PBS&J #7

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February 17, 2011

Mr. Mark Phillips
Brookfield Properties Management
601 South Figueroa Street, Suite 2200
Los Angeles, CA 90017

Re: Noise Standard Recommendations Pertaining to Proposed Wilshire Grand Redevelopment

Dear Mr. Phillips:

The Wilshire Grand redevelopment project is proposing helicopter operations that would negatively impact the noise environment affecting the holdings of Brookfield Properties Management, specifically 601 South Figueroa Street and 725 South Figueroa Street. For the purposes of this report, data specific to 601 South Figueroa Street is used and assumed to be consistent with 725 South Figueroa Street.

The Draft EIR for the Wilshire Grand redevelopment project measured noise impacts associated with the proposed helicopter operations in terms of the Community Noise Equivalent Level (CNEL). CNEL is a 24-hour weighted average measure of community noise. However, CNEL is not an appropriate standard to measure noise impacts associated with periodic high intensity, low frequency noise events typical of helicopter flight noise. Single-event noise level (SEL) is the maximum noise level at a given receptor resulting from a single event. This can be the over-flight of a single airplane, or the pass-by of one ambulance siren with respect to a receptor. SEL is measured in decibels (dB or dBA). While the Draft EIR for the Project predicted SEL for the helicopter flyovers only the CNEL standard was applied in determining the significance of these noise events. The purpose of this report is to provide guidance and recommendations on an appropriate and reasonable standard to apply to high intensity, low frequency noise events.

Noise Terminology

Noise is defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment. The unit of measurement used to describe a noise level is the decibel (dB). The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, the "A weighted" noise scale, which weights the frequencies to which humans are sensitive, is used for measurements. Noise levels using A weighted measurements are written as dB(A) or dBA. Decibels are measured on a logarithmic scale, which quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as doubling a traffic volume, would increase the noise level by 3 dBA; a halving of the energy would result in a 3 dBA decrease. Table 1 shows the relationship of various noise levels to commonly experienced noise events.

Table 1 Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at a Given Distance)	*Scale of A-Weighted Sound Level (dBA)*	*Noise Environment*	*Human Judgment of Noise Loudness (Relative to a Reference Loudness of 70 dB*)*
Military Jet Take-off with After-burner (50 ft) Civil Defense Siren (100 ft)	130	Carrier Flight Deck	
Commercial Jet Take-off (200 ft)	120	Airport Runway	Threshold of Pain *32 times as loud
Pile Driver (50 ft)	110	Rock Music Concert	*16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Power Lawn Mower (3 ft)	100	Boiler Room	Very Loud *8 times as loud
Motorcycle (25 ft) Propeller Plane Flyover (1,000 ft)	90	Printing Press Plant	*4 times as loud
Diesel Truck, 40 mph (50 ft) Garbage Disposal (3 ft)	80	High Urban Ambient Sound	*2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (3 ft) Electronic Typewriter (10 ft)	70	Busy Shopping Mall Indoor Sports Park	Moderately Loud *70 dB (Reference Loudness)
Normal Conversation (5 ft) Air Conditioning Unit (100 ft)	60	Data Processing Center Department Store	*1/2 as loud
Light Traffic (100 ft)	50	Private Business Office	*1/4 as loud
Bird Calls (distant)	40	Lower Limit of Urban Ambient Sound	Quiet *1/8 as loud
Soft Whisper (5 ft)	30	Rural Residential Area	
	20	Quiet Bedroom	Just Audible
	10		Threshold of Hearing

SOURCE: PBS&J, 2011

Existing Guidance in the Development of Standards

Much research has been done to quantify and qualify appropriate noise standards for safety, interference, and annoyance. The World Health Organization (WHO) has published literature illustrating the impact of noise on human activity:

> It is evident that when a task involves auditory signals of any kind, noise exposure at an intensity sufficient to mask or interfere with the perception of these signals will interfere with the performance of the task. Mental activities involving sustained attention to multiple cues, high load in working memory, and complex analytical processes are sensitive to noise exposure. A novel event, such as the start of an unfamiliar noise, will cause distraction and interfere with many kinds of tasks. (WHO 1995)

Source noise from the arrival, landing, take off, and departure of a helicopter would be a novel event as described by the WHO, and stand out above the ambient noise levels as a distraction to employees in

601 South Figueroa Street. As discussed in a report prepared for the U.S. Navy, helicopter noise is particularly distinctive:

> Aircraft noise is disturbing to people because of several different factors. First the sound may include a combination of low frequency rumble and the throbbing of helicopters. Second, unlike highway noise which is generally constant and may fade into the background, each aircraft overflight is likely to be recognized as a distinct event, calling attention to itself when it interrupts speech or some other activity ... Helicopters produce high sound levels at 10 to 80 Hz. Due to the strong low-frequency content of noise from helicopters, noise from this type of aircraft can more easily penetrate into a house than can noise from a military jet aircraft. The noise generated by these aircraft is more difficult to attenuate than the higher frequency military aircraft noise. (Wyle Acoustics Group 2005)

Based on the unique and pervasive noise associated with helicopter operations, standards have been developed to adequately protect sensitive uses from these noise impacts. In the U.S. Navy report, land uses for business and professional services are compatible with exterior noise zones ranging from less than 55 dB to 69 dB CNEL, require 25 dB of outdoor to indoor noise level reduction (NLR) in exterior noise environments from 70 to 74 dB CNEL, require 30 dB of NLR in exterior noise environments from 75 to 79 dB CNEL, and are not compatible with exterior noise environments of 80 dB CNEL or higher. However, CNEL contour maps do not exist for the proposed Wilshire Grand heliport, and it is infeasible to assume their dimensions at this time. Noise Criterion (NC) have been established in the United States for rating indoor noise. For typical office settings, a NC rating of NC-35 is appropriate, which roughly equates to an interior noise level of 45 dBA.

Existing Conditions

Noise readings were taken at 601 South Figueroa Street on February 15, 2011, and the results are displayed in Table 2 (Noise monitoring locations are identified in Figures 1-4).

Table 2 Existing Noise Levels at 601 South Figueroa Street

	Location	Primary Noise Sources	Secondary Noise Sources	Noise Level Statistics		
				L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)
1	Street Level, Northwest Corner of Wilshire Boulevard and South Figueroa Street	Road Traffic on Wilshire Boulevard and South Figueroa Street	Pedestrians	69.7	63.2	80.8
2	7th Floor, Southwest Side, Open Office Space	Road Traffic on Wilshire Boulevard and South Figueroa Street	Ambient Building Noise	45.5	43.8	51.8
3	37th Floor, Southwest Side, Corner Office	Ambient Building Noise	None	44.0	43.0	50.3
4	51st Floor (Roof), Southwest Side, Overlooking Parapet	HVAC Cooling Towers on Wilshire Grand Hotel	110 Freeway, Traffic on South Figueroa Street	66.1	63.4	81.9

SOURCE: PBS&J, February 15, 2011

These readings were taken in order to show the attenuation factor of the building on existing noise conditions. Attenuation of street noise, demonstrated by the L_{eq} readings from Locations 1 and 2, is 24.2 dBA. Attenuation of rooftop noise, demonstrated by the L_{eq} readings from Locations 3 and 4, is 22.1

dBA. The lower attenuation value of associated with the building envelope at the upper floors of the building is due to the amount and thickness of the glass glazing on the upper floors as compared to more structural massing and the amount of glass on the ground floor. Since the proposed heliport would be near or above the rooftop of 601 South Figueroa Street, a conservative attenuation of 22 dBA is assumed for the existing building materials.

Recommendations

Based on the existing noise standards and existing conditions, PBS&J recommends a maximum interior noise threshold of 55 dBA SEL that cannot be exceeded by helicopter operations at the proposed Wilshire Grand heliport. This is in line with standards proposed by the WHO and U.S. Navy reports discussed above, which discuss interior exposure estimates relating to speech interference. As discussed in our previous report, helicopter noise at the upper levels of 601 South Figueroa Street could cause exterior noise levels as high as 97 dBA SEL. In order to achieve the interior standard of 55 dBA during helicopter events, a number of factors need to be considered. First, the building would attenuate approximately 22 dBA, bringing interior levels down to 75 dBA. Additionally, research is being conducted in Europe by Eurocopter, an EADS company, in conjunction with the Clean Sky JTI, in order to reduce the environmental impact of helicopters. With their bluecopter technology, they are hoping to achieve a noise reduction of up to 10 dB with the use of blue-edge blades and blue-pulse control (Eurocopter 2010). By requiring all helicopter operations at the Wilshire Grand heliport to take advantage of this new technology, which is expected to be available by the time operations would commence, an additional 10 dB reduction could be accomplished, bringing the noise level to 65 dBA inside the building. This is approaching the level where spoken speech with slightly more vocal effort can be understood (WHO 1995).

In order to achieve the additional 10 dBA reduction required to comply with the recommended 55 dBA standard, modifications to the building would be necessary. Certain glazings and window constructions have been shown to reduce interior noise levels more than 10 dBA when compared to other glazings with regards to helicopter noise impacts (Wilson, Ihrig & Associates, Inc. 2007). Retrofitting 601 South Figueroa Street would be necessary to accomplish such an installation. Retrofitting of 725 South Figueroa Street would also likely be necessary if extrapolating the noise results. Timing and frequency of helicopter trips could be adjusted during non-business hours, i.e. prior to 8:00 a.m. or after 7:00 p.m. These are feasible mitigation measures to reduce the noise impacts of the proposed heliport operations. However, outside of retrofitting the building, no feasible mitigation currently exists to bring interior noise levels to a recommended 55 dBA during helicopter trips to the proposed Wilshire Grand redevelopment project.

Sincerely,

Karl Fielding
Environmental Consultant

Attachments
Attachment A: Figures 1–4 (Noise Monitoring Locations)
Attachment B: References