Appendix F
Noise Technical Memorandum

Wood Environment & Infrastructure Solutions, Inc.
10940 White Rock Road, Suite 190
Rancho Cordova, CA 95670
USA
T: 916-636-3200
www.woodplc.com

16 April 2019

Project No. 5025183001

Mr. Mo Sharma
Public Works Administrator
City of South San Francisco
550 N. Canal St.
South San Francisco, CA 94083

Subject: Orange Memorial Park Water Capture Project Technical Noise Memorandum

Dear Mo,

Wood Environment & Infrastructure Solutions, Inc. (Wood) has prepared this technical noise memorandum to independently evaluate potential noise issues associated with the proposed Water Capture Project at Orange Memorial Park in the City of South San Francisco (City).

1.0 Introduction

Wood's acoustic specialist reviewed the evaluation of noise impacts presented within the *Draft Initial Study/Mitigated Negative Declaration (Draft IS/MND) for Orange Memorial Park Water Capture Project* and further quantified noise levels to the nearest sensitive receptors including single-family residences situated near the borders of Orange Memorial Park (Park) along West Orange Avenue, multi-family residences situated at Park Lane Apartments near the western end of the Park, the Boys and Girls Club of South San Francisco located to the south of the Park, and Los Cerritos Elementary School located to the southeast of the Park.

2.0 Project Description

The Project site is located at 1 West Orange Avenue in South San Francisco, California. The Project involves the installation of a stormwater diversion, capture, and treatment project, with installation of a large underground storage reservoir beneath two ballfields situated in the southeast portion of the Park. The reservoir will cover up to 2.5 acres, depending on final design plans and involve the excavation of soil and fill material approximately 10 feet deep below ground surface (bgs) of the two ballfields. The Project would include construction and operation of a water capture facility through the installation of a drop inlet, diversion channel, and pipe inlet junction structure (grit chamber and trash screen) in the upper and western end of the Colma Creek channel and Park boundary (refer to Figure 2 in the Draft IS/MND Project Description). Captured water would be diverted into a storm pipe and a

series of underground filtration chambers that would lead to an underground storage reservoir. These facilities would be constructed underneath a portion of the Park's two existing ballfields. Water stored for irrigation use would be further treated in a water quality polishing and disinfection shed. An irrigation pump would be sited adjacent to the shed located in the southwestern corner of the Park. This regional water capture Project would have multiple benefits in addition to water quality improvements, including reducing flooding and reusing treated water for irrigation and groundwater recharge. Following construction of the proposed Project, the two ballfields would be restored to pre-grade conditions. Artificial turf would be installed on the ballfields as part of a separate and subsequent project.

3.0 Noise Screening Criteria and Residential Receptors

City of South San Francisco Municipal Code (SSFMC) Chapter 8.32 Noise Regulations

The City of South San Francisco regulates exterior noise levels through its Noise Regulations (Municipal Code Section 8.32.030, *Maximum Permissible Sound Levels).* Section 8.32.030 of the Noise Regulations contains maximum permissible sound levels to be generated on properties in the City. The maximum allowable noise level is determined by the land use category of the nearest sensitive receptor properties. The Noise Regulations limits noise levels in single-family or multiple-family residential areas to 60 decibels (dBA)[1] between the hours of 7 a.m. and 10 p.m. Section 8.32.030(a) states it is unlawful for any person to operate any source of sound at any location within the city, which causes the noise level when measured on any other property to exceed:

1. The noise level standard for the specified land use for a cumulative period of more than 30 minutes in any hour;
2. The noise level standard plus 5 dB for a cumulative period of more than fifteen minutes in any hour;
3. The noise level standard plus 10 dB for a cumulative period of more than five minutes in any hour;
4. The noise level standard plus 15 dB for a cumulative period of more than one minute in any hour; or
5. The noise level standard or the maximum measured ambient level, plus 20 dB for any period of time.

The City of South San Francisco regulates interior noise levels through Municipal Code Section 8.32.040, *Interior Noise Limits*. Section 8.32.050(d) indicates that a noise level more than 10 dB above the level allowed by Section 8.32.030 three feet from any wall, floor or ceiling inside any unit on the same property when the windows and doors of the unit are closed is unallowable.

[1] Noise is measured and quantified with an A-weighted filter, which closely approximates the way the human ear hears sound: a de-emphasis for low-frequency and high-frequency sound. The resulting measurement is quantified as an A-weighted decibel, or dBA.

The Noise Regulations also contain special provisions for construction activities in Municipal Code Section 8.32.050, *Special Provisions*. Section 8.32.050(d) indicates that construction activities, which are authorized by a valid city permit, are allowed on weekdays between 8 a.m. and 8 p.m.; on Saturdays between 9 a.m. and 8 p.m.; and on Sundays and holidays between the hours of 10 a.m. and 6 p.m., or at other hours as may be authorized in the city permit, as long as they meet at least one of the following noise limitations:

1. No individual piece of equipment shall produce a noise level exceeding 90 dB at a distance of 25 feet. If the device is housed within a structure or trailer on the property, the measurement shall be made outside the structure at a distance as close to 25 feet from the equipment as possible.

2. The noise level at any point outside the property plane of the Project shall not exceed 90 dB (Ordinance 1088 Section 1, 1990).

According to Municipal Code Section 8.32.060, *Exception Permits,* if the applicant can show to the city manager, or the manager's designee, that a diligent investigation of available noise abatement techniques indicates that immediate compliance with the requirements of this chapter would be impracticable or unreasonable, a permit to allow exception from the provisions contained in this chapter may be issued, with appropriate conditions to minimize the public determinant caused by such exceptions. Any such permit shall be of as short a duration as possible, but in no case for longer than six months. These permits are renewable upon a showing of good cause, and shall be conditioned by a schedule for compliance and details of compliance methods in appropriate cases (Ordinance 1088 Section 1, 1990).

Existing Noise Setting

The existing noise setting within the vicinity of the Park consists of vehicle traffic along El Camino Real (State Route 82) and local street traffic along West Orange Avenue, North Canal Street, Tennis Drive, Memorial Drive, and Commercial Avenue. Centennial Way bike path is located directly south of the Park and generates bicycle and pedestrian traffic. The SamsTran Number 37 Bus runs along West Orange Avenue during weekdays (i.e. school days) with stops at West Orange Avenue and Tennis Drive. The BART Line runs south of the Park and east of El Camino Real between the South San Francisco and San Bruno stations. Secondary noise sources in the vicinity consist of aircraft overflights from the nearby San Francisco International Airport and distant traffic noise from U.S. Highway 101. Adjacent land uses include urban, industrial, and residential development.

Residences, schools, hotels, child care facilities, and convalescent facilities are typically considered noise sensitive land uses. Based on a conservative approach, the nearest potential residential receptors to the Project site are single-family homes located approximately 70 feet east of the Park along West Orange Avenue and multi-family residences located at Park Lane Apartments to the west of the Park and south of Colma Creek channel. Centennial Dog Park and Boys and Girls Club of South San Francisco are located approximately 400 feet to the south on the opposite side of Memorial Drive. Los Cerritos Elementary School is located approximately 600 feet to the southeast of the Memorial Drive and West Orange Avenue intersection.

No ambient noise monitoring data was available for the project vicinity. It should be noted that the maximum ambient sound levels within residential land use areas are assumed to be less than 65 dBA; (South San Francisco Municipal Code Section 20.300.010, *Performance Standards*).

Thresholds of Significance

Construction noise is limited by both the permitted hours of construction activities and the maximum noise levels that may affect nearby properties. The City's Municipal Code contains noise regulations for permitted construction hours of operation and allowable exterior noise levels. As such, the proposed Project would result in a significant noise impact if:

- Project construction activities occur outside allowed construction hours of operation identified in The City's Municipal Code Section 8.32.050, *Special Provisions* or do not contain a valid city permit authorizing such construction activities and that such activities do not produce a noise level exceeding 90 dB at a distance of 25 feet or exceed 90 dB at any point outside the property plane of the project.
- Project operational noise sources exceed 60 dBA Community Noise Equivalent Level (CNEL) for single-family uses.

Changes in noise levels of less than 3 dBA are generally not discernible to most people, while changes greater than 5 dBA are readily noticeable and would be considered a significant increase. Therefore, the significance threshold for mobile source noise is based on human perceptibility to changes in noise levels with consideration of existing ambient noise conditions and the City's Noise Regulations.

For ground borne vibration, according to the Federal Transit Administration (FTA) guidelines, a vibration level of 65 vibration decibels (VdB) is the threshold of perceptibility for humans.[2] For a significant impact to occur, vibration levels must exceed 80 VdB during infrequent events (FTA 2006).

3.0 Project Noise Impacts

Construction Noise

Two types of temporary noise impacts would occur during project construction. First, construction workers would commute to the site and trucks would transport equipment and materials to the site. These truck trips are expected to incrementally increase noise levels on El Camino Real and the local roads throughout the duration of project construction. Although these worker commute trips and truck trips are expected to result in intermittent noise increases on local roads, they are not expected to effect long-term ambient noise levels, as truck trips would not last more than 18 months. The second type of temporary noise impact would be related to noise generated during site mobilization and staging, excavation, installation of water capture facilities, and grading. Louder types of construction equipment may include the operation of dozers, cranes, front loaders, excavators, dump trucks, backhoes, generators, air compressors, and forklifts. The City would ensure project construction

[2] VdB is the vibration velocity level expressed in decibels relative to one micro-inch per second (1 x 10^{-6} inch per second).

would comply with the City's Noise Regulations, but certain activities may be more noticeable and cause short-term nuisances to nearby sensitive receptors.

To determine noise levels associated with short-term construction (i.e., installation of the water capture facility) and the corresponding noise levels that would be experienced at the nearest sensitive receptor(s), it is industry practice (General Assessment) to combine the two loudest pieces of equipment that would be operating simultaneously during a specific construction phase and then calculate the attenuation of the construction noise level based on the distance to the nearest sensitive receptor(s) (U.S. Department of Transportation [USDOT] / Federal Transit Administration [FTA] 2006). Maximum construction equipment noise levels at the nearby sensitive receptors during construction are shown in Table 1. As shown in Table 1, noise levels would be highest at the nearby sensitive receptors during site mobilization and staging, the installation of the underground storage reservoir (i.e. structural/auger drilling), and grading. Depending on the final plans for the underground storage reservoir, these activities would include excavation and grading activities within 50 feet of the property line of the Park.[3] However, typical construction equipment would not be expected to generate noise levels above 90 dBA at 50 feet, and most equipment types would typically generate noise levels of 85 dBA at 50 feet.

Table 1.

Typical Noise Levels from Construction Equipment

Construction Equipment	Noise Level (dB, Lmax[1] at 50 feet)
Dump Truck	76
Auger Drill Rig	84
Drill Rig Truck	79
Air Compressor	78
Crane	81
Scraper	84
Dozer	82
Paver	77
Generator	81
Rock Drill	81
Front End Loader	79
Grader	85
Backhoe	78

Source: Federal Highway Administration (FHWA) Roadway Construction Noise Model User's Guide 2006.
[1] Lmax is the instantaneous maximum noise level for a specified period of time.

For this proposed Project, the combined loudest pieces of equipment (e.g., crane, dump truck, dozer, etc. at 85 dBA), during construction would reach 88 dBA at 50 feet from the construction activity

[3] Based on the 30 percent conceptual plans, the underground storage reservoir is sited approximately 200 feet from the property line of the Park along West Orange Avenue. The pipe inlet structure and diversion channel are sited approximately 75 feet from the property line of the Park south of Colma Creek.

(USDOT / Federal Highway Administration [FHWA] 2006). These higher noise levels are anticipated to be generated during the use of earth moving equipment and excavation activities, installation of the underground storage reservoir, and grading. Thus, the construction noise level at the sensitive receptor locations, including both the single-family residences along West Orange Avenue and multi-family residences at Park Lane Apartments, both located 70 feet from the Project site would be 85 dBA (see Calculation 1).

Calculation 1. Noise Attenuation from Distance

L (dBA) = Lr-20*Log(d2/d1)

L= noise level at sensitive receptor

Lr= noise level at reference distance

d1= reference distance

d2= distance to sensitive receptor

If a valid city permit is obtained, construction activities would comply with the South San Francisco Noise Regulations, as long as no individual piece of equipment shall produce noise levels that exceed the construction noise limit of 90 dB at the property line. Similarly, groundborne vibration levels during construction should be minimal as no vibratory equipment is expected to be used (e.g. jackhammers to break up pavement). While noise levels may still impact nearby sensitive receptors, these noise levels would be temporary. Therefore, the proposed Project must adhere to the City's Municipal Code and obtain a valid city permit consistent with Municipal Code Section 8.32.050, *Special Provisions* and implement standard noise reduction measures. The implementation of mitigation measures is recommended to minimize the temporary increase in noise levels and nuisance impacts to nearby sensitive receptors.

Mitigation should at a minimum include the following measures:

Recommended Mitigation

Construction noise levels will vary depending on the construction phase, equipment type, duration, distance between noise source and sensitive receptor(s), and the presence/absence of barriers between the noise source and receptors. To minimize temporary increases in noise, the project applicant shall require the construction contractor to limit standard construction activities as follows:

- Secure a valid city permit for construction noise levels that could temporarily exceed 90 dB at the Park's property line in order to comply with the South San Francisco Noise Regulations.
- Ensure construction equipment and haul trucks use the best available noise control techniques, including improved mufflers, use of intake silencers, ducts, engine enclosures and acoustically-attenuating barriers, curtains, and shields.

- Site stationary noise sources, such as air compressors and generators as far from adjacent sensitive receptors as possible and ensure they are muffled and enclosed within temporary sheds or incorporate insulation barriers, shields, or other measures to the extent feasible (i.e. site stationary sources along western perimeter of ballfields and along Memorial Drive).

- If impact equipment and machinery are used, such as jack hammers, pavement breakers, and rock drills they should be hydraulically or electrically-powered whenever possible to avoid noise associated with air compressors or pneumatically-powered tools. If the use of pneumatically-powered tools is necessary, an exhaust muffler shall be installed on the air compressor. Such a muffler can lower noise levels from the exhaust by up to 10 dBA. Similarly, the installation of external jackets on the tools can reduce noise levels by 5 dBA.

- Ensure electrically-powered equipment shall be used instead of pneumatic or internal combustion powered equipment, whenever feasible.

- Material stockpiles and mobile equipment, staging, and parking areas shall be located as far as possible from noise sensitive receptors (i.e. within parking area west of enclosed picnic area off Memorial Drive; within vacant parcel located in northwest portion of Orange Memorial Park).

- As construction will occur within 600 feet of Los Cerritos Elementary School, the construction contractor shall coordinate with the school administration to limit disturbance to the campus. Efforts shall include limiting louder construction activities to after-school hours, if feasible.

- Identify a liaison that represents the property owners located adjacent to the Project site along West Orange Avenue and if needed, a second liaison for the residents at the Park Lane Apartment complex. These liaisons shall be contacted with concerns regarding construction noise. The liaison's contact information shall be clearly displayed at the construction location on posted signs informing the public of the construction hours and the liaison to contact in the event of a noise-related problem.

- Notify all adjacent landowners and occupants of the properties adjacent to the Project site of the anticipated construction schedule at least two weeks prior to ground disturbing activities.

- Hold a pre-construction meeting with the Contractor Superintendent, General Contractor, and City inspectors to confirm that all noise mitigation measures (including signage on construction hours, valid city exception permit, and liaison contact information) are completed.

If construction activity cannot comply with Municipal Code Section 8.32.050, *Special Provisions* and noise levels are anticipated to exceed 90 dB at the Park's property line, the project applicant shall require the construction contractor to obtain a valid exception permit consistent with Municipal Code Section 8.32.060, *Exception Permit*.

Operation Noise

There would be little to no operational noise associated with the proposed Project. The water capture facility is a gravity fed system that would not involve any large-scale electrical or pumping equipment.

However, there may be minimal noise generated by the water quality polishing and disinfection shed and irrigation pump. The dedicated equipment shed would measure approximately 15 feet by 20 feet and would house the carbon and UV treatment and distribution equipment and a control panel. There would be minimal noise associated with running the irrigation equipment as noise generated would only consist of minor humming, but the humming would be similar to noise levels associated with the existing irrigation pump in the same area. The small-scale irrigation pump would be located adjacent to the equipment shed along the western boundary of the ballfields and to the northeast of the large covered picnic area. The operational noise levels associated with the new irrigation pump would be within a noise level reduction enclosure and pump noise levels would not exceed the existing criteria noise level for the specific land use. Park visitors who are utilizing the open picnic area may hear the light humming, however this noise would be nominal and unlikely detectable unless close to the shed (e.g., walking on the foot path between ballfields and open picnic area).

5.0 Conclusion

Noise levels associated with the development the water capture facility would exceed criteria identified in South San Francisco Municipal Code Section 112.05 (60 dBA in residential zones), and ambient noise levels of the area (Q-M2-1 zone are assumed to be 70 dBA). Short-term construction noise levels would be approximately 85 dBA at the single-family residences along West Orange Avenue and the multi-family residences at the Park Lane Apartments both located approximately 70 feet away from the proposed construction activity. Operational noise levels associated with an irrigation pump would not exceed the existing criteria noise level for the specific land use, as the irrigation pump would be within a noise level reduction enclosure.

If construction activities occur within allowed construction hours and a valid city exception permit is obtained, and no single piece of equipment exceeds a noise level of 90 dBA, then noise impacts should be temporary and limited to nuisance impacts to nearby sensitive receptors. Mitigation measures recommended in this technical memorandum should be incorporated into the civil plans, design measures, and specifications, as well as the construction contractor's bid documents to minimize nuisance impacts to the nearby sensitive receptors. This documentation will also ensure the construction equipment is staged near the middle of the site along Memorial Drive and away from the single-family residences located along West Orange Avenue, and the multi-family residences at Park Lane Apartments.

6.0 References

South San Francisco Municipal Code. Section. 8.32.030. MAXIMUM PERMISSIBLE SOUND LEVELS. (Amended by Ord. No. 1088, Eff. 1/1990.)

South San Francisco Municipal Code. Section 8.32.040. INTERIOR NOISE LIMITS. (Amended by Ord. No. 1088, Eff. 1/1990.)

South San Francisco Municipal Code. Section 8.32.050. SPECIAL PROVISIONS. (Ord. No. 1088 Eff. 1/1990.)

U.S. Department of Transportation/Federal Highway Administration. 2006. Roadway Construction Noise Model. Available at: https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/

U.S. Department of Transportation/Federal Transit Authority. 2006a. Transit Noise and Vibration Impact Assessment. May.

U.S. Department of Transportation/Federal Transit Authority. 2006b. Noise and Vibration Manual.

If you have any questions or need clarification on any of the information provided, please do not hesitate to Brian Cook at (805) 895-0630 or Juliana Prosperi at (303) 503-7794.

Sincerely yours,
Wood Environment & Infrastructure Solutions, Inc.

Brian Cook
Acoustic Specialist
104 West Anapamu Street, Suite 204A
Santa Barbara, CA 93101
Direct Tel.: (805) 895-0630
E-mail: brian.cook@woodplc.com

Juliana Prosperi, AICP, LEED AP, ENV SP
Senior Environmental Scientist/Project Manager
10940 White Rock Road, Suite 190
Rancho Cordova, CA 95670
Direct Tel.: (303) 503-7794
E-mail: juliana.prosperi@woodplc.com