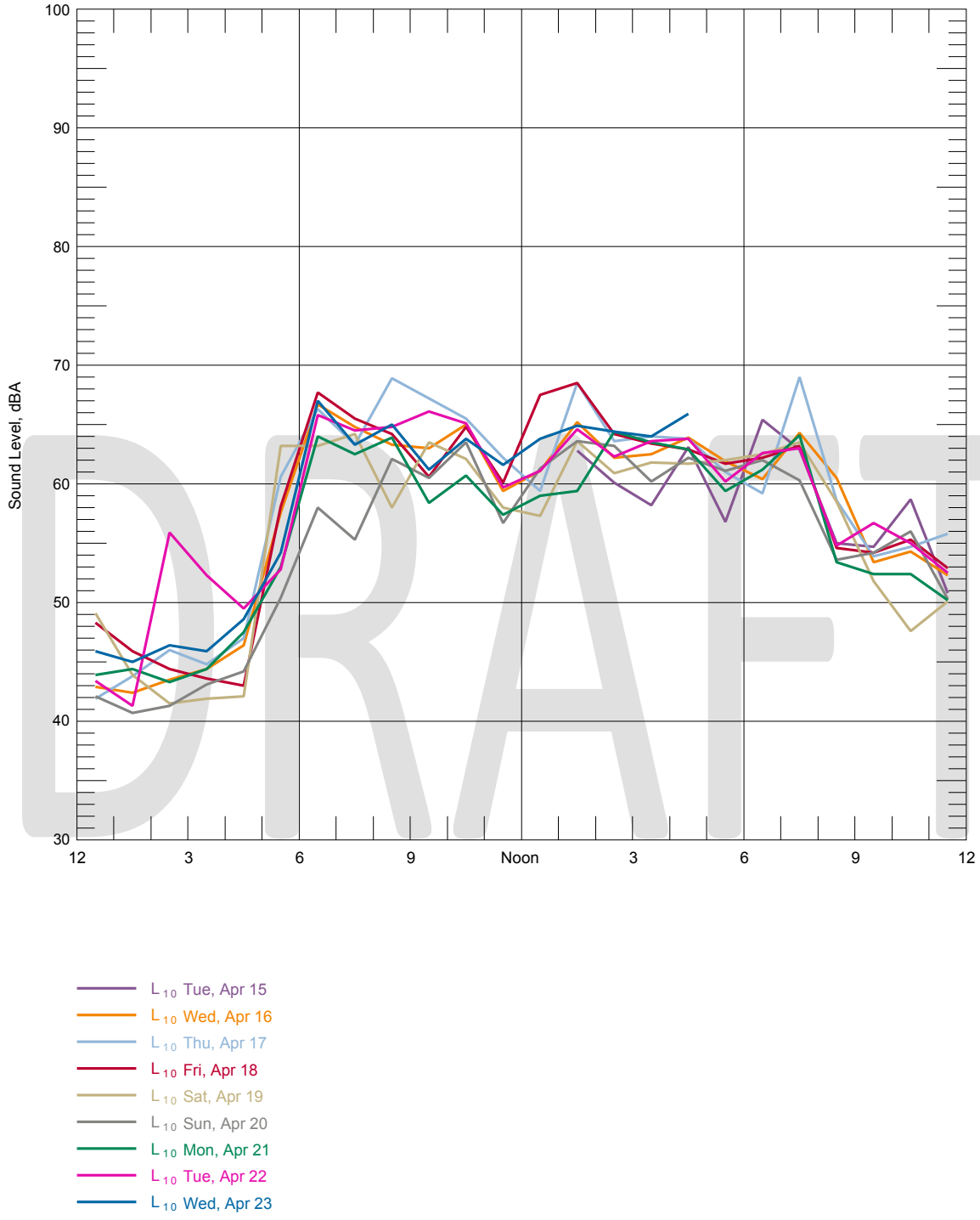

Figure A-14 L_{10} Comparison at LT-4

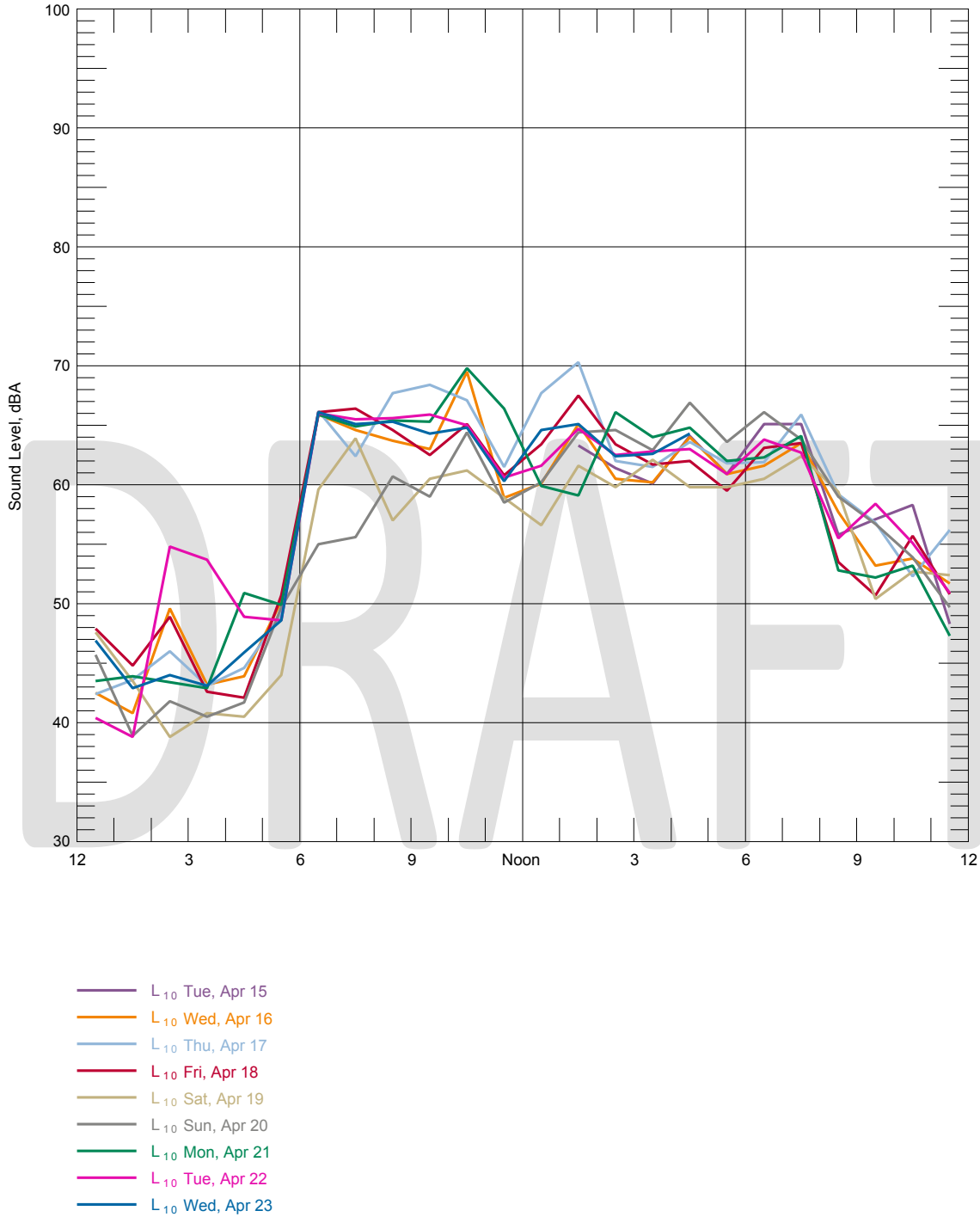

Figure A-15 L_{10} Comparison at LT-5

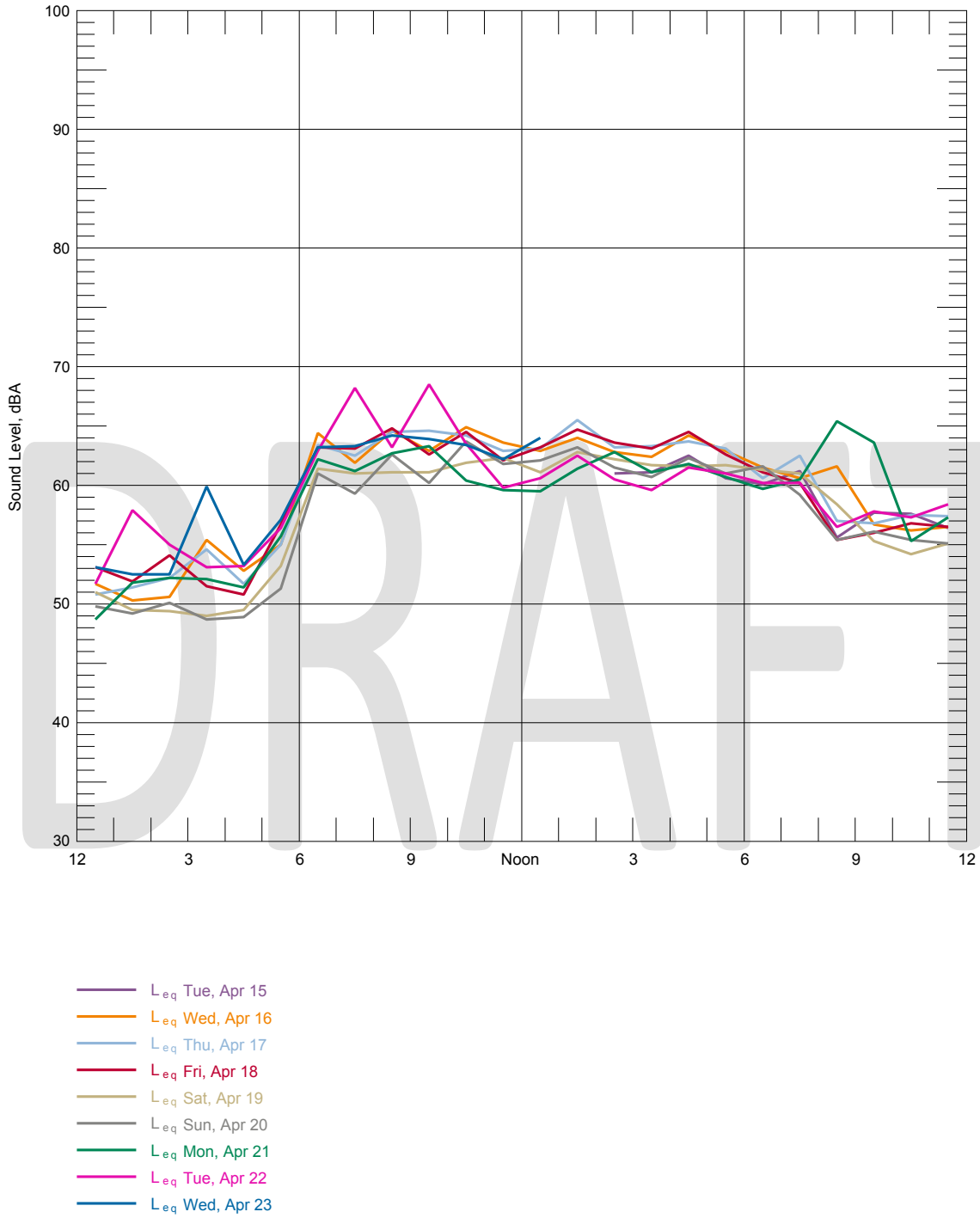

Figure A-16 L_{eq} Comparison at LT-1

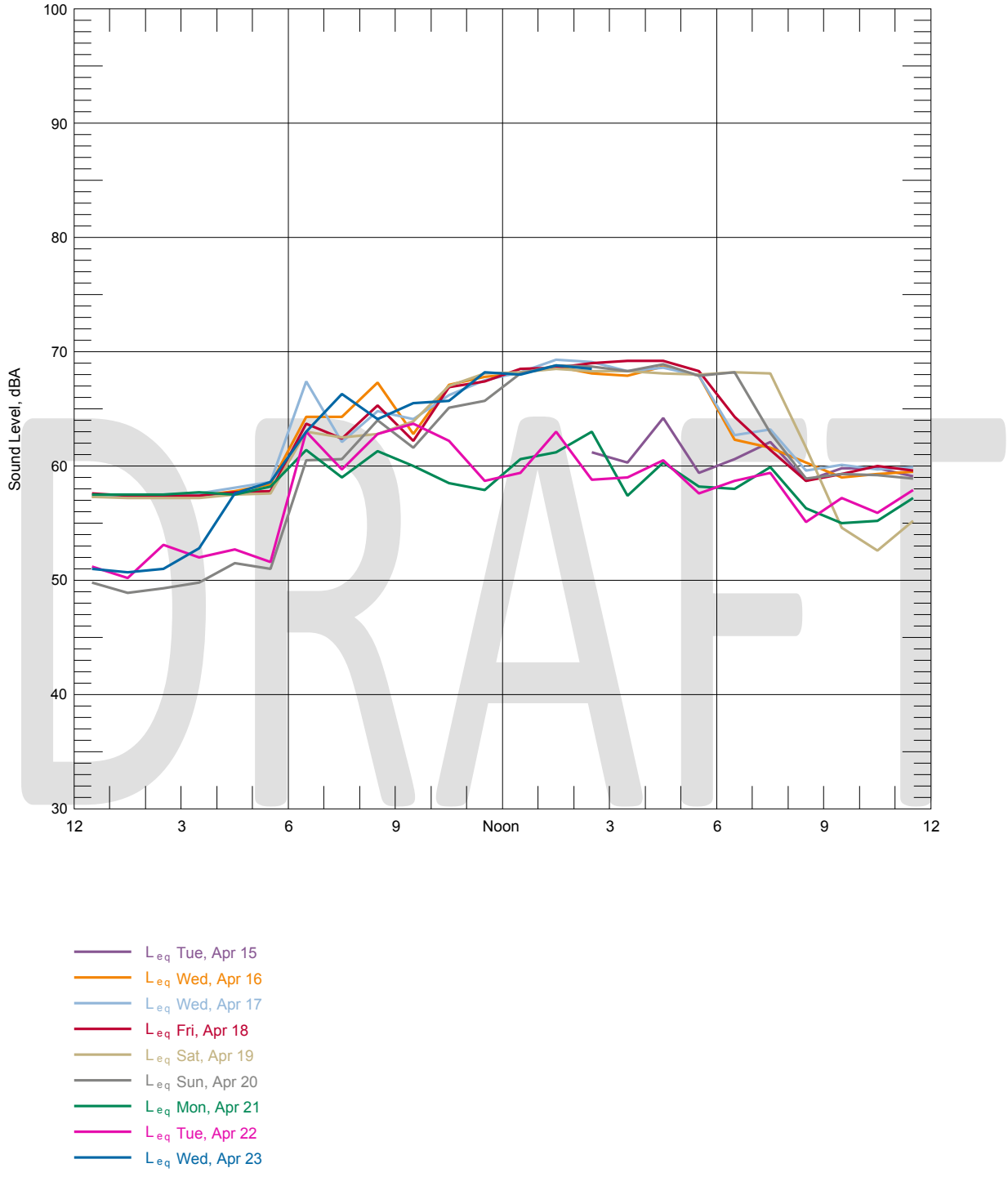

Figure A-17 L_{eq} Comparison at LT-2

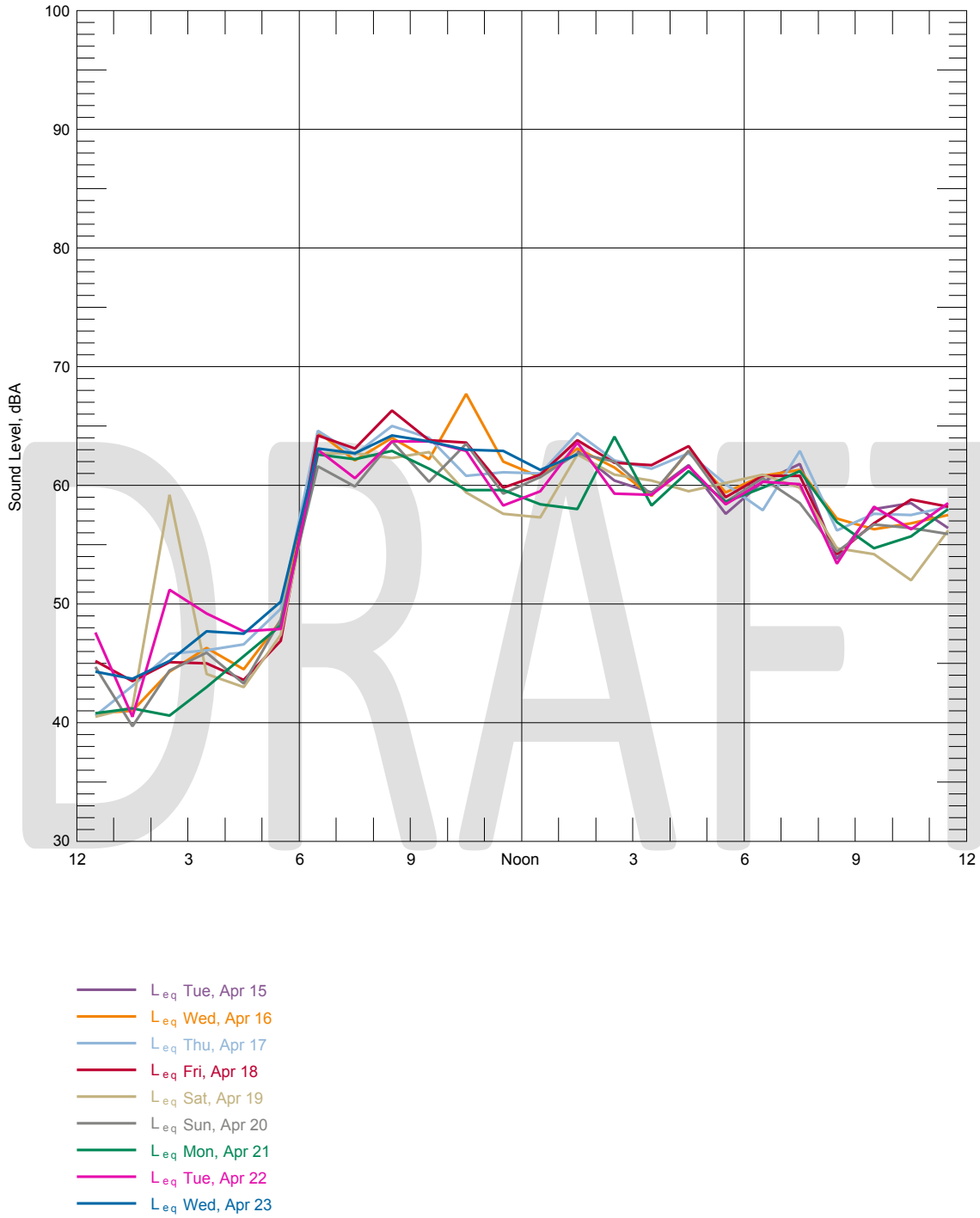

Figure A-18 L_{eq} Comparison at LT-3

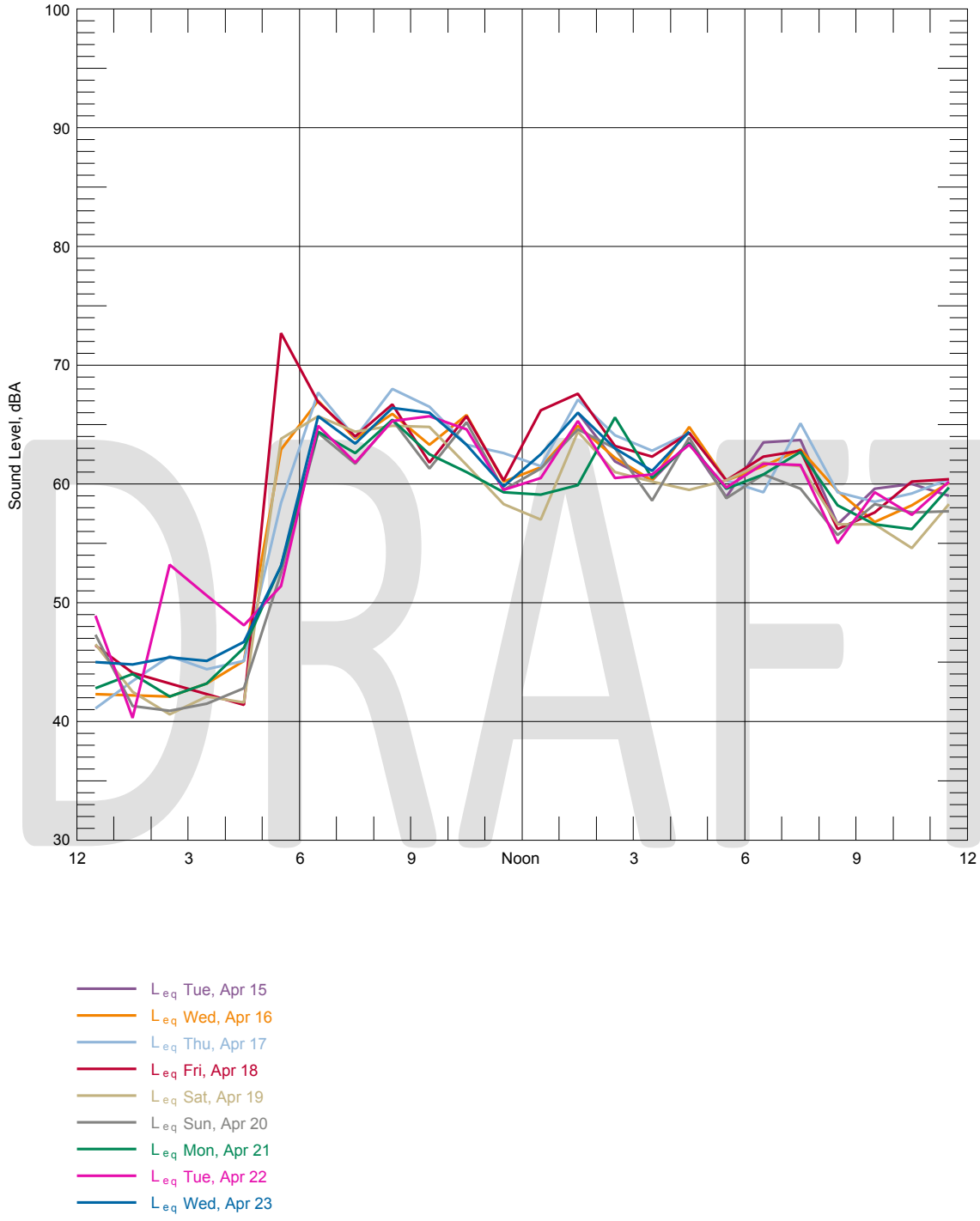

Figure A-19 L_{eq} Comparison at LT-4

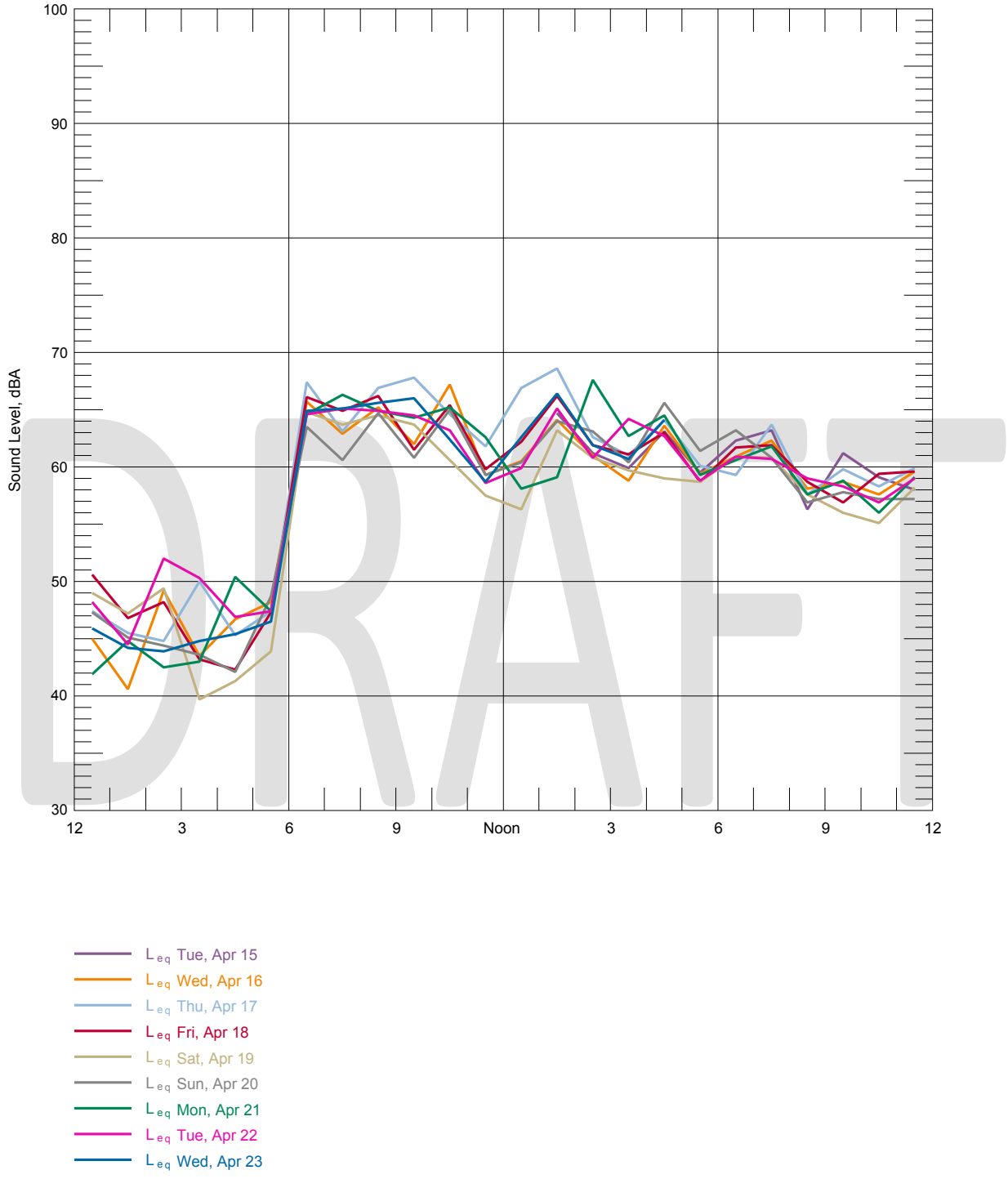

Figure A-20 L_{eq} Comparison at LT-5

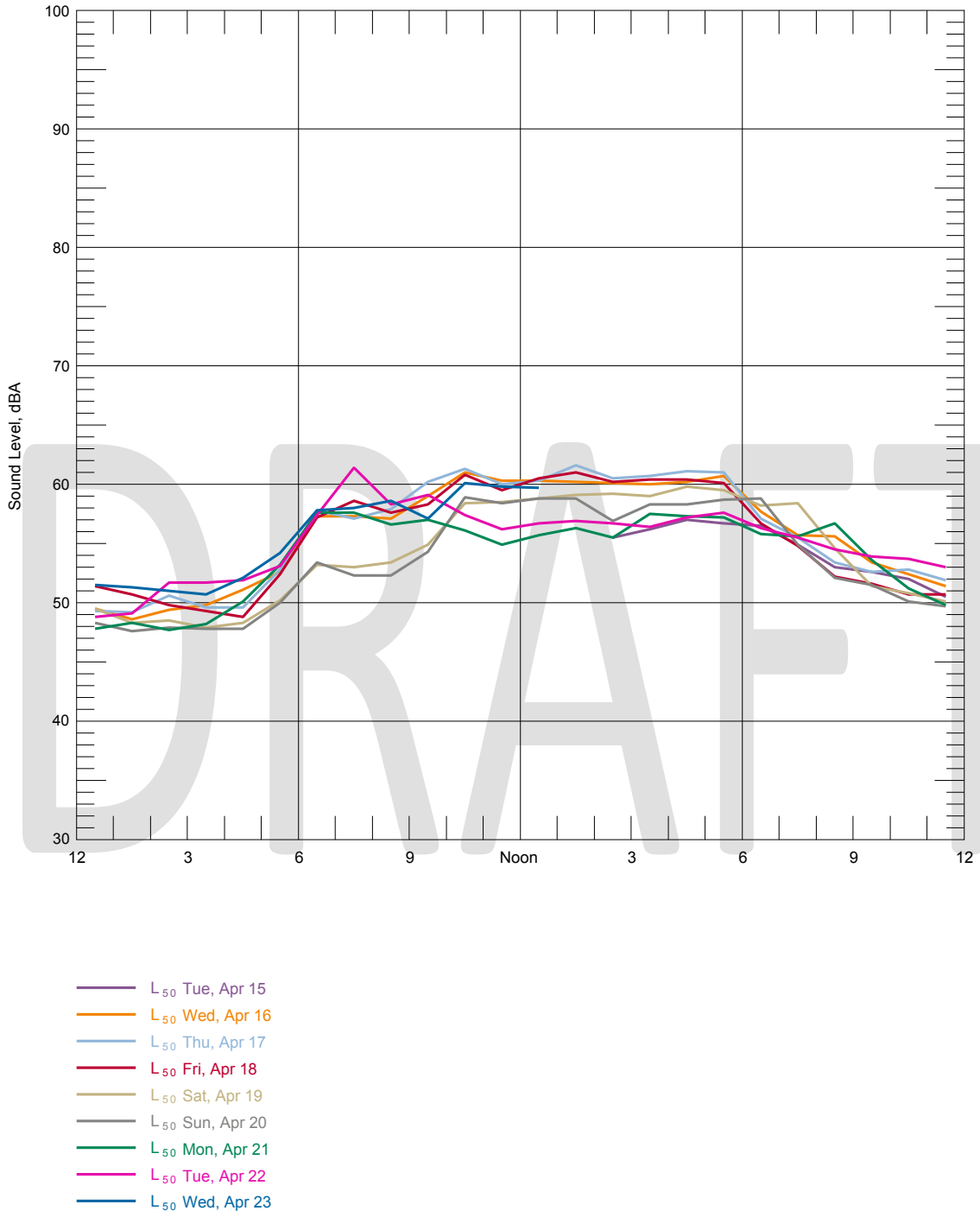

Figure A-21 L50 Comparison at LT-1

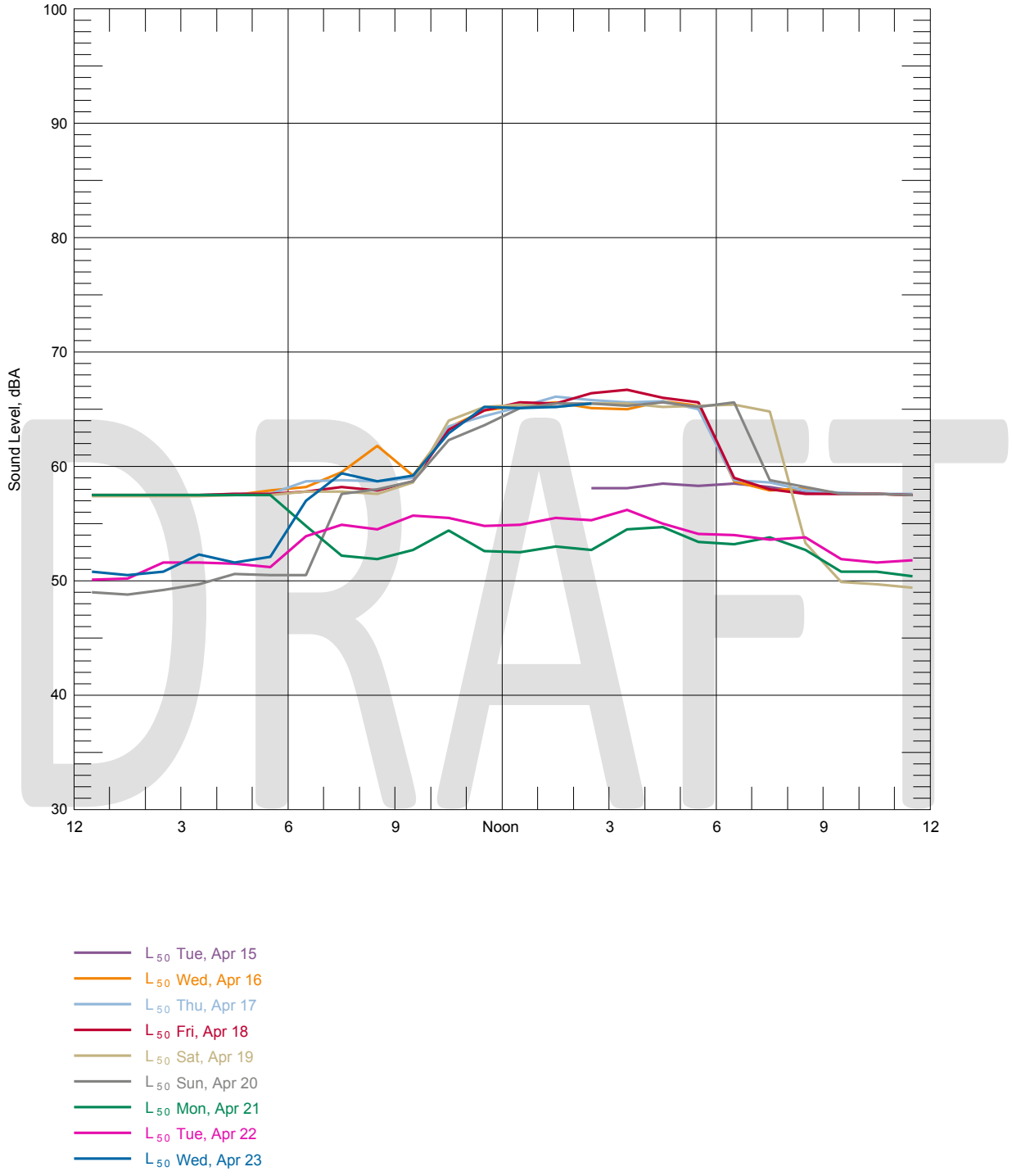

Figure A-22 L50 Comparison at LT-2

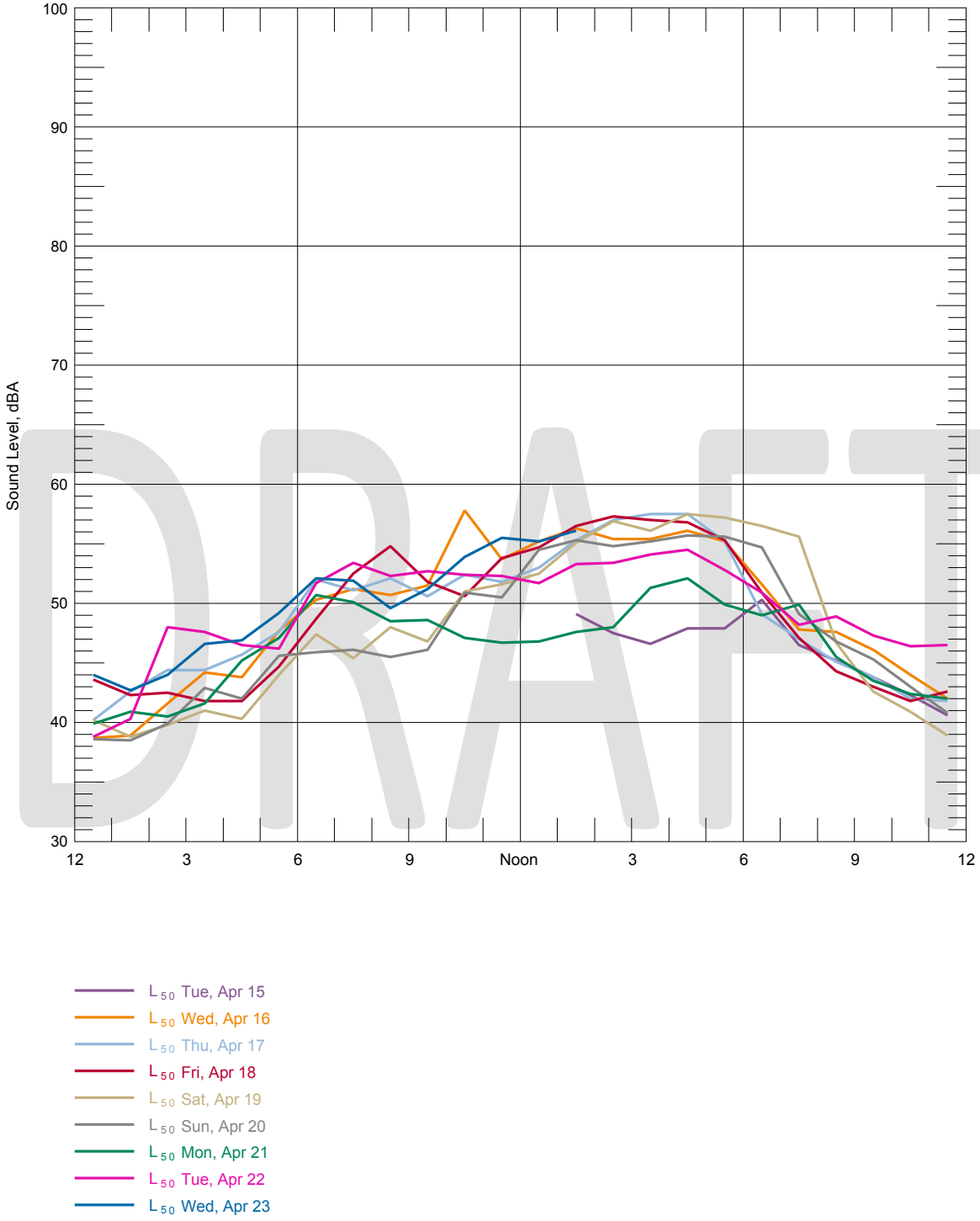

Figure A-23 L50 Comparison at LT-3

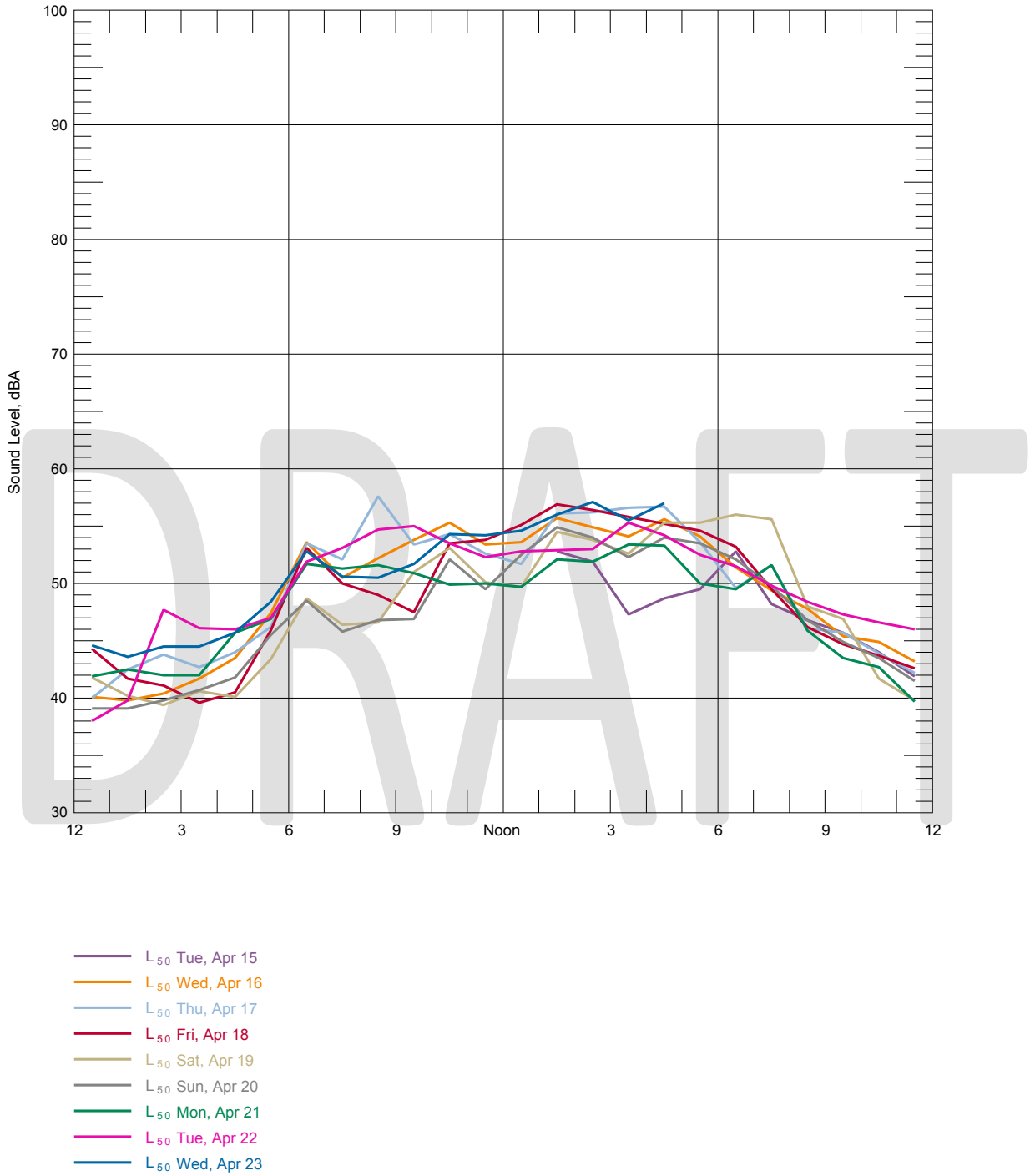

Figure A-24 L50 Comparison at LT-4

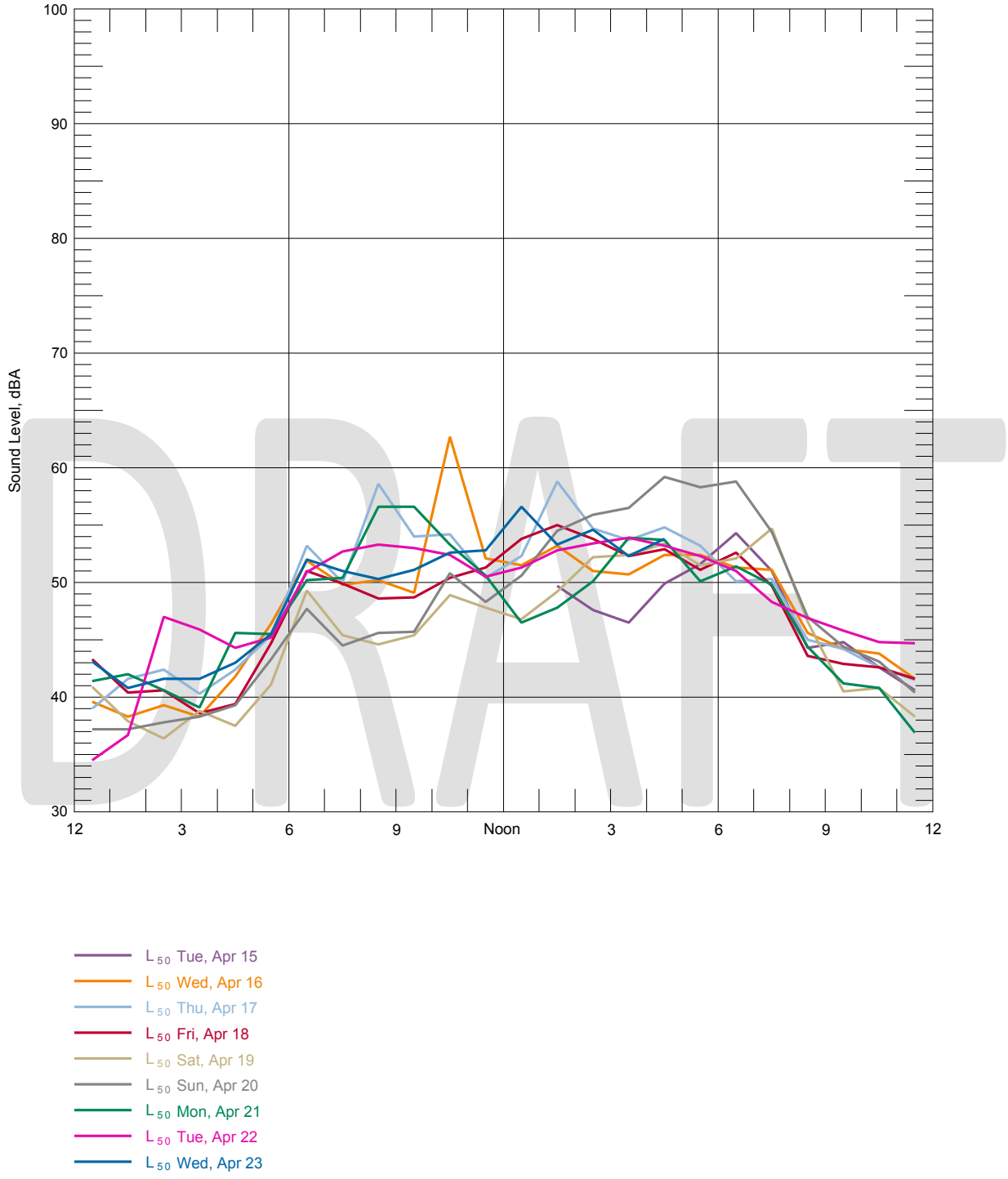

Figure A-25 L50 Comparison at LT-5

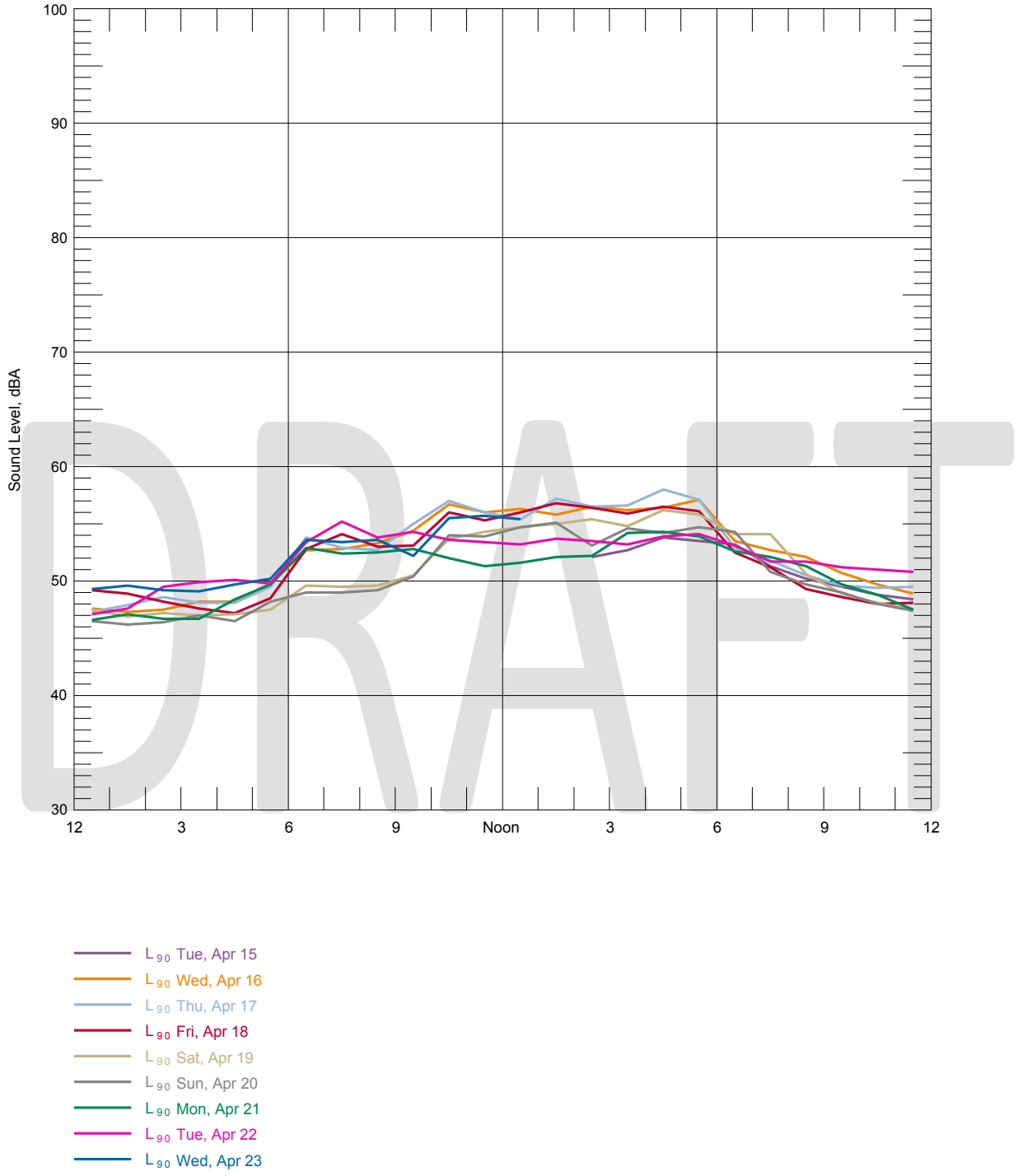

Figure A-26 L_{90} Comparison at LT-1

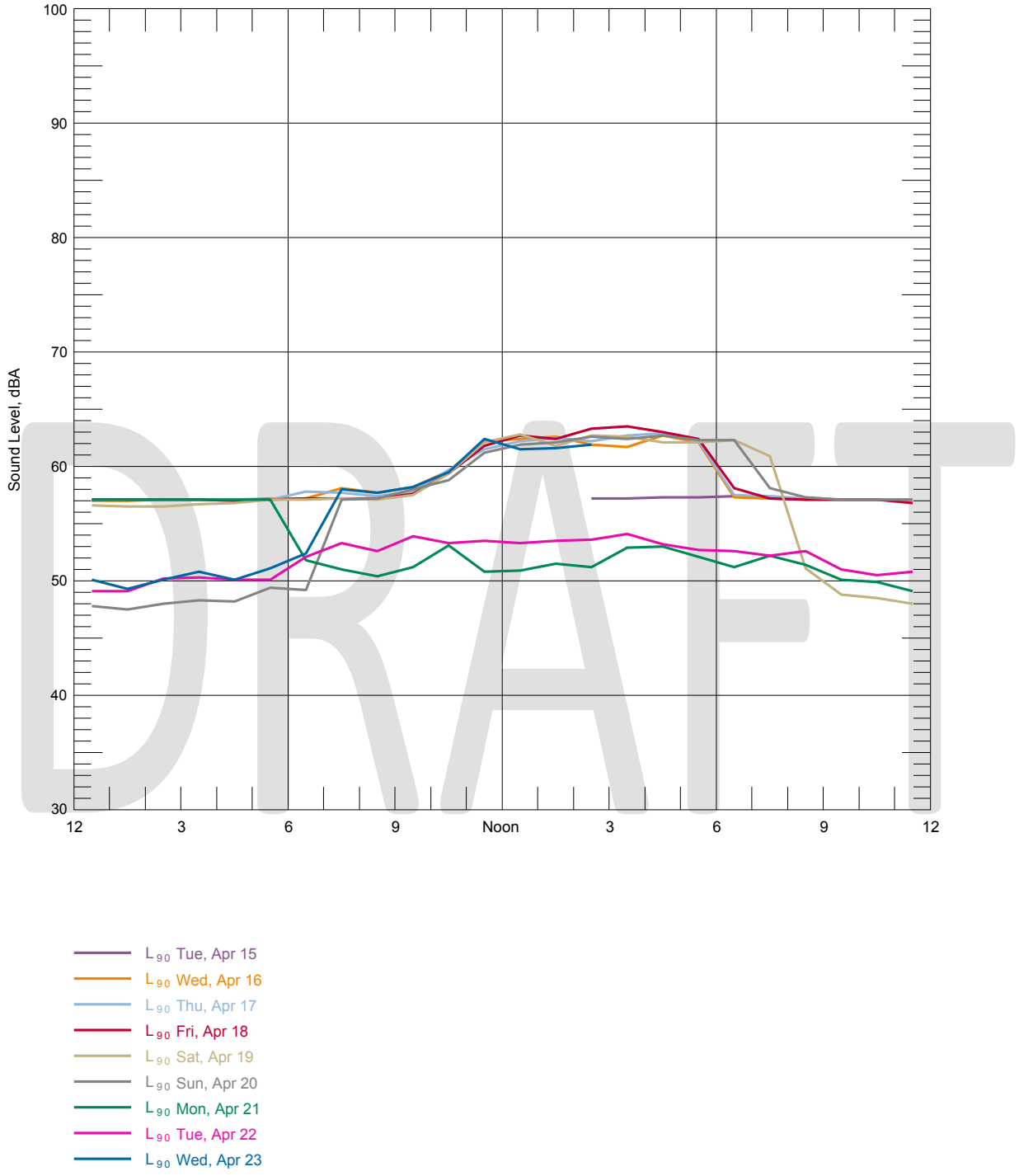

Figure A-27 L_{90} Comparison at LT-2

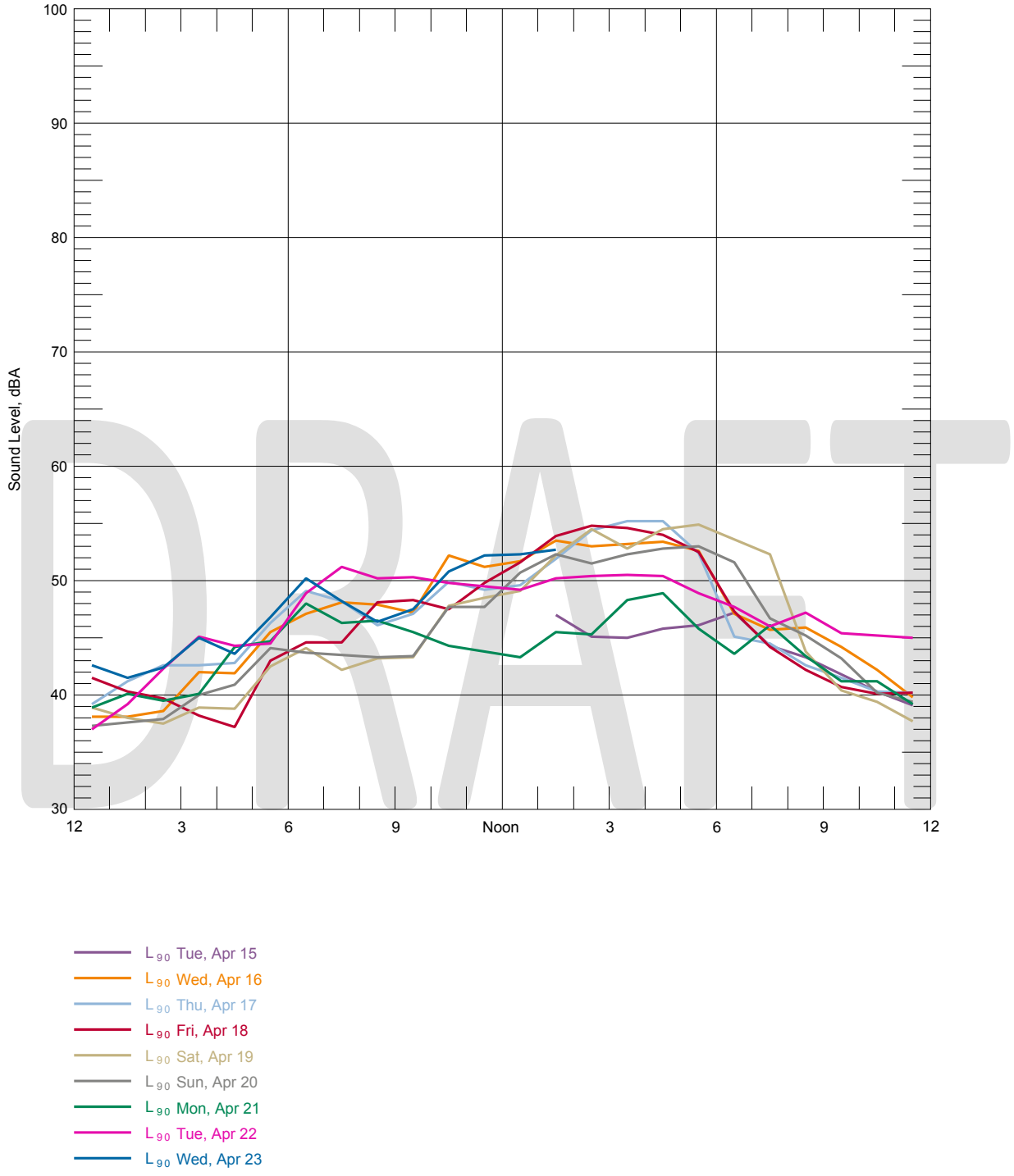

Figure A-28 L_{90} Comparison at LT-3

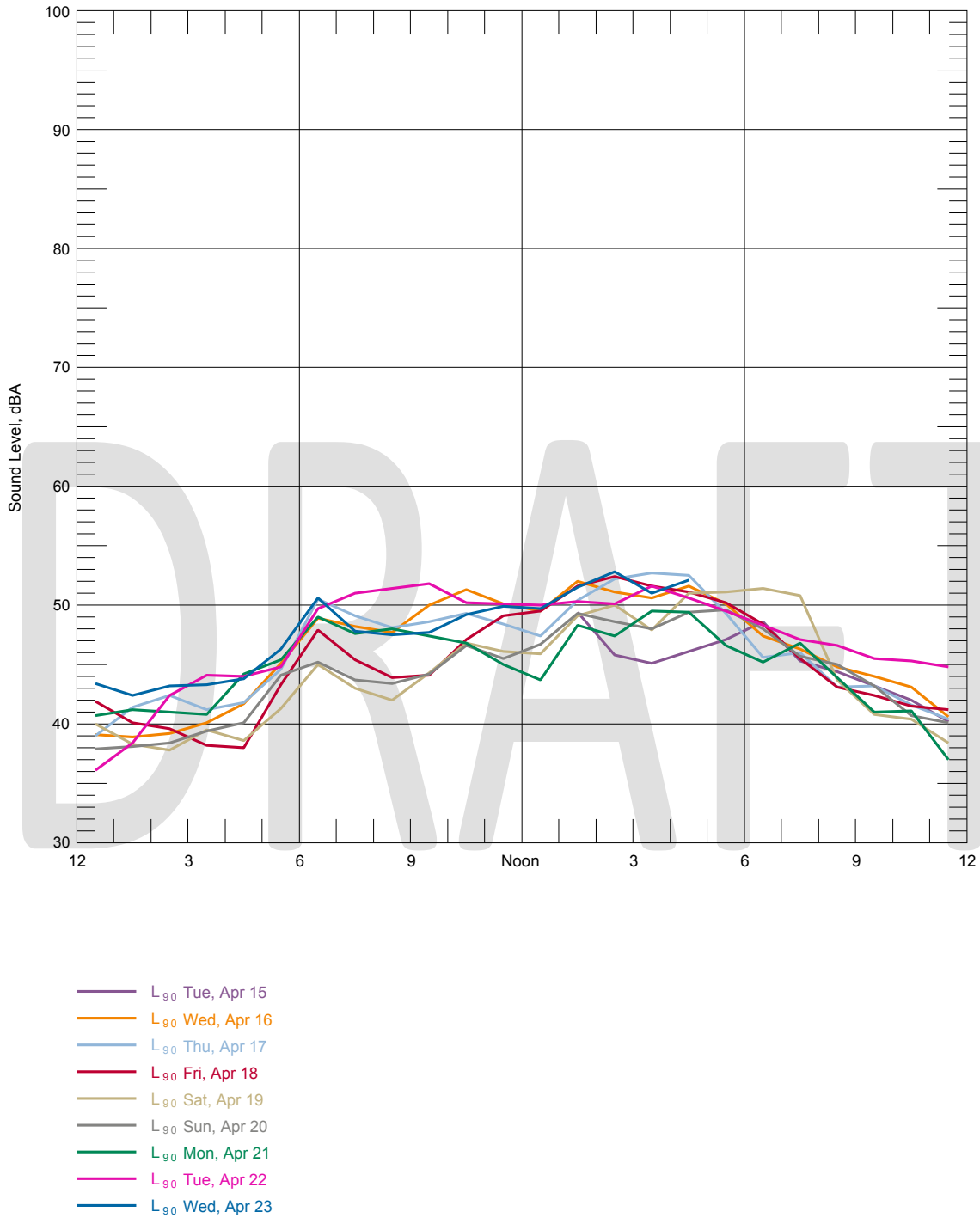

Figure A-29 L_{90} Comparison at LT-4

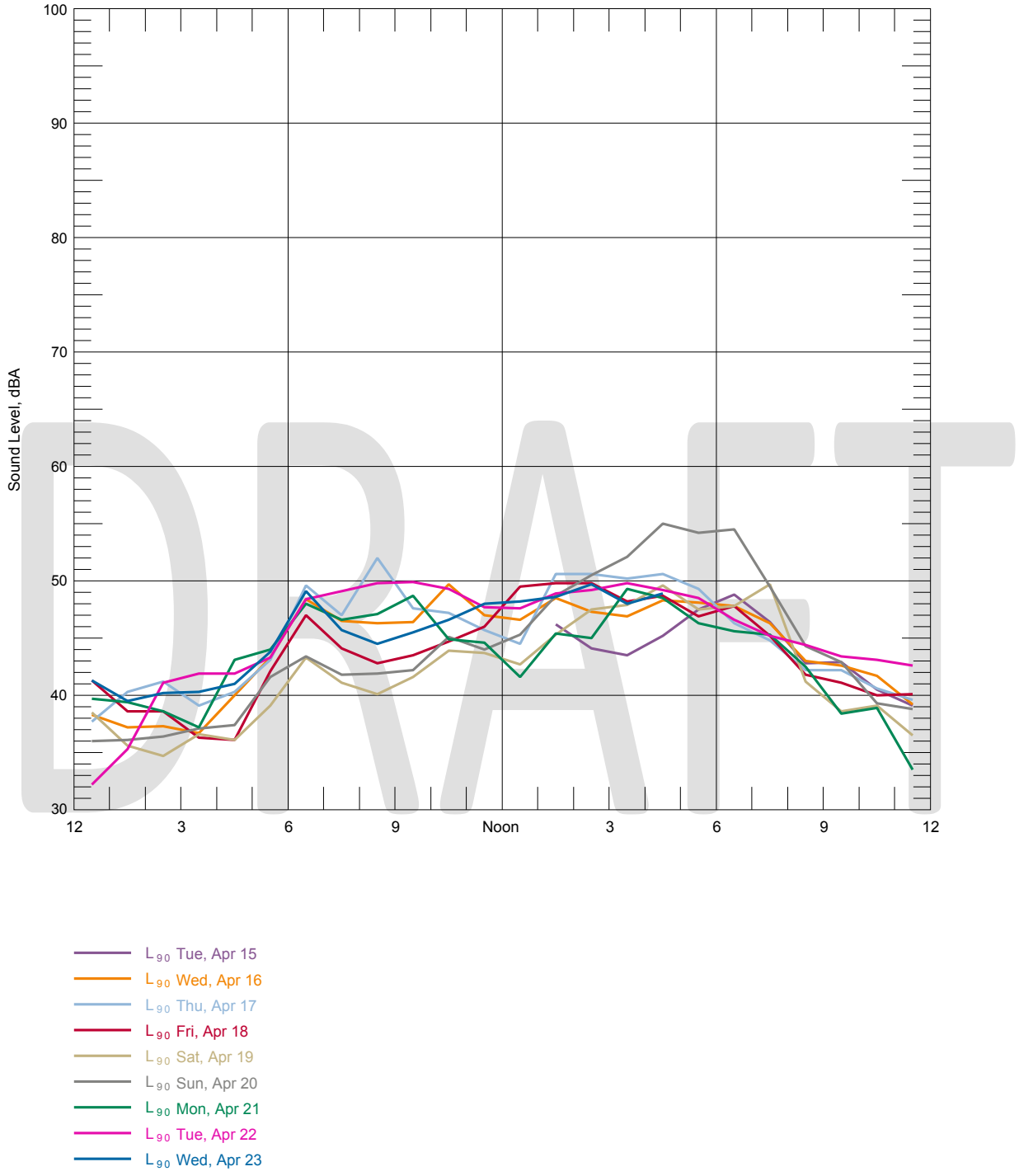

Figure A-30 L_{90} Comparison at LT-5

APPENDIX B – APPROVED AND PENDING PROJECTS

Santa Clara Approved Projects

Applicant/Owner/Project Name	Address/Location	Proposed Project Description
Intel SC-13	2250 Mission College Boulevard	100 ksf of office
Hewlett-Packard/Agilent Technologies	5301 Stevens Creek Boulevard	727.5 ksf of office
Gateway Santa Clara	3700 El Camin Real	476 Homes, 87 ksf of retail
Lawson Lane	2200 Lawson Lane	516 ksf of office
2350 Mission College Boulevard Office Retail	2350 Mission College Boulevard	300 ksf of office, 6 story parking garage, 6,000 s.f. of retail
NVDIA	2600, 2800 San Tomas Expressway, 2400 Condensa Street	1.2 m.s.f. of office
BAREC	90 Winchester Boulevard	165 apartment units
Augustine Bowers Industrial Campus/Equity Office	2620-2727 Augustine Drive	1,969.6 ksf of office, 35 ksf of retail
Fairfield Development	900 Kiely Boulevard	57 Single Family Homes, 68 Row Houses, 116 Townhouses, 525 Apartments
Yahoo!	5010 Old Ironsides Drive	3,060 ksf of office
Patrick Duran	4888 Patrick Henry	13,000 square foot addition to existing industrial/office
Brad Krouskup	4800 Great America Parkway	New 171,000 sq. ft. office building and new site improvements and two level parking garage
Mission College Master Plan	Mission College Boulevard and Great America Parkway	427 ksf expasion of the existing college
Elaine Breeze/Urban Planning Group	2645 El Camino Real	183 Apartments
Silicon Sage Builders	1460 Monroe Avenue	4-story mixed use development with 1,800 sq.ft. of ground floor retail and 18 residential
Laurelwood Office/Retail	2121 Laurelwood Road	217.7 ksf of office, 4,000 s.f. of retail
Cogswell College	5302 Betsy Ross Drive	Cosgwell Polytechincal College - private educational institution
Calvary Southern Baptis Church	3137 Forbes Avenue	construction of a new 2-story building, 14,000+ sq.ft. and parking, landscaping improvements
Prometheus	45 Buckingham and 66 Saratoga	4-story 222 multi-family res and wrap parking
Charles Mckeag	166 Saratoga Avenue	33 unit residential project on 1.74 acre site. Total building area 54K sq. ft.
Silicon Valley Builders	1313 Franklin Street	multifamily Residential project with 46 units and 16K or retail space and 4 stories
Silicon Valley Builders	555 Saratoga Avenue	3-story condominium project with 13 units
3000 Bowers office	3000 Bowers Avenue	New (2) 5-story 150ksf office building, (1) 2-story 17.4 ksf amenity building
Great America Parkway	4301 Great America Parkway	600 ksf of office
Irvine Co	3515 Monroe Street	825 housing units and 40ksf of retail
Jane Vaughn	3333 Scott Boulevard	581 ksf of office

Source: City of Santa Clara Planning Department October 2015

San Jose Approved Projects

Applicant/Owner/Project Name	Address/Location	Proposed Project Description
Lincoln Property	both side of Gold Street N/O of SR237	348,732 sf of office/r&d and commercial development
Legacy Terrace Development	Gold Street and SR237	985 ksf of research development, 175-room hotel
NSJ Phase I Project Trips	North San Jose Development Policy	6,675 msf of industrial space 425 ksf of commercial space 8,000 Residential units

Source: City of San Jose Traffix Database

Santa Clara Pending Projects

Applicant/Owner/Project Name	Address/Location	Proposed Project Description
Ray Hashimoto /HMH for River of Life Church	1177 Laurelwood Road	New 35K sanctuary structure adjacent to existing building
Washington Holdings/Kelly Snyder	2041 Mission College Boulevard	build 5 new retail buildings totaling 24,000 sq. ft., a 5-story 175-room hotel
Scott Menard	3305 Kifer Road	48 attached townhomes and stacked flats with 109 parking spaces
Irvine Company	575 Benton Street	5-story mixed use project consisting ground floor 25,942 sf commercial space and 417 apartments
Summerhill	2230 El Camino Real	164 apartment units
Pinn Bros	1890 El Camino Real	four story mixed use development consisting of 60 for sale units, 5,820 sq. ft. of commercial
Johnathon Fearn/Summerhill Homes	3505 Kifer Road	996 residential units with 37,000 square foot retail
Irvine	3265 Scott Boulevard	2,000 rental housing units 40,000 sf retail added
Lour Mariani	2570 El Camino Real	1.5 acre site w/315 dwelling units
Menlo Equities	3535 Garrett	eight story office and three level parking
Rashik Patel T2	2950 Lakeside Drive	New 7 story hotel with 188 rooms
Xeres Dupont Fabros	555 Reed Street	111,000 sf data center
Jeff Guinta	2580 Lafayette	Adult gymnasium
Lennar Commercial	3607 Kifer Road	5-level parking structure, 5-story 199,460 sq.ft. office building
MCA	3265 Scott Boulevard	Expansion of activities at Muslim Community Association to include new high school
City Place	5155 Stars and Stripes Drive	5.7M sq ft office; 1.1M sq ft retail; 1,360 mixed density residential units; 700 hotel rooms; 250K restaurant uses; 190K entertainment space

Source: City of Santa Clara Planning Department October 2015

San Jose Pending Projects

Applicant/Owner/Project Name	Address/Location	Proposed Project Description
NSJ Phase II Project Trips	North San Jose Development Policy	6,675 msf of industrial space 425 ksf of commercial space 8,000 Residential units

APPENDIX C – FIREWORKS NOISE MEASUREMENTS

On July 3, 2016, Wilson Ihrig measured fireworks noise for an unrelated project in Sebastopol, California. See the figure below for a time history of the event, which was measured at a distance of about 1,700 ft from the show/staging area. The table below summarizes the noise measurement results.

Table 29 Noise Measurements from July 3, 2016 Fireworks, Sebastopol, California

Noise Metric	Value (dBA)	Comment
Lmax	94	Show finale
L1	86	Infrequent maximum events
L10	79	Frequent maximum events
Leq	76	Energy average