

April 24, 2014

MEMORANDUM

To: Joy Navarrete, Planning Department, City and County of San Francisco

From: Kevin Warner
Kristen Wallace

Cc: Therese Brekke, Lennar Urban

Subject: Noise and Vibration Impact Assessment for the Automated Waste Collection Systems in the Candlestick Point-Hunters Point Shipyard Phase II Development Plan
Planning Department Case File No: 2007.0946E

Introduction

The Environmental Impact Report (EIR) for the Candlestick Point – Hunters Point Shipyard Phase II Development Plan (San Francisco Planning Department Case Number 2007.0946E) was certified by the City in June 2010. The 2010 EIR analysis included discussion of an Automated Waste Collection System (referred to herein as AWCS) in the Utilities Variant. The project sponsor, Lennar Urban, is seeking approval of the AWCS and additional details about the design are now available. This memorandum evaluates noise and vibration impacts of the proposed AWCS in light of the analysis and conclusions reached in the 2010 EIR.

Project Description

The AWCS is a type of waste collection. Instead of implementing the traditional method where waste trucks pick up trash on the side of the road, users will deposit their waste into inlets to an underground distribution network that leads to the AWCS Facility.

Separate inlets for regular trash, recycling items, and compostables will be located in every building and at appropriate public locations. Waste would enter the underground distribution network of piping periodically throughout the day. The pipe transports waste using vacuum pressure and air velocity created by electrically powered large suction fans. Once the waste reaches the facility, the waste is separated from the transport air with a cyclone separator. The waste is then compacted with a compactor feed hopper and stored in separate 40 cubic yard containers, one for each waste stream – trash, recycling and compostables. When the containers of waste are full, trucks will transport the full container to either Recology's Tunnel Beatty Site (for trash and compostables) or their recycling facility at Pier 96 (recycling). An estimate of seven trucks per day would be needed to transport the full containers. The fans and other collection equipment will be fully enclosed within buildings. One collection facility will be located on top of the parking garage for the retail center in Candlestick Point at the southwest corner of the intersection of Arellous Walker Way and Ingerson Avenue. The other two collection facilities will be located in Hunters Point Shipyard – one near Crisp and Ring Roads in a Research and Development area and one at Spear Avenue near C Street in a Research and

Development area. Before the construction of the AWCS facilities is complete, Recology will handle waste collection using its current waste cart and collection truck methods.

Construction

The 2010 EIR identified three construction related noise and vibration impacts:

- *Impact NO-1(a-c): Construction activities associated with the Project would generate increased noise levels for both off-site and on-site sensitive receptors; however, the Project's construction noise impacts would occur primarily in noise-sensitive areas adjacent or near to active construction sites (which would vary in location and duration over the entire period the proposed Project would be under construction); they would also not occur during recognized sleep hours, and would be consistent with the requirements for construction noise that exist in Sections 2907 and 2908 of the Municipal Code. (Less than Significant with Mitigation)*
- *Impact NO-2(a-c): Construction activities associated with the Project would create excessive groundborne vibration levels in existing residential neighborhoods adjacent to the Project site and at proposed on-site residential uses should the latter be occupied before Project construction activity on adjacent parcels is complete. Although the Project's construction vibration impacts would be temporary, would not occur during recognized sleep hours, and would be consistent with the requirements for construction activities that exist in Sections 2907 & 2908 of the Municipal Code, vibration levels would still be significant. (Significant and Unavoidable with Mitigation)*
- *Impact NO-3: Construction activities associated with the Project would result in a substantial temporary or periodic increase in ambient noise levels. (Significant and Unavoidable with Mitigation)*

The construction noise and vibration impact assessment described in the 2010 EIR included construction activities in the areas where the AWCS are proposed to be located. Thus, the construction impacts of the AWCS were included in the 2010 EIR analysis. Consequently, the findings of the 2010 EIR for *Impact NO-1*, *Impact NO-2*, and *Impact NO-3* would not change based on the additional detail now available for the AWCS.

Operation

The 2010 EIR identified the following five noise and vibration impacts related to long-term operation of the Project:

- *Impact NO-4: Implementation of the Project, including the use of mechanical equipment or the delivery of goods, would not expose noise-sensitive land uses on or off site to noise levels that exceed the standards established by the City. (Less than Significant)*
- *Impact NO-5: Implementation of the Project would not generate or expose persons on or off site to excessive groundborne vibration. (Less than Significant)*
- *Impact NO-6: Operation of the Project would generate increased local traffic volumes that could cause a substantial permanent increase in ambient noise levels in existing residential areas along the major Project site access routes. (Significant and Unavoidable)*

- *Impact NO-7: Noise during football games and concerts at the proposed stadium would result in temporary increases in ambient noise levels that could adversely affect surrounding residents for the duration of a game or concert. (Significant and Unavoidable with Mitigation)*
- *Impact NO-8: Implementation of the Project would not expose residents and visitors to excessive noise levels from flights from San Francisco International Airport such that the noise would be disruptive or cause annoyance. (Less than Significant)*

Regarding *Impact NO-6*, the original Project analyses estimated over 500 trucks per day would be generated by the Project and is assumed to have included truck travel in a traditional waste collection system. The AWCS would not increase the truck travel on the main roads and would decrease travel on small residential roads. Thus, the impact of seven daily trucks (14 one-way trips) associated with each of the collection facilities were included in the EIR noise impact analysis, and the additional detail now available for the AWCS facilities would not change the conclusions of *Impact NO-6* regarding traffic noise levels. No further analysis of traffic-related noise is considered here.

Regarding *Impact NO-7*, the current Project does not include the stadium, and any noise impacts associated with the stadium are no longer relevant.

Regarding *Impact NO-8*, the original Project analysis assessed the potential for exposure of residents and visitors to excessive noise levels from flights to or from San Francisco International Airport. The inclusion of the AWCS facilities would replace the more traditional trash collection system for the developed area of the project site and would not change or influence the provision of residential or visitor uses in the project. Consequently, the AWCS facilities would not alter the conclusions identified in *Impact NO-8*.

Inclusion of the AWCS facilities could potentially alter the conclusions of *Impact NO-4* and *Impact NO-5*. Therefore, this supplemental assessment focuses on noise and vibration from operation of the AWCS potentially affecting nearby sensitive receptors. Below we describe the methods used in this supplemental noise and vibration impact assessment to determine whether the proposed AWCS facilities would result in any new significant noise or vibration impacts beyond those identified in the EIR or substantially increase the severity of a previously identified significant impact.

AWCS Noise Levels

To characterize the noise and vibration of the proposed AWCS equipment and processes, ENVIRON visited an AWCS collection facility at Swedish Medical Center in Issaquah, Washington. The Swedish Medical Center system is similar to, though smaller than, the AWCS facilities proposed for the Candlestick Point and Hunter's Point developments.

Fan Room – The fan room of the Swedish Medical Center AWCS contains two 100 horsepower (hp) fans and a compressor. When the fans and compressor were operating at full power, the measured sound level inside the fan room was 88 dBA. Because the proposed AWCS facilities at Candlestick Point and Hunter's Point are expected to contain four 250 hp fans and two compressors, the sound level inside the proposed fan rooms could be as high as 7 dBA louder than measured at the Swedish Medical Center facility, resulting in an estimated sound level of 95 dBA inside the fan rooms.

The following design features are expected to reduce the sound levels of the fans and compressors at locations outside of the Candlestick Point and Hunter's Point AWCS facilities:

- The fan rooms would be contained within the larger AWCS buildings
- The walls of the fan rooms are proposed to be constructed of filled concrete block
- The fans would be wrapped with acoustical blankets
- The fans would be connected to the ducting with resilient collars
- Fan exhaust would travel through a silencer, several filters, and an acoustic louver prior to exiting outside

Exhaust Louver – Each AWCS facility would include an exhaust louver on the outside wall of the facility. The measured sound level of the exterior exhaust louver during full operation of the fans at the Swedish Medical Center was 51 dBA at 25 feet (adjusted from 60 dBA at a distance of 8.5 feet).

Waste Collection Area – The collection areas of the proposed AWCS facilities would include four compactors/cyclones and ducting through which the collected material would travel. During the visit to Swedish Medical Center, ENVIRON measured a sound level of approximately 75 dBA at 25 feet due to trash flowing through ducting. However, this activity occurs only sporadically (assumed to be 5 minutes or less per hour), and the hourly L_{eq} was estimated to be approximately 64 dBA at 25 feet.¹

The sound level of the compactors was provided to ENVIRON by TransVac and is estimated to be approximately 57 dBA at 25 feet. For this assessment, the compactors were assumed to operate continuously, although they are not compacting trash the majority of the time.

The collection areas would be enclosed within the AWCS buildings but would include two sliding doors to allow truck access to the waste containers. The doors would remain closed until trucks arrive to remove full waste containers or to deliver empty containers.

Noise Model

ENVIRON conducted noise modeling of the AWCS facilities using Datakustik's CadnaA noise model, version 4.3.143, based on ISO 9613-2 calculation methods. CadnaA is similar to the model used in the EIR (SoundPLAN) and considers frequency-specific sound level data, topography, intervening buildings, barriers, atmospheric conditions, and other factors. The model allows the user to input frequency-specific sound level data based on measurements or manufacturer specifications.

Using source data captured at the Swedish Medical Center AWCS and/or provided by TransVac, ENVIRON modeled the sound levels of the three proposed AWCS facilities Candlestick Point and Hunter's Point. Noise model receptors were selected based on proximity of sensitive uses to the proposed AWCS facilities. Modeled levels were predicted at the nearest existing off-site residential receivers, nearest proposed on-site residential receivers, and if applicable, nearest non-residential noise-sensitive receivers.

¹ The L_{eq} is the constant sound level that would contain the same acoustic energy as the varying sound level during the same time period (i.e., the average noise exposure level for the given time period).

Noise Standards

As for the noise assessment conducted for the EIR, ENVIRON compared the modeled sound levels to the noise standards established by the City of San Francisco (section 2909 of the San Francisco Noise Ordinance). For dwellings, the City applies a noise limit of 45 dBA between 10 PM and 7 AM (55 dBA between 7 AM and 10 PM) at locations inside a sleeping or living room. For this assessment, we assumed the windows would be open for ventilation and applied the noise limit at the exterior wall of the nearest dwellings. We also assumed the facilities could operate day or night, and applied the more restrictive nighttime noise limit of 45 dBA at the nearest dwellings. The City noise limits are applied to specific facility-related noise, not to the overall noise levels (i.e., not to the existing ambient levels plus the Project noise).

The City Noise Ordinance also restricts increases over ambient noise levels to 5 dBA when emanating from a residential use or 8 dBA when emanating from a commercial/industrial land use. Because this is a commercial use, the increase would be restricted to 8 dBA at neighboring properties. Existing ambient sound levels were based on the measured off-site ambient levels identified in the EIR. The ambient noise level can be established through measurement, but in no case shall it be considered to be less than 45 dBA in exterior locations.

Model Results and Conclusions

Using the equipment sound level assumptions identified above, ENVIRON modeled the sound levels of the AWCS facilities at the Candlestick Point, Hunter's Point South, and Hunter's Point North facilities. Results of the AWCS noise modeling assessment are summarized in **Table 1**.

Table 1. Noise Modeling Results, AWCS at Candlestick Point and Hunter's Point (dBA)

AWCS Location	Receiver Type	Ambient Levels (dBA, L90) ^a	Modeled Levels (Leq, dBA) ^b			Notes
			AWCS	Overall	Increase	
Candlestick Point	Nearest Proposed On-Site Residence	46	38	47	1	Approximately 110 feet north of the AWCS facility
	Nearest Existing Off-Site Residence	46	21	46	0	Approximately 500 feet northwest of the AWCS facility
	Nearest Proposed Commercial	46	43	48	2	Movie Theater, approximately 50 feet south of the AWCS facility
Hunter's Point South	Nearest Off-Site Residence (under construction)	45	29	45	0	Approximately 200 feet northwest of the AWCS facility
Hunter's Point North	Nearest Proposed On-Site Residence	45	32	45	0	Approximately 110 feet northwest of the AWCS facility

Note: Apparent mathematical errors in the displayed increase are due to rounding to the whole number, not due to calculation errors.

^a The ambient level at the locations near the Candlestick Point development was considered to be the lowest of the measured ambient levels (identified as 46-50 dBA) at location N6 in EIR Table III.1-4. The ambient level near the Hunter's Point developments was considered to be 45 dBA, since most of the measured levels identified for location N3 in EIR Table III.1-4 were less than 45 dBA.

^b Because the analysis assumed most of the equipment would operate continuously at full capacity, the modeled hourly Leq levels can be considered similar to the L90 levels (i.e., the level exceeded 90% of the time). The only exception is the sound from trash traveling through the ducts in the collection facility. The L90 level would not include this activity since it would occur less than 90% of an hour (i.e., less than 6 minutes per hour), but the modeled hourly Leqs include some of this sound energy. Therefore, the results can be considered conservative.

As shown in **Table 1**, the modeled sound levels of the AWCS facilities at the nearest existing or proposed residential dwellings to each proposed facility are 43 dBA or less. This would comply with the City's interior nighttime noise limit of 45 dBA applied to specific Project-related noise. Additionally, note that predicted sound levels are at the outside plane of a window, and not inside a living space. It is expected that, even with windows open, interior levels would be slightly lower than outside the building envelope.

In addition, the estimated increases over ambient levels at the nearest sensitive receivers to each site are 2 dBA or less, which would comply with the City's restriction on increases to 8 dBA or less due to commercial/industrial uses.

Based on the above, noise levels are expected to comply with the San Francisco Municipal Code, and thus the impact would be less than significant. These findings are consistent with the findings outlined in *Impact NO-4*.

Waste Collection Noise Levels

As part of this review, ENVIRON also considered potential noises associated with the collection of the waste containers at the AWCS facilities. To characterize these sources, ENVIRON observed and measured a container pickup and drop-off at two different sites. Both the pickup and drop-off included brief, loud noises from the arrival and departure of a diesel truck, brake releases, the truck engine revving to lift the bed of the truck and pull up or lower the container, minor clanks and bangs, and the truck engine idling while the driver prepared the container for pickup or release.

Because the waste collection truck is not a fixed source, it would not be subject to the interior noise limits for residences as identified in section 2909 of the San Francisco Noise Ordinance (i.e., 55 dBA during the day and 45 dBA at night inside sleeping or living rooms). Furthermore, because the collection noise would occur only for short periods during the seven container pickups/drop-offs daily, it would not affect the ambient levels (as characterized by the L90 in the EIR).² Therefore, although the waste collection activities would produce brief, loud noises, these types and levels of noise would fall within the range of ordinary urban noise and would not result in significant noise impacts. These findings are consistent with the findings outlined in *Impact NO-4* as regard waste collection activities.

AWCS Vibration Levels

During ENVIRON's visit to the Swedish Medical Facility AWCS, there were no noticeable vibrations inside the fan room from the fans or any other equipment. The fans were mounted on an isolation base along with shock isolators that were attached to the floor. The mass of the base in conjunction with the shock isolators attenuated vibrations that may have been transmitted to the floor. These same design features will be used at the Candlestick Point and Hunter's Point AWCS facilities. Therefore, operation of the AWCS facilities would not generate or expose persons on or off site to excessive groundborne vibration and any impact would be less than significant. This finding is consistent with the finding outlined in *Impact NO-5*.

² The L90 is the level exceeded 90% of the time, or 54 minutes of any hour. A container pickup/drop-off would occur for less than 15 minutes of any hour.