Prepared for
California Air Resources Board
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FOURTH SUPPLEMENTAL MEMO SUPPORTING AB 734 CERTIFICATION

OAKLAND SPORTS AND MIXED-USE PROJECT AT HOWARD TERMINAL
OAKLAND, CALIFORNIA

RAMBOLL

CONTENTS

APPENDICES

1. INTRODUCTION

The original application for the Oakland Waterfront Ballpark District Project ("Project") pursuant to Assembly Bill 734 (AB 734) included a Greenhouse Gas (GHG) Emissions Methodology and Documentation prepared by Ramboll dated March 15, 2019 (herein referred to as the "Original Application"). Since that time, the methods used in the calculation of greenhouse gas emissions, reductions, and offsets have been refined , based on updates to the Project as well as direction from the California Air Resources Board (ARB). The purpose of this document is to provide an explanation and context for the changes in this final submittal for certification, relative to the original application.

Since the Original Application, Ramboll has provided three supplemental memorandums on August 26, 2019 (herein referred to as the "First Supplemental Memo"); October 29, 2019 (herein referred to as the "Second Supplemental Memo"); and March 10, 2020 (herein referred to as the "Third Supplemental Memo"). These supplemental memorandums are included as **Appendix C**, **Appendix D**, and **Appendix E**, respectively.

In addition to minor changes that were made in order to respond to ARB comments and provide additional details and accuracy, there were several larger changes to the emissions and emission reduction methods, summarized in **Table S1**.

Table S1 – Summary of Application Revisions

Revision	Supporting Information				
	First Supplemental Memo	**Second Supplemental Memo**	**Third Supplemental Memo**	**Discussed with ARB, Formally Introduced in This Memo**	**Reviewed by ARB in Prior Memo**
Exclusion of NFL Uses	x				x
Backfill of Coliseum Emissions			x		x
Project Design and Inputs	x	x	x		x
Oakland Power Plant (OPP) Assumptions		x			x
Interpretation of Total Allowable Offsets				x	
Unit Emission Factor Development				x	
Block-Level Development Analysis				x	

Each of these changes will be described in detail. This document also provides a specific implementation plan to ensure that the goals of AB 734 are met.

1.1 Project Description

In this supplemental package, the overall anticipated Project development program remains unchanged from previous AB 734 submittal material. The Project proposes to redevelop the Project site with a baseball park that will become the new home to the Oakland Athletics, and with adjacent residential, hotel, entertainment, office, retail, and open space, on the approximately 55-acre site. The Project will also reflect the possibility that an approximately 10 acre corner of the Howard Terminal site will be subject to the Port's right for a ten (10) year period of time (beginning May 20, 2019) to demolish that portion of the site in order to enlarge the existing maritime turning basin (the "Turning Basin Area"). If the option is exercised, the Project Land Uses will be redistributed on the balance of the site. The proposed Project site plan (including the Turning Basin Area) is provided in **Appendix A**. The anticipated Project land uses are outlined in **Table S2**.

Table S2 – Existing and Proposed Land Uses

Land Use Type		Existing		Project
		Coliseum	Jack London Square	
Ballpark Uses				
MLB Uses	square feet	1,400,000	--	1,200,000
	capacity	47,170	--	35,000
	attendees	2,870,000	--	2,870,000
NFL Uses	attendees	0	--	--
Other Events	events	4 [a]	--	160
	attendees	--	--	779,000
A's Headquarters [b]	square feet	--	40,000	--
Parking	spaces	10,000	--	2,000
Non-Ballpark Uses				
Office	square feet	--	--	1,500,000
Retail [c]	square feet	--	--	270,000
Residential	units	--	--	3,000
	square feet	--	--	3,300,000
Performance Venue	square feet	--	--	50,000
	seats	--	--	3,500
Hotel	square feet	--	--	280,000
	rooms	--	--	400
Parking Garages	spaces	--	--	6,900

Notes

[a] See Section 2 for more information regarding Coliseum backfill.

[b] The Athletics headquarters is anticipated to move from its present location in Jack London Square to the new Howard Terminal ballpark land uses and is therefore not separately listed under the Project scenario.

[c] Proposed retail uses for purposes of this analysis are approximately 90,000 GSF food and beverage, 90,000 GSF entertainment (theater, bowling alley, gaming, etc.), and 90,000 GSF soft goods retail including food retail.

2. CHANGES TO EXISTING EMISSIONS INVENTORY AND BACKFILL OF COLISEUM EMISSIONS

In the Original Application, Ramboll quantified the GHG emissions associated with the displaced activity at the Oakland Coliseum, noting that these do not represent new GHG emissions due to the Project at the Howard Terminal Site but the cessation of certain activities at the existing Coliseum stadium and their movement to the Project Site. Ramboll has updated components of the existing emissions inventory since the Original Application. Additionally, through discussions with ARB and the City of Oakland, Ramboll has developed a protocol for emissions backfill should they occur as defined below.

2.1 Exclusion of NFL Uses

In the Original Application, Ramboll included all activity at the Oakland Coliseum as part of the existing condition. Based on comments from ARB, the analysis has been updated to remove the National Football League (NFL) activity and any activity that was not part of the Major League Baseball operations from the existing conditions inventory. This change is detailed in the First Supplemental Memo.

2.2 Backfill of Coliseum Emissions

The backfill of Coliseum emissions is outlined in detail in the Third Supplemental Memo. Many of these details have been reproduced here, as the backfill concept and calculations are fundamental to the A's achievement of the goals of AB 734.

An approach outlined in the February 28, 2020 letter from Oakland Mayor Libby Schaaf to Mr. Richard Corey of the California Air Resources Board (ARB), included as an attachment to **Appendix E**, commits the A's to be responsible to provide offsets for each backfill event in excess of the rounded historic average of four events per year.

The calculation of operational GHG emissions for the ballpark component of the Project will assume, as set forth in the Original Application, that GHG emissions from ballgames will be the same whether occurring at the Coliseum or Howard Terminal because team performance drives attendance. This yields a baseline assumption of no net additional ballpark operational GHG emissions from A's ballgames. Additional GHG emissions from the backfilled events will be measured and added to the operational GHG emissions for the ballpark component of the Project in accordance with the following:

The City of Oakland (the "City"), as the lead agency and implementing agency for AB 734, will require the A's to submit for its review and approval, an annual report ("Annual Event Report") to the City documenting:

- The number of events held in the immediately preceding year at the existing Oakland Coliseum and its surrounding parking lot (the "Coliseum")
- The approximate number of attendees of such events
- Scaled emissions for each event, using the approximate attendance and the established emission factor per attendee as detailed below
- The quantity of offsets required to be purchased (if any)
- The quantity of Local Reduction Measures (LRMs) required to be implemented, and the cost associated with implementing those LRMs (if any)

As set forth in the Third Supplemental Memo, the Annual Event Report shall be submitted to the City commencing twelve (12) months following the opening day of the new ballpark at the Howard Terminal Project until the earlier of: the closing or demolition of the Coliseum or thirty (30) years.

The annual event reporting will not model any new emissions. Rather, an established emission factor will be applied to attendance of events included in the report.

Currently the Coliseum averages approximately four (4) non-A's, non-Raiders events per year. As such, the Annual Event Report will document all events at the Coliseum above the existing four (4) total events (the "Additional Events"). The total attendance for the Additional Events will be the average attendance at all events at the Coliseum times the total number of events minus the four existing events:

$$\text{Additional Event Attendance} = \left[\frac{\text{Total Attendance for All Events}}{\text{Total Number of Events}}\right] \times [(\text{Total Number of Events}) - 4]$$

The intensity of emissions associated with each attendee will be calculated by applying the average attendee emission factor from the existing A's games:

$$\text{Additional Event Emissions Factor} = \frac{10{,}600 \text{ MT } CO_2e}{82 \text{ games} \times 35{,}000 \text{ attendees}} = 0.0037 \ \frac{\text{MT } CO_2e}{\text{attendee} \cdot \text{event}}$$

The total quantity of GHG emissions associated with the Additional Events will be calculated by multiplying the additional event attendance by the additional event emissions factor:

$$\text{Additional Event GHG Emissions} = 0.0037 \ \frac{\text{MT } CO_2e}{\text{attendee} \cdot \text{event}} \times \text{Additional Event Attendance}$$

If the Annual Event Report documents that in the prior year there were Additional Events, the report will include the Additional Event GHG Emissions, as calculated above.[1]

Upon the City's review and approval of the Annual Event Report, the City shall require the A's to offset the Additional Event GHG Emissions such that the operational GHG emissions from the ballpark will continue to be no net additional emissions and that the Project maintains its compliance with the requirement that no less than fifty percent (50%) of non-residential operational GHG emissions are offset through project design features, onsite reduction measures, or offsite reduction measures in the neighboring communities (collectively, the "Local Reduction Measures"). To the extent LRMs are required to mitigate backfill events, Community Serving Electric Vehicle Charging Stations (EVCS)

[1] If, in any given year, the number of Additional Events exceeds 82, which reflects more than 86 total events at the Coliseum, then the Additional Event GHG Emissions shall be calculated by (Average Event Attendance) x (0.0037 MT CO2e/attendee event) x (82 events).

would be implemented as soon as feasibly possible and the A's shall enter into contracts for the purchase of additional offsets (if any necessary) no later than six months after the City's review and approval of the Annual Event Report. The A's shall document compliance with the Additional Events obligations in subsequent Annual Event Reports.

To ensure the implementation of the Local Reduction Measures associated with the Additional Events, the project applicant agrees to fund an escrow account for the amount required to mitigate the emissions associated with 43 Additional Events. As discussed in the Third Supplemental Memo, the amount to be provided is $290,376, based on the following:

Additional Events	43
Attendance	35,000
Emission Factor (MT CO_2e/attendee/event)	0.0037
Total Emissions (MT CO_2e)	5,558
Local Direct Reductions Required (MT CO_2e)	2,779
Approximate Cost for Local Direct Reduction[2] ($/MT CO_2e)	$86.61
Local Direct Reduction Cost	**$240,711**
Offsets Required (MT CO_2e)	2,779
Cost for Offsets[3] ($/MT CO_2e)	$17.87
Offset Cost	**$49,665**
Total Cost	**$290,376**

The escrow account would be funded prior to the issuance of the Temporary Certificate of Occupancy for the new Howard Terminal ballpark if, and when, the A's leave the Coliseum for a new ballpark at Howard Terminal. The escrow account will be terminated upon the earlier of (a) closure or demolition of the Coliseum or (b) 30-years of Project operation, and any remaining balance returned to the A's.

Should the escrow account be fully depleted to $0, the A's shall deposit monies into the escrow up to the original amount of $290,376.

[2] See the Third Supplementary Memo for the derivation of the approximate cost for a local direct reduction.

[3] According to *Financing Emissions Reductions for the Future: State of the Voluntary Carbon Markets 2019* from Ecosystem Marketplace (hubs.ly/H0m5qf60), in 2018, a total of $295.7 million was spent purchasing 98.4 million MT CO_2e, indicating, on average, the cost of a voluntary offset is approximately $3. However, this may underestimate as many of these offsets may not have been from an ARB accredited offset registry. Unfortunately, those registries do not release transaction and costs data. As a conservative measure, we assume that the cost of a voluntary offset would not exceed the cost of an AB 32 Cap-and-Trade compliance allowance, which was $17.87 as of the February 2020 Joint Auction #22 (https://ww3.arb.ca.gov/cc/capandtrade/auction/results_summary.pdf).

3. REFINEMENTS TO PROJECT DESIGN AND EMISSIONS

Since the Original Application, new information has become available and Ramboll has revised our emissions analysis to account for the new information. These assumptions are documented below:

3.1 Construction Inputs

The Original Application included construction emissions from diesel off-road equipment and on-road trips. The methodology used to estimate direct emissions from these sources has not changed in any of the supplemental materials. The list below describes each of the changes to the construction emissions inventory inputs.

- The Project's construction emissions were updated based on Project-specific construction equipment information received from Devcon Construction Inc., on August 7, 2019 and reconfirmed on June 1, 2020.
- The Project's on-road construction emissions inventory was updated with Project-specific worker and vendor trips, received from Devcon Construction Inc., on May 24, 2019 and reconfirmed on June 1, 2020.
- The Project's hauling trip assumptions was updated to reflect larger amounts of import and exported material, based on communication with the Project Sponsor on August 6, 2019 and reconfirmed on June 1, 2020.
- The Cutoff Wall subphase was added with inputs provided and verified by Devcon Construction Inc., on August 28, 2019 and reconfirmed on June 1, 2020.
- Cranes used in the mitigated construction inventory are assumed to have Tier 3 engines.

3.2 Operational Inputs

The Original Application included operational emissions from all major CalEEMod® source categories. Where Project-specific information was not available, CalEEMod® default assumptions were used. Below is a list of inputs to the operational emissions that has changed between the Original Application and this supplemental report:

- Vehicle miles traveled (VMT) was updated based on revised Fehr & Peers traffic data that uses the TIRG method required by the City of Oakland, dated August 21, 2019.
- Truck and bus trips were added to the mobile emissions inputs to reflect the Project
- Electricity indirect emission factors were updated to reflect newer Pacific Gas & Electric (PG&E) renewable portfolio standard data for 2017.
- Proposed Project electricity and natural gas usage was updated to reflect anticipated reductions beyond CalEEMod® default assumptions from 2019 Title 24, based on the new California Energy Commission 2019 Impact Analysis for 2019 Energy Efficiency Standards published in March 2019.[4]

[4] California Energy Commission. 2019. Impact Analysis for 2019 Energy Efficiency Standards. Available online at: https://www.energy.ca.gov/title24/2019standards/post_adoption/documents/2019_Impact_Analysis_Final_Report_2018-06-29.pdf.

- Project ballpark electricity consumption, Project water usage rates, and Project generator assumptions were updated based on Project-specific information from Meyers+ (Project electrical subcontractor).
- Based on communication with the Project Sponsor, hearth emissions were removed, as the Project will not have hearths.
- Routine maintenance and testing assumptions for Project generators were assumed to occur for 20 hours per year in order to minimize health risks on nearby receptors. This change is described in the Second Supplemental Memo.

3.3 Changes to Construction Emissions Methodology and Inclusion in Non-Residential Land Use Emissions

As discussed in **Section 3.1**, the methodology associated with the emissions from diesel-fueled construction off-road equipment and on-road construction trips has not changed. However, two additional sources of construction emissions were added to the analysis.

- The construction emissions inventory more conservatively includes indirect emissions from electrified construction equipment and water pumping. The methodology used to estimate emissions from electrified equipment is included in the First Supplemental Memo and the methodology used to estimate emissions from water pumping is included in the Second Supplemental Memo.
- The construction emissions associated with Project water truck usage were updated to use EMFAC2017 instead of OFFROAD2011 to estimate emissions from the truck, and default assumptions from CalEEMod® 2016.3.2. to estimate emissions from the water usage. This methodology is described in the Second Supplemental Memo.

Additionally, in the final submission, it is assumed that emissions from the construction of non-residential land uses would be included in the calculation of non-residential emissions that need to be 50% reduced locally. This update is described in the Third Supplemental Memo.

3.4 Addition of Operational Emissions Sources and Local Reduction Measures

The methodology associated with the operational emissions inventory for source categories consistent with CalEEMod® has not changed. Since the Original Application, two new source categories have been added and LRM methodology has been adjusted and incorporated in the various supplemental memos. These changes are described briefly below.

- Transportation refrigeration units (TRU) were added for the ballpark and performance venue. Details of this calculation methodology are included in the First Supplemental Memo.
- Emissions from truck delays surrounding the Port of Oakland due to traffic from the Project were included. Specific details are included in the First Supplemental Memo.
- The methodology used to estimate the potential reductions from on-site electric vehicle (EV) charging was updated based on discussions with ARB. Details of the change in methodology are discussed in the First Supplemental Memo.
- An additional Project feature LRM was included to achieve the goals of AB 734: no natural gas for 50% of residential units on site. Details of the additional Project feature LRM are included in the Second Supplemental Memo.

- EVCS were included in the Third Supplemental Memo to provide an alternative path to the local reduction goal outlined in AB 734 should the OPP not be implemented. The methodology for estimating emissions reductions associated with the installation of a community-serving EVCS is described in the Third Supplemental Memo.

4. OAKLAND POWER PLANT ASSUMPTIONS

The A's have identified the removal of the existing Oakland Power Plant (OPP) and conversion to a battery storage facility as a potential LRM. The OPP Variant would involve replacing the three existing jet-fueled turbines with a 90 MW battery energy storage system (ESS) with up to four hours of storage. The methodology used to estimate avoided GHG emissions resulting from the OPP Variant comprises two components: (1) a direct reduction in GHG emissions from closure of the existing jet-fueled turbines and replacement with cleaner grid energy; and (2) avoided indirect GHG emissions from the ramping down of fossil-fueled plants that would have been required to regulate and condition the grid, a function now served by the battery ESS. The reductions associated with the OPP conversion were presented in the Second Supplemental Memo.

For reference, the OPP Conversion will be described as a Variant in the Project Environmental Impact Report (EIR) because the physical layout of the Project site is different under the OPP Variant than under what is described as the Project in the EIR and the conversion of the OPP may require approvals from agencies other than the City of Oakland. The land use program is the same under both conditions. The difference in the physical configuration is simply that the OPP Variant anticipates the removal of the OPP jet fuel tank and the construction of a structure in its place, as well as some modifications to a historic structure, resulting in a slightly different configuration of buildings on-site. The Project could proceed without converting the OPP.

5. CHANGE IN INTERPRETATION REGARDING TOTAL ALLOWABLE OFFSETS

In the Original Application, offset credits from projects located within the United States and verified by a third party accredited by ARB (the "offset credits") were introduced as potential reductions to achieve no net additional GHG emissions consistent with the goals of AB 734. Calculations in the Original Application and subsequent Supplemental memos allowed for the A's to purchase offset credits for any emissions of GHG beyond the 50% net new non-residential local reduction requirement in AB 734.

Based on communication with ARB, Ramboll and the A's understand that ARB has interpreted AB 734 to require that no more than 50% of total net new emissions can be reduced through the purchase of offset credits. Consistent with ARB's interpretation, the calculations of offset credit purchases and additional LRMs required for Project development have been updated in this supplemental submittal.

6. UNIT EMISSION FACTOR DEVELOPMENT

In order to understand how the overall emissions inventory changes due to changes in phasing (which will depend on market conditions at the time of development), Ramboll developed a set of unit emissions that represent the estimated emissions associated with the construction and operation of a single unit of development (see defined "units" below) over a thirty year lifetime. As discussed with ARB, the goal of this analysis is to provide the Project with a method of estimating pro-rated emissions offset requirements; unit emissions can be multiplied by the number of units actually developed in order to get the full pro-rated emissions that the A's will need to reduce through LRMs or offset credits.

For this analysis, Ramboll defined a "unit of development" as one of the following:

- The ballpark stadium
- The performance venue
- 1 residential dwelling unit
- 1,000 square feet of office space (occupied floor area)
- 1,000 square feet of retail or restaurant space (occupied floor area)
- 1,000 square feet of hotel (occupied floor area)
- The OPP Variant

It was assumed that the ballpark, the performance venue, and the OPP Variant would only occur in full, so these land uses were not subdivided further.

For each unit of development, Ramboll estimated emissions from related existing conditions (negative local emissions), construction, Project 1.0 operation, and Project 2.0 operation.[5] To do so, a few key assumptions were made:

Assumptions for Construction Emissions:

- Emissions associated with horizontal construction on site east of Market Street were attributed to the ballpark as these infrastructure improvements are required for ballpark operations.
- Emissions associated with horizontal construction of the remaining Project area were allocated for each land use based on building square footage.
- Emissions associated with the construction of parking lots were added to the land use associated with the parking. For ballpark and ancillary land uses, emissions were allocated based on the number of spaces associated with each land use.
- Architectural coating emissions were proportional to total building square feet.

Assumptions for Operational Emissions:

[5] As defined in the Original Submittal, Project 1.0 represents the Proposed Project without any GHG Reduction Measures beyond current building code requirements. In the Original Submittal, Project 2.0 represented the Proposed Project with implementation of the Transportation Management Plan (TMP) and Transportation Demand Management (TDM) Plan. For this submittal, Project 2.0 also includes the reduced generator operation, on-site EVCS, and 50% electrification of residential dwelling units.

- The restaurant and retail land uses were assumed to be roughly equivalent for all emissions sources except for mobile sources and EV charging reductions. To determine the unit emission factor, the mobile emissions and EV charging reductions from restaurant and retail land uses were combined.
- Lighting electricity emissions associated with the operation of parking lots were added to the land use associated with the parking.
- Total non-residential ancillary landscaping emissions were allocated to each land use based on the fraction of overall non-residential building square footage.
- Ancillary stationary source emissions and truck idling emissions were allocated to each land use based on percent square footage.
- 50% of overall residential dwelling units are assumed to be electrified, based on the Project design. As such, the unit emission factor assumes each dwelling unit is electrified at 50%.

Lifetime operational emissions were estimated assuming a thirty-year lifetime for each land use, consistent with previous analyses, for a starting year of 2024 (the first full year of assumed operations on-site). To account for decreasing emission factors over time (for electricity and mobile emissions), Ramboll developed lifetime multipliers that scale the thirty-year lifetime by the anticipated reduction in emission factors for electricity and for each of the Project vehicle fleets (passenger, all, truck, and bus) based on **Table OP-12** of the Original Application.

New **Table 9** included as an attachment to this report shows the emissions associated with existing conditions, construction, Project 1.0 operation, and Project 2.0 operation for a single unit of development. This table and the tables that follow this memorandum supersede the previous tables that were submitted as part of the Original Application and supplemental memos.

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7. BLOCK-LEVEL DEVELOPMENT ANALYSIS

7.1 Anticipated Development Scenario and Emissions

This Supplemental submittal defines an Anticipated Development Scenario, which reflects a steady pace of development across the site. Each phase is comprised of one development block on site. The phases may be built in any order. Emissions from Phases that are not constructed shall not be mitigated.

Anticipated emissions have been developed based on the unit emission factors described in **Section 6** and the Anticipated Development Scenario, as reflected in new **Tables 8 and 9**.

For each Phase (block) of Project development, emissions are shown for construction, Project 1.0 operation, and Project 2.0 operation. The total lifetime emissions are calculated for each unit of development as the sum of construction and Project 1.0 operation. From these, the maximum allowable offset credits are purchased for each block (interpreted by ARB to mean 50% of overall lifetime emissions, (including both construction and operational emissions). The direct local reductions associated with TDM, TMP, onsite EV charging, and electrification of 50% of residential dwelling units, are estimated for each unit development. The remaining emissions that must be reduced through local reduction measures (LRMs) is then estimated. The existing conditions (operation of the Coliseum stadium) are considered in the baseline condition, and therefore offset any emissions from the new ballpark constructed at Howard Terminal, subject to backfill event mitigation and annual reporting as defined in this application.

As described in detail in **Section 8.2**, the difference between the baseline emissions and the Project ballpark emissions is accounted for in the Credit Bank to be used to satisfy future offset credit obligations, and the reductions from the OPP as implemented by the Project are included in the Credit Bank to satisfy future Local Reduction Measure obligations at the Applicant's discretion. This is reflected in **Table 9.**

Because the total amount of banked LRMs from the OPP exceeds the total amount of required LRMs from Project development, a fraction of the banked LRMs from OPP are used to reduce the amount of offset credits required to be purchased.

Table 9 shows that regardless of the order of development, or distribution of space within the site, the Project will accomplish the goals of AB 734.

Final emissions and mitigations will be determined in each Phase's AB 734 Compliance Memo by adjusting the emissions from the Anticipated Development Scenario up or down to reflect the final development program for each Phase. See Section 8 Implementation for details.

8. IMPLEMENTATION

At the request of ARB, the A's have prepared an outline showing the plan for implementing the program described in **Section 7**.

The implementation approach for AB 734 is summarized as follows:

- Each block is a phase
- The City of Oakland is the enforcing agency
- Phases are mitigated as they are constructed, with the required offset credits purchased and LRMs implemented prior to Temporary Certificate of Occupancy (TCO) for that phase
- The expected emissions for each phase, and associated mitigations (both offsets and LRMs), are identified according to the Anticipated Development Scenario (previously called Scenario 1)
- As development permit applications are filed with the City of Oakland for each phase, their emissions and mitigation profiles are adjusted from the Anticipated Development Scenario using the unit emission factors as established in this application to reflect the phase's proposed development.

8.1 Baseline Emissions

AB 734 requires that "the project does not result in any net additional emissions of greenhouse gases." As such, baseline emissions from the A's operations at the Coliseum constitute a credit for the new ballpark to be constructed at Howard Terminal. Consequently, no mitigation, offset credit or LRM, is required of the new ballpark at Howard Terminal. This is reflected in **Table 9**.

Baseline emissions equal 317,998 MT CO_2e. New ballpark 1.0 lifetime emissions (including construction) at Howard Terminal equal 287,877 MT CO_2e. This means that existing emissions are 30,121 MT CO_2e higher than the Project ballpark emissions. This difference will be carried forward to the credit bank in the form of offset credits, to be used to satisfy the offset credit obligation of a phase, as allocated by the applicant in an AB 734 Compliance Memo.

8.2 Credit Bank

A Credit Bank will be established that will include credit from:

1. The difference between baseline and project ballpark emissions (as described above), equal to 30,121 MT CO_2e offset credits
2. Credits from the OPP, as implemented by the project, equal to 520,655 MT CO_2e LRM Credits.

Credits from the Credit Bank are to be applied to offset purchase or LRM implementation requirements for future phases at the Applicant's election, as defined in AB 734 Compliance Memos. Each AB 734 Compliance memo will identify the amount of credit from the Credit Bank allocated to that particular phase, as determined to be needed at the time. This could be some, none or all of the credit remaining from the Credit Bank. To the extent that an allocation from the Credit Bank does not fully satisfy the requirement for a phase, the developer will implement community-serving EVCS to comply with the LRM requirement, and/or purchase offset credits for up to 50% of the phase's emissions (see **Section 5**).

The Credit Bank would likely be preserved to meet the LRM requirements for subsequent project development. However, the Credit Bank may also be used to satisfy offset credit requirements. Additionally, there may be certain phases for which the economics may not allow for a significant investment in LRMs or offset credits (such as affordable housing or grocery stores), in which case the Credit Bank could be utilized preferentially at the applicant's discretion. This means that the applicant may elect to implement EVCS to satisfy a phases' LRM obligations, even if the Credit Bank has not been exhausted. Should the applicant do so, the Compliance Memo will calculate the number of EVCS required, as described in **Section 8.3**.

As detailed below, vertical development applications will be required to submit an AB 734 Compliance Memo for review and approval by the City of Oakland. This memo will include a detailed accounting of the Credit Bank, demonstrating the source of Local Reduction Measure credits. The City will not issue a TCO for the vertical buildings in the phase until compliance is demonstrated.

8.3 Development of an AB 734 Compliance Memo

An AB 734 Compliance Memo will be required for City review and approval with each phase as identified in the AB 734 materials. The Compliance Memo will document:

- The land use program identified for that phase in the Anticipated Development Scenario
- The specific development program proposed for vertical development in that phase
- A description of how the development program shown in the phase permit application differs from the Anticipated Development Scenario identified in the AB 734 certification, if necessary
- The emissions, LRMs and offset credits required of that phase as defined by the Anticipated Development Scenario
- Quantification of the difference in emission and mitigation (including offset credit purchase and LRMs) profiles between the development program shown in the permit application and the Anticipated Development Scenario, using established unit emission criteria from the AB 734 Certification
- Confirmation of the emissions and mitigations (including offset credit purchase and LRMs) for the phase in question in the form of evidence of contracts entered into for the purchase of offset credits or the implementation of EVCS for LRM credits, as necessary
- The source of the local reduction measure credits (the Credit Bank or community-serving EV chargers [EVCS])

The AB 734 Compliance Memo will be reviewed and approved by the City of Oakland. As defined in AB 734, the City of Oakland is the implementing agency for the statute. ARB's role does not extend beyond certification of the GHG methodology.

Once the City of Oakland has reviewed and approved the AB 734 Compliance for each phase, a courtesy copy will be sent to ARB for their files.

8.4 Mitigation Timing and Enforcement

The applicant must demonstrate offset credits and LRMs are in place prior to receiving Temporary Certificate of Occupancy (TCO) for the relevant building in any phase. Project

Features for LRM credit must be shown on the relevant building permits and implemented during construction.

All mitigation identified in the approved AB 734 Compliance Memo would be required prior to receipt of TCO, including the entering into contracts for the purchase of offset credits, and the implementation of LRMs.

The City will withhold issuance of the TCO if the applicant does not demonstrate offset credit purchases and LRM implementation.

8.5 Adjustment for Final Development Program

As the project is a large, phased, multi-year master planned development, the specific vertical development constructed in any given phase in the future may differ from the Anticipated Development Scenario. To address the potential deviations from the Anticipated Development Scenario, the exact emissions and required mitigations associated with each phase will be determined by adjusting the Anticipated Development Scenario based on two inputs:

- The development program included in each phase's application for vertical development made to the City of Oakland
- Established unit emission criteria for each land use category in the Project, detailed below

If the development program for any phase differs from the program described for that phase in the Anticipated Development Scenario, the development program, emissions and mitigations from the Anticipated Development Scenario will be adjusted upward or downward to match the development program for the phase.

Lifetime unit emissions for each land use category in the project are reflected in **Table 8**. An AB 734 Emissions and Mitigations Calculator (Calculator) is provided to determine the emissions, LRMs, and offset credits associated with the vertical development application for each phase. The applicant inputs the proposed development program into the Calculator, and the final emissions and mitigations are produced using the emissions and mitigations from the Anticipated Development Scenario, pre-determined unit emission criteria for each land use category, and the proposed development program for each phase, preventing the need for calculations in the future. The Calculator is included as **Appendix B**.

8.6 Implementation Examples

Examples of hypothetical scenarios are provided below to illustrate how these concepts will be implemented in the future.

8.6.1 Example 1 – Block 3

Project Status: OPP conversion, Block 1 constructed

Development Program

Example 1. Block 3 Proposed Development Program			
Block 3 Land Uses	**Anticipated Development Scenario**	**Proposed Development Program for Permit**	**Difference**
Residential Units	212	150	-62
Retail/Restaurant Square Feet	3,400	2,500	-900
Commercial (Non-Retail/Restaurant) Square Feet	0	0	0
Performance Venue Square Feet	0	0	0
Hotel Square Feet	0	0	0

Emissions, Local Reduction Measures, and offset credits identified using information from the Application:

The applicant inputs the proposed vertical development program for each phase into the Calculator for review by the City of Oakland. In this example, the calculator determines the final emissions, LRMs and offset credits for Block 3 as follows:

Example 1. Block 3 Proposed Development Emissions			
Block 3 Emissions (MT CO_2e)	**Anticipated Development Scenario**	**Proposed Development Program for Permit**	**Difference**
Net Lifetime Emissions	34,326	24,462	-9,864
Offset Credits Purchased	17,163	**12,231**	-4,932
LRMs Through Project Design Features	9,664	6,878	-2,785
Remaining LRMs Required	7,500	**5,353**	-2,147

According to the Calculator, Block 3 must:

- Purchase offset credits for **12,231** MT CO_2e
- Implement Local Reduction Measures equaling **5,353** MT CO_2e

Source of Local Reduction Measure Credits:
In this example, the applicant chooses to source the Local Reduction Measures from the Credit Bank. The Credit Bank balance is detailed below:

Example 1. Credit Bank Accounting		
Credit Banking	**Offset Credits (MT CO_2e)**	**LRMs (MT CO_2e)**
Initial Balance	30,121	520,655
Previous Draws		
Block 1	0	0
Total Previous Draws	0	0
Current Balance	30,121	520,655
Current Draw	12,231	5,353
Remaining Balance	17,890	515,302

Total Emissions: **24,462**
Offset Credits (From Credit Bank): **12,231** MT CO_2e
% of total emissions: 50%
LRM Credits from Project Features and Credit Bank: **12,231** MT CO_2e
% of total emissions: 50%
% of net new non-residential emissions: 266%

With the use of offset credits equal to 12,231 MT GHG CO_2e from the Credit Bank, and the use of 5,353 MT GHG CO_2e LRMs from the Credit Bank, Block 3 is in compliance with the requirements of AB 734.

8.6.2 Example 2 -- Block 12 (With OPP)

Project Status: OPP conversion, Blocks 1-11, 14, 17 and 18 constructed as envisioned in the Anticipated Development Scenario, no offset credits from the Credit Bank used.

Development Program

Example 2. Block 12 Proposed Development Program			
Block 12 Land Uses	**Anticipated Development Scenario**	**Proposed Development Program for Permit**	**Difference**
Residential Units	400	420	20
Retail/Restaurant Square Feet	48,000	40,000	-8,000
Commercial (Non-Retail/Restaurant) Square Feet	0	0	0
Performance Venue Square Feet	0	0	0
Hotel Square Feet	0	0	0

Emissions, Local Reduction Measures, and offset credits identified using information from the Application:

The applicant inputs the proposed vertical development program for each phase into the Calculator for review by the City of Oakland. In this example, the calculator determines the final emissions, LRMs and offset credits for Block 12 as follows:

Example 2. Block 12 Proposed Development Emissions			
Block 12 Emissions ($MT CO_2e$)	**Anticipated Development Scenario**	**Proposed Development Program for Permit**	**Difference**
Net Lifetime Emissions	141,322	129,229	-12,094
Offset Credits Purchased	70,661	**64,614**	-6,047
LRMs Through Project Design Features	36,067	33,407	-2,660
Remaining LRMs Required	34,594	**31,207**	-3,387

According to the Calculator, Block 12 must:

- Purchase offset credits for **64,614** MT CO_2e
- Implement Local Reduction Measures equaling **31,207** MT CO_2e

Source of Local Reduction Measure Credits

In this example, the applicant chooses to source the LRMs and offsets credits from the Credit Bank. The Credit Bank balance is detailed:

Example 2. Credit Bank Accounting		
Credit Banking	**Offset Credits ($MT CO_2e$)**	**LRMs ($MT CO_2e$)**
Initial Balance	30,121	520,655
Previous Draws		
Block 1	0	0
Block 2	0	4,880
Block 3	0	7,500
Block 4	0	18,673
Block 5	0	16,629
Block 6	0	14,586
Block 7	0	53,891
Block 8	0	7,830
Block 9	0	9,892
Block 10	0	15,880
Block 11	0	21,349
Block 14	0	45,969
Block 17	0	37,771
Block 18	0	9,751
Total Previous Draws	0	264,601
Current Balance	30,121	256,054
Current Draw	30,121	31,207
Remaining Balance	0	224,847
Remaining Block 12 Obligation	34,493	0

Total Emissions: **129,229** MT CO_2e
Offset Credits: **64,614** MT CO_2e (30,121 from credit bank and 34,493 purchased)
% of total emissions: 50%
LRM Credits from Project Features and Credit Bank: **64,614 MT** CO_2e
% of total emissions: 50%
% of net new non-residential emissions: 88%

With the purchase of offset credits equal to 34,493 MT GHG CO_2e, and the use of 31,207 MT GHG CO_2e LRMs and 30,121 MT GHG CO_2e offset credits from the Credit Bank, Block 12 is in compliance with the requirements of AB 734.

8.6.3 Example 3 -- Block 12 (No OPP)

Project Status: No OPP Conversion, Blocks 1-6 constructed as envisioned in the Anticipated Development Scenario.

Development Program

Example 3. Block 12 Proposed Development Program			
Block 12 Land Uses	**Anticipated Development Scenario**	**Proposed Development Program for Permit**	**Difference**
Residential Units	400	420	20
Retail/Restaurant Square Feet	48,000	40,000	-8,000
Commercial (Non-Retail/Restaurant) Square Feet	0	0	0
Performance Venue Square Feet	0	0	0
Hotel Square Feet	0	0	0

Emissions, Local Reduction Measures, and offset credits identified using information from the Application:

The applicant inputs the proposed vertical development program for each phase into the Calculator for review by the City of Oakland. In this example, the calculator determines the final emissions, LRMs and offset credits for Block 12 as follows:

Example 3. Block 12 Proposed Development Emissions			
Block 12 Emissions (MT CO_2e)	**Anticipated Development Scenario**	**Proposed Development Program for Permit**	**Difference**
Net Lifetime Emissions	141,322	129,229	-12,094
Offset Credits Purchased	70,661	**64,614**	-6,047
LRMs Through Project Design Features	36,067	33,407	-2,660
Remaining LRMs Required	34,594	**31,207**	-3,387

According to the Calculator, Block 12 must:

- Purchase offset credits or draw from offset credit bank for 64,614 MT CO_2e
- Implement Local Reduction Measures equaling 31,207 MT CO_2e

Source of Local Reduction Measure Credits

In this example, Block 12 implements EVCS to cover the remaining LRM requirement. The Credit Bank balance is detailed below.

Example 3. Credit Bank Accounting

Credit Banking	Offset Credits ($MT CO_2e$)	LRMs ($MT CO_2e$)
Initial Balance	30,121	0
Previous Draws		
Block 1	0	0
Block 2	0	0
Block 3	0	0
Block 4	0	0
Block 5	0	0
Block 6	0	0
Total Previous Draws	0	0
Current Balance	30,121	0
Current Draw	30,121	0
Remaining Balance	0	0
Remaining Block 12 Obligation	34,493	31,207

The remaining Block 12 obligation is met as follows:

- Remaining LRM Credits Required: **31,207** MT CO_2e
- Credits/EVCS: 351 MT CO_2e
- EVCS Required: **89** (rounded from 88.9)

In this example, the AB 734 Compliance Memo reviewed and approved by the City of Oakland for Block 12 documents the number, location, and timing of installation for the EVCS.

Total Emissions: **129,229** MT CO_2e

Offset Credits: **64,614** MT CO_2e (30,121 from credit bank and 34,493 purchased)

% of total emissions: 50%

LRM Credits from Project Features and EVCS: **64,614** MT GHG CO_2e

% of total emissions: 50%

% of net new non-residential emissions: 88%

With the purchase of offset credits equal to 64,614 MT GHG CO_2e and the implementation of 89 community EVCS, Block 12 is in compliance with the requirements of AB 734.

9. CONCLUSION

The information provided above provides a comprehensive overview of the updates to the Project AB 734 application since the submittal of the Original Application. Attached to this document is the full set of up-to-date Project application tables. The Project tables incorporate the methodology of the Original Application, along with the updates described in this Supplemental submittal.

This final application catalogues the ARB's exhaustive review of the Project's AB 734 Compliance, and demonstrates the Project's commitments to and compliance with the requirements of AB 734.

TABLES

Table 1. Emissions Sources
Oakland Waterfront Ballpark District Project
Oakland, California

Proposed Project		
Type	**Source**	**Description**
Construction	Off-Road Equipment	Direct emissions from diesel off-road equipment exhaust; Indirect emissions from electricity use for electric off-road equipment
	On-Road Mobile Sources	Direct emissions from running, idling, and starting exhaust
Operations	Energy	Indirect emissions from building electricity use; Indirect emissions from EV charger electricity use; Direct emissions from natural gas use
	On-Road Mobile Sources	Direct emissions from running exhaust; (Emissions reductions from EV chargers)
	Solid Waste	Direct emissions from treatment of solid waste
	Water	Direct emissions from water treatment; Indirect emissions from electricity use for water supply, distribution, and treatment
	Standby Emergency Generators	Direct emissions from combustion exhaust
	Area Sources	Various emissions from landscaping equipment

Proposed Project Variants		
Type	**Source**	**Description**
Gondola	Energy	Indirect emissions from gondola electricity use
	On-Road Mobile Sources	(Emissions reductions from replaced running exhaust)
Power Plant	Energy	(Direct and Indirect emissions reductions from replaced fossil fuel combustion)

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Table 2. Construction GHG Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	CO_2e Emissions (MT/year)[1]				
	Diesel Off-Road Equipment[2,3]	Electric Off-Road Equipment[2]	Indirect Emissions from Water Use[4]	On-Road Vehicles[5]	Total
2020	282	0	14	36	333
2021	2,182	14	70	3,314	5,580
2022	2,664	58	12	3,205	5,939
2023	1,739	20	17	1,768	3,543
2024	1,872	0	39	1,662	3,572
2025	1,836	123	17	1,818	3,793
2026	2,696	159	12	1,893	4,760
2027	1,781	36	6.2	1,232	3,056
				Total GHG Emissions from Construction (MT)	**30,576**

Notes:

1. Construction inputs were provided by the Project sponsor and Devcon Construction Inc. based on Project-specific assumptions and assuming the fastest possible buildout schedule.

2. Construction equipment list, fuel, size in HP or kW, start and end dates, hours of operation per day, and utilization were provided by the Project sponsor. Utilization refers to the percentage of the phase that equipment is expected to be in use. Equipment load factors were estimated from the Air Resource Board's OFFROAD database. Emission factors were from OFFROAD2011 for diesel equipment and PG&E for electric equipment.

   Emissions = Σ(N * P * LF * Hr * U * EF)

   N: number of Equipment Pieces
   P: equipment power, either horsepower or kilowatts (OFFROAD2011)
   LF: Load Factor
   U: Utilization
   EF: Emissions Factor

   The greenhouse gas emission factor calculations for electric equipment calculations are shown in Table OP-8. For CO_2, the 2020 emission factor was conservatively used (297 lb/Mwh) for all construction years. For CH_4 and N_2O, the CalEEMod default factors were used (0.029, and 0.00617 lb/MWh, respectively).

3. Emissions from water trucks were calculated using EMFAC2017 emission factors as they are on-road trucks. Emissions from water trucks were calculated using the following assumptions:
   - EMFAC2017 was run in emissions rates mode and output by vehicle class and fuel for Alameda County and averaged across model years for EMFAC 2007 vehicle classes for a specific fuel type.
   - Hours are calculated as number of equipment * utilization percent * number of construction days * hours/day * load factor.
   - Starts are calculated as hours * 1 start/hour.
   - Miles are calculated as hours * 10 miles per hour.
   - Idle-hrs are calculated as starts * 1 idle/start * 2 minutes/idle.
   - Number of water trucks and schedule are provided in the off-road equipment list table.
   - Water trucks are assumed to be diesel fueled and similar to medium heavy duty trucks (MHDT).
   - Idling is restricted to 2 minutes/idle.
   - Water trucks start once per hour.

Table 2. Construction GHG Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

Notes, Continued:

4. Indirect electricity emissions from water use in the water trucks were calculated using CalEEMod methodology for electricity intensity and PG&E's greenhouse gas emission factor. Total water use was based on the total acreage of the phase area and the water ysage rate provided by Devcon. Electric intensity factors were taken from Table 9.2 in Appendix D of the CalEEMod User's Guide as the sum of supply water, treat water and distribute water electric intensity factors. Since the water use reported here is only for fugitive dust control, indoor water use-related emissions and wastewater treatment-related emissions are not estimated here. Greenhouse gas emission factor calculations are shown in Table OP-8. For CO_2, the 2020 emission factor was conservatively used (297 lb/MWh) for all construction years. For CH_4 and N_2O, the CalEEMod default factors were used (0.029, and 0.00617 lb/MWh, respectively).

5. CalEEMod® default fleet mixes were used for Worker (LD_Mix), Vendor (MHDT/HHDT), and Hauling (HHDT) trips. LD_Mix was assumed to be 100% gasoline vehicles and MHDT/HHDT and HHDT were assumed to be 100% diesel vehicles. For Worker, Vendor, and Hauling emission factors, EMFAC2017 was run for each year of construction. Annual number of trips and VMT were output by vehicle class and fuel for Alameda County and averaged across model years for EMFAC 2007 vehicle classes for a specific fuel type. From these, emission factors were calculated by dividing the emissions by either the number of trips or the VMT, where appropriate. Emission factors were calculated using the equations below:

   $E_{g/mi} = E / VMT$

   $E_{g/trip} = E / T$

   Where $E_{g/mi}$ is the emission factor in g/mi, $E_{g/trip}$ is the emission factor in g/trip, VMT is annual vehicle miles traveled and T is the annual number of trips.

6. Global warming potentials used in the calculation of CO2e are 1, 25 and 298 for CO2, CH4 and N2O, respectively, and are from IPCC AR4.

Abbreviations:

CO_2e - carbon dioxide equivalents
GHG - greenhouse gas
MT - metric ton

Table 3. Existing Conditions Emissions Summary (2020)
Oakland Waterfront Ballpark District Project
Oakland, California

Category	CO_2e Emissions (MT/year)[1]
Mobile	8,175
Electricity	1,302
Natural Gas	240
Water and Wastewater	119
Solid Waste	762
Area Sources	0.22
Stationary Sources	0
Transportation Refrigeration Units[2]	0.37
Total Emissions	**10,600**

Notes:

1. Existing conditions include A's games and other events at the Oakland Coliseum, as well as the A's headquarters at Jack London Square. NFL games are excluded.
2. Transportation Refrigeration Units (TRU) emissions account for emissions from the diesel-powered electrical generation units used to refrigerate or heat perishable goods transported by trucks.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric ton

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Table 4. Project 1.0 Operational Emissions for Full Buildout Year
Oakland Waterfront Ballpark District Project
Oakland, California

Category	Project CO_2e Emissions (MT/year)		
	Ballpark	**Ancillary - Nonresidential**	**Ancillary - Residential**
Mobile[1]	7,728	32,794	10,694
Electricity[1]	913	2,095	1,138
Natural Gas	253	2,218	1,396
Water and Wastewater	190	339	550
Solid Waste	945	956	694
Area Sources	0.061	0.17	37
Stationary Sources[2]	21	47	47
EV Charging	--	--	--
Transportation Refrigeration Units[3]	0.41	0.045	0
Port Truck Idling Delays[4]	2.1	23	--
Total	**10,053**	**38,472**	**14,556**
	63,082		

Notes:

1. Emission factors for year 2028 were used to estimate full buildout emissions. 2028 represents the anticipated year of full buildout operation under the fastest possible buildout.
2. Stationary source emissions from emergency generators are not associated with particular types of land uses, but rather mixed-use buildings on the Project site. For the purpose of this preliminary estimate, stationary source emissions are equally split between the Ancillary - Nonresidential and Ancillary - Residential totals.
3. Transportation Refrigeration Units (TRU) emissions account for emissions from the diesel-powered electrical generation units used to refrigerate or heat perishable goods transported by trucks.
4. Traffic from the Project is estimated to contribute to truck delays in the surrounding areas, which results in truck idling emissions. Data was provided from Fehr & Peers for ballpark traffic-caused delays and ancillary development traffic-caused delays. However, no information was provided for the breakdown between non-residential ancillary and residential ancillary, so all emissions were considered to be from non-residential for this analysis.

Abbreviations:

CO_2e - carbon dioxide equivalents
EV - electric vehicle
MT - metric ton

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Table 5. Project 2.0 Operational Emissions for Full Buildout Year
Oakland Waterfront Ballpark District Project
Oakland, California

Category	Project CO_2e Emissions (MT/year)		
	Ballpark	**Ancillary - Nonresidential**	**Ancillary - Residential**
Mobile[1]	5,829	26,658	8,015
Electricity[1]	913	2,095	1,138
Natural Gas	253	2,218	1,396
Water and Wastewater	190	339	550
Solid Waste	945	956	694
Area Sources	0.06	0.17	37
Stationary Sources[2]	21	47	47
EV Charging[3]	-510	-2,581	-971
Transportation Refrigeration Units[4]	0.41	0.05	0
Port Truck Idling Delays[5]	2.1	23	--
Total	**7,644**	**29,755**	**10,907**
	48,306		

Notes:

1. Emission factors for year 2028 were used to estimate full buildout emissions. 2028 represents the anticipated year of full buildout operation under the fastest possible buildout.
2. Stationary source emissions from emergency generators are not associated with particular types of land uses, but rather mixed-use buildings on the Project site. For the purpose of this preliminary estimate, stationary source emissions are equally split between the Ancillary - Nonresidential and Ancillary - Residential totals.
3. This analysis assumes that electric vehicle chargers will be installed for 10% of all parking spaces.
4. Transportation Refrigeration Units (TRU) emissions account for emissions from the diesel-powered electrical generation units used to refrigerate or heat perishable goods transported by trucks.
5. Traffic from the Project is estimated to contribute to truck delays in the surrounding areas, which results in truck idling emissions. Data was provided from Fehr & Peers for ballpark traffic-caused delays and ancillary development traffic-caused delays. However, no information was provided for the breakdown between non-residential ancillary and residential ancillary, so all emissions were considered to be from non-residential for this analysis.

Abbreviations:

CO_2e - carbon dioxide equivalents

EV - electric vehicle

MT - metric ton

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Table 6. Project Variant Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

Emissions Source	GHG Emissions [MT/year] CO_2e
Aerial Gondola	
Construction Emissions	848
Energy Use Emissions	479
Mobile Emission Reductions (due to VMT Reductions)	-4,192
Total Emissions	**-2,865**
Oakland Power Plant	
Construction Emissions	219
Direct Energy Emission Avoided	-7,824
Indirect Energy Emission Avoided	-9,129
Total Emissions	**-16,734**
Total Emission Reductions	**-19,599**

Note:

1. GHG emissions were only calculated for the Aerial Gondola and Oakland Power Plant variants, since these are expected to potentially have significant impacts on the GHG analysis. All other variant projects are anticipated to have minimal GHG impacts or reductions.

Abbreviations:

CO_2e - carbon dioxide equivalent

GHG - greenhouse gas

MT - metric ton

VMT - vehicle miles traveled

Table 7. Potential GHG Emissions Reductions for Backfill of Coliseum
Oakland Waterfront Ballpark District Project
Oakland, California

Potential Additional Emissions	Emissions	Units
Backfill Emissions per Attendee[1]	0.0037	MT CO_2e/backfill event/attendee

Location	Measure	Lifetime[2] (Years)	Lifetime Emissions (MT CO_2e/Unit)	Unit
On-site	Solar Panels[3]	30	1.4	MWh
On-site	Residences without NG[4]	30	12	DU
On-site	Waste Diversion[5]	30	15	ton diverted
On-site	Reduced On-Site Parking[6]	30	1,024	100 spaces reduced
Off-site	Neighborhood EVCS[7]	10	127	EVCS

Notes:

1. Backfill emissions per attendee were estimated by dividing the total annual emissions at the Coliseum stadium by 82 games per year with 35,000 attendees at each game.
2. On-site emissions reductions are assumed over a 30-year operational life. Off-site emissions reductions are assumed over a 10-year operational life, with the exception of Trees Planted, which assumes a 20-year growing period.
3. Methodology is consistent with Table OP-19. CO_2e emissions reductions were calculated for the lifetime starting with 2023. Since electricity emission factors decrease each year (see Table OP-12), the sum of the CO_2e emissions reductions over the lifetime and dividing by the electricity generation to obtain a relationship between MT CO_2e and MWh.
4. Methodology is consistent with Table OP-20. CO_2e emissions reductions were calculated by multiplying residential natural gas usage rate by the natural gas emission factor. CO_2e emissions associated with the electricity that will replace natural gas (40% increase) have been added back into the reduction.
5. Methodology is consistent with Table OP-5. The value for CO_2e emissions per unit is equal to the CO_2e emission factor for solid waste disposal.

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Table 7. Potential GHG Emissions Reductions for Backfill of Coliseum
Oakland Waterfront Ballpark District Project
Oakland, California

Notes, Continued:

6. Reduced on-site parking reductions are based on communication with Fehr & Peers on February 12, 2020, for every 500 on-site parking spaces removed from the project design, there would be 540 fewer trips for large events and concerts, 10,320 fewer miles travelled for weekday games, 10,920 fewer miles traveled for weekend games, and 8,890 fewer miles traveled for concerts. This reduction is capped at 2,000 spaces. Due to the complex nature of this analysis, Ramboll has evaluated these reductions for 100 spaces, which may not scale linearly when changing the number of spaces.

7. Methodology is consistent with Table OP-22.

Abbreviations

CO_2e - carbon dioxide equivalent

DU - dwelling unit

EV - electric vehicle

MT - metric tons

MWh - megawatt-hour

NG - natural gas

ZEV - zero emission vehicle

Table 8. Summary of Lifetime GHG by Land Use
Oakland Waterfront Ballpark District Project
Oakland, California

Estimated Lifetime Emissions by Land Use

Land Use and Size	Units	Ballpark[5]	Performance Venue	Residential	Office	Retail/ Restaurant	Hotel	OPP Variant[6]
		1 Ballpark	1 Performance Venue	1 Dwelling Unit	1,000 Square Feet	1,000 Square Feet	1,000 Square Feet	
Existing Conditions	MT CO_2e	-317,998	--	--	--	--	--	-520,874
Construction		10,821	185	4.0	3.7	3.7	3.5	219
Project 1.0 Operations[1]		249,450	24,741	128	255	1,837	425	0
Project 2.0 Operations[1]		185,134	20,307	90	188	1,408	373	0
Total Emissions to Reduce or Offset[2]	MT CO_2e	-57,728	24,926	132	259	1,840	428	-520,655
Maximum Allowable Offset Credits Purchased[3]	MT CO_2e	-57,728	12,463	66	129	920	214	--
Required Local Reduction Measures		--	12,463	--	129	920	214	-520,655
Reduction from TDM, TMP, Onsite EV Charging, and 50% Electrification of Residences		64,316	4,434	39	67	429	51	0
Remaining Emissions (+), Banked Emissions (-)		N/A	8,029	27	63	491	163	-520,655
Off-site Neighborhood EVCS Required If Credit Bank Not Used	#	n/a	23	0.078	0.18	1.4	0.46	-1,484

Notes

1. The estimated lifetime emissions assume 30 years of operation. Emissions associated with mobile sources or electricity generation have been scaled to represent that they become cleaner over time, consistent with Table OP-12.
2. The estimates presented here do not include anticipated additional reductions from Project features associated with LEED Gold design or from local air quality mitigation measures with GHG co-benefits. The Project is committed to achieving LEED Gold Standard, which requires projects to obtain points in the areas of Location & Transportation, Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation, and Regional Priority. Many of these measures, such as optimizing energy performance, demand response, and renewable energy production, would allow the Project to achieve further GHG reductions locally that are not captured in this analysis.
3. Per CARB's interpretation of AB734, up to 50% of the total net new emissions for the Project can be reduced with offset credits on the carbon market.
4. The number of EVCS operating assumes that the charger will be maintained, or replaced if necessary, for 30-years of operation. Where the number of offsite neighborhood EVCS is negative, the Project has earned an EVCS credit due to negative emissions.
5. For this analysis, it is assumed that there are 2,000 on-site EVCS available for ballpark parking in 2024.
6. The Oakland Power Plant variant emissions assume that 100% of power generation at the existing plant is terminated and that a 90 MW battery system is installed in its place.

Abbreviations:

EV - electric vehicle
EVCS - electric vehicle charging station
GHG - greenhouse gas
OPP - Oakland Power Plant
TDM - Transportation Demand Management Plan
TMP - Transportation Management Plan

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Table 9. Summary of Lifetime GHG by Block with the Oakland Power Plant
Oakland Waterfront Ballpark District Project
Oakland, California

Development		Units	OPP[5] Existing	Project Development Phase																			Project Total	Net Additional
				Block 1 (Stadium)	OPP-A	Block 2	Block 3	Block 4	Block 5	Block 6	Block 7	Block 8 [8]	Block 9	Block 10	Block 11	Block 12 [8]	Block 13	Block 14	Block 15 [8]	Block 16 [8]	Block 17	Block 18	OPP-B[9]		
Land Use Buildout per Block[1]	Ballpark	--		1.0																			1	0
	Performance Venue	--																		1.0			1	1
	Residential	*DU*				54	212	494	391	304			130	360	460	400						145	50	3,000	3,000
	Commercial (Non-Retail/Restaurant)	*ksf*																620	400		480			1,500	1,500
	Retail/ Restaurant	*ksf*		15	3.4	6.9	3.4	10	12	13	17	16	13	12	18	48	9.0	14	11	19	16	12	2.0	270	270
	Hotel	*ksf*									280												280	280
Lifetime Emissions	Construction	*MT CO_2e*		10,876	13	243	867	2,029	1,620	1,272	1,044	59	571	1,495	1,919	1,789	33	2,329	1,510	253	1,819	627	209	30,576	30,576
	Project 1.0	*MT CO_2e*		277,001	6,282	19,623	33,459	82,441	72,164	62,301	150,108	29,263	40,301	68,570	91,570	139,534	16,531	184,726	122,674	58,897	151,170	40,158	10,092	1,656,862	1,338,864
	Project 2.0	*MT CO_2e*		206,254	4,815	14,570	23,796	58,878	51,901	45,101	128,424	22,432	29,757	49,417	66,174	103,467	12,672	137,167	91,175	46,490	112,446	29,517	7,300	1,241,753	1,241,753
Existing Coliseum Stadium Emissions		*MT CO_2e*		-317,998																			-317,998	--
Net Lifetime Emissions[2,3]		*MT CO_2e*	-520,655	287,877	6,294	19,866	34,326	84,469	73,783	63,572	151,153	29,322	40,872	70,065	93,489	141,322	16,564	187,054	124,184	59,150	152,989	40,786	10,301	1,687,438	--
Commitments to Local Reduction Measures (LRMs) or Offsets	Offset Credits Purchased[4]	*MT CO_2e*		-30,121	3,147	9,933	17,163	42,235	36,892	31,786	75,576	14,661	20,436	35,033	46,744	70,661	8,282	93,527	62,092	29,575	76,495	20,393	5,151	669,659	669,659
	LRMs Through Project Design Features	*MT CO_2e*			1,466	5,052	9,664	23,562	20,263	17,200	21,685	6,831	10,544	19,153	25,396	36,067	3,859	47,559	31,499	12,406	38,723	10,641	2,793	344,362	--
	Remaining LRMs[6] (can be drawn from credit bank or implement offsite EVCS)	*MT CO_2e*	-520,655		1,681	4,880	7,500	18,673	16,629	14,586	53,891	7,830	9,892	15,880	21,349	34,594	4,423	45,969	30,593	17,169	37,771	9,751	2,358	355,418	-165,237
Off-site Neighborhood EVCS[7]		#	-1,484		4.8	14	21	53	47	42	154	22	28	45	61	99	13	131	87	49	108	28	6.7	1,013	-471
Percent Local Reduction		#	100%	100%	50%	78%	274%	222%	168%	136%	50%	50%	86%	156%	143%	80%	50%	50%	50%	50%	50%	94%	140%	54%	--

Notes

1. Land use phasing by block was provided by the Project Sponsor. The ballpark and performance venue are assumed to be fully built out in the blocks indicated.
2. The estimated lifetime emissions assume 30 years of operation. Emissions associated with mobile sources or electricity generation have been scaled to represent that they become cleaner over time, consistent with Table OP-12.
3. The estimates presented here do not include anticipated additional reductions from Project features associated with LEED Gold design or from local air quality mitigation measures with GHG co-benefits. The Project is committed to achieving LEED Gold Standard, which requires projects to obtain points in the areas of Location & Transportation, Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation, and Regional Priority. Many of these measures, such as optimizing energy performance, demand response, and renewable energy production, would allow the Project to achieve further GHG reductions locally that are not captured in this analysis.
4. Per CARB's interpretation of AB734, up to 50% of the total net new emissions for the Project can be reduced with offset credits on the carbon market. It is assumed that the maximum offset credits are purchased for each block of development. While the purchase of OPP is a local, direct measure, once there are no additional local direct measures required, the reduction from the OPP are applied to the offset credits purchased.
5. The OPP emissions assume that 100% of power generation at the existing plant is terminated and that a 90 MW battery system is installed in its place. While the OPP is a local, direct measure, once there are no additional local direct measures required, the reduction from the OPP are applied to the offset credits purchased.
6. The local, direct reductions from OPP are greater than the total additional LRMs required for the project, resulting in net negative remaining LRMs at full Project buildout. While the reductions associated with OPP are local and direct in nature, these excess LRMs can be used to reduce the number of offset credit purchases required.
7. An offsite neighborhood EVCS can reduce roughly 351 MT CO_2e over a 30-year lifetime. Should the OPP not occur, the Total Remaining Emissions per block can be offset via local neighborhood EVCS. The number of EVCS required per block can be estimated using the lifetime reduction. Any excess remaining LRMs associated with the OPP Variant conversion can be drawn as offset credits.
8. Project Blocks 8, 15, and 16 would not be developed under the Maritime Reservation Scenario. Block 12 would be partially developed under the Maritime Reservation Scenario.
9. OPP-B is the fuel tank parcel that requires remediation prior to construction.

Abbreviations

EV - electric vehicle
EVCS - electric vehicle charging station
GHG - greenhouse gas
OPP - Oakland Power Plant
TDM - Transportation Demand Management Plan
TMP - Transportation Management Plan

RAMBOLL

APPENDIX A
SITE PLAN

24" x 36" Arch D - SHEET SIZE

NOTE: BUILDING ENVELOPE ELEVATIONS ARE MEASURED FROM THE CITY OF OAKLAND DATUM (ELEVATION 10' AT FINISHED FLOOR) AND BASED ON CURRENT ZONING REGULATIONS

THE OAKLAND ATHLETICS HOWARD TERMINAL MASTERPLAN

1 MARKET STREET, OAKLAND, CALIFORNIA 94607, USA

CEQA SUBMITTAL

CLIENT:
THE OAKLAND ATHLETICS
7000 Coliseum Way
Oakland, CA 94621 USA
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LANDSCAPE ARCHITECT:
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LIGHTING CONSULTANT:
HLB LIGHTING DESIGN INC.
300 Brannan Street, Suite 212
San Francisco, CA 94107
TEL: +1 415 348 8273

	DATE:	REVISION:

NOT FOR CONSTRUCTION

KEY PLAN

BAR SCALE
10 50 100 200 400

DRAWING TITLE:

ILLUSTRATED FULL BUILDOUT SITE PLAN

DRAWING NO:

S1020

PROJECT NO:	18520
SCALE:	1" = 140'-0"
FORMATE	ARCH D
DATE:	12/06/2019

24" x 36" Arch D - SHEET SIZE

NOTE: BUILDING ENVELOPE ELEVATIONS ARE MEASURED FROM THE CITY OF OAKLAND DATUM (ELEVATION 10' AT FINISHED FLOOR) AND BASED ON CURRENT ZONING REGULATIONS

THE OAKLAND ATHLETICS HOWARD TERMINAL MASTERPLAN

1 MARKET STREET, OAKLAND, CALIFORNIA 94607, USA

CEQA SUBMITTAL

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TEL: +1 415 348 8273

	DATE:	REVISION:

NOT FOR CONSTRUCTION

KEY PLAN

BAR SCALE 10 50 100 200 400

DRAWING TITLE:

ILLUSTRATED FULL BUILDOUT SITE PLAN - MARITIME RESERVATION SCENARIO

DRAWING NO: S1020B

PROJECT NO:	18520
SCALE:	1" = 140'-0"
FORMATE	ARCH D
DATE:	12/06/2019

APPENDIX B
AB 734 CALCULATOR

[Included Electronically]

APPENDIX C
FIRST SUPPLEMENTAL MEMO

MEMORANDUM

Date: August 26, 2019

To: Noah Rosen, Oakland Athletics

From: Michael Keinath
Megan Sutter

Subject: **Oakland Sports and Mixed-Use Project**
AB734 Application – Revised Analysis

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Introduction

The proposed Oakland Waterfront Ballpark District Project at Howard Terminal (herein referred to as the "Project") has applied for California Environmental Quality Act (CEQA) judicial streamlining under Public Resources Code (PRC) Section 21168.6.7 et seq. In support of the Application, Ramboll quantified direct and indirect greenhouse gas emissions associated with the Project's construction and operation, to show that the Project meets the requirement for no "net additional emission of greenhouse gases [GHG], including greenhouse gas emissions from employee transportation," where 50 percent of the GHG emissions reductions for nonresidential uses are from local, direct GHG emissions reductions that give consideration to criteria air pollutant and toxic air contaminant emissions reductions, including, but not limited to, any of the following:

(I) Project design features or onsite reduction measures, or both design features and onsite reduction measures.

(II) Off-site reduction measures in the neighboring communities.

Since the initial AB734 application submittal dated March 20, 2019 (herein referred to as the "Initial AB734 Application"), new information has become available and Ramboll has revised our emissions analysis to account for this new information. This memorandum provides a brief summary of the updates and revisions made to the Initial AB734 Application. Some minor updates to the application text are not discussed here because they were made for clarification purposes only and do not affect emissions results.

Summary of Updates and Revisions

A summary of those revisions and updates is shown below:

- **Existing Conditions.** Ramboll quantified the GHG emissions associated with displaced activity at the Oakland Coliseum, noting that these do not represent new GHG emissions due to Project at the Howard Terminal Site but the cessation of certain activities at the

existing Coliseum stadium and their movement to the Project site. The Initial AB734 Application analysis was updated as follows:

  - Removal of National Football League (NFL) activity from Existing Conditions, based on comments from the Air Resources Board.
  - Additional removal of non-NFL and non-MLB activity from the Existing Conditions, to provide the most conservative approach to the Existing Conditions.
  - Removal of existing generator emissions at the Coliseum from Existing Conditions.
  - Addition of Transportation Refrigeration Unit (TRU) emissions to Existing Conditions inventory.

- **Potential Construction Emissions.** The Proposed Project's discrete construction emissions were estimated as part of the total emissions analysis. This was updated as follows:
  - Updated construction emissions to reflect revised project-specific construction equipment information received from Devcon Construction Inc. on August 7, 2019.
  - Updates include the addition of electric construction equipment.
  - Updated construction on-road emissions to include Project-specific worker and vendor trips.
- **Potential Operational Emissions.** Operational emissions from the Proposed Project include vehicle exhaust from on-road vehicles (mobile), stationary sources within the project site (generators), energy (indirect emissions from electricity and direct emissions from natural gas), water and wastewater, solid waste disposal, and area sources such as landscaping equipment. Updates in this revised application include:
  - Updated vehicle miles traveled (VMT) based on revised Fehr & Peers traffic data (using the TIRG method required by the City of Oakland).
  - Added truck and bus trips to mobile emissions.
  - Updated Pacific Gas & Electric (PG&E) GHG emission factors based on newly released data for 2017.
  - Updated Proposed Project electricity and natural gas emissions estimated for 2019 Title 24 based on new California Energy Commission 2019 Impact Analysis for 2019 Energy Efficiency Standards (published online in March 2019).
  - Updated Howard Terminal Ballpark electricity consumption based on new information from Meyers+ (Project Sponsor electrical subcontractor).
  - Updated water uses based on new Project-specific information from Meyers+ (Project Sponsor electrical subcontractor).
  - Removed residential hearth emissions since Project Sponsor confirmed that residences will not include hearths.
  - Updated generator emissions to include refined generator list provided by the Project Sponsor.
  - Addition of TRU emissions for the ballpark and performance venue. Details of these calculations are presented in **Table OP-10** of **Appendix**.

- Addition of emissions due to truck delays surrounding the Port of Oakland due to traffic from the Proposed Project. Details of these calculations are presented in **Table OP-11** of **Appendix**.

- **Potential Reductions from EV Charging.** Electric vehicle (EV) chargers reduce operational mobile emissions by encouraging the use of plug-in hybrid electric or battery-electric vehicles and thereby displacing gasoline or diesel fuel combustion. The application includes the following:

  - **Table OP-9A** of **Appendix** shows the assumed EV charger usage rates and total vehicle miles traveled per year displaced by EVs charged at the Project site.

    The usage rates of the EV chargers is assumed to correspond to the anticipated EV fleet mix percentage in the BAAQMD region that would meet California's 2030 EV target. This is a conservative assumption, as the presence of Project EV chargers would likely encourage additional EV adoption and/or use relative to the statewide targets.

    Reductions are capped based on the maximum charging capacity and number of EV trips that are available for charging for each activity type. For certain activities such as weeknight ballpark games, the Project is charger-limited (e.g., there are more EV trips than there is available charger capacity during prime business or activity hours), while for other activities the Project is EV-limited (e.g., there is more than enough charger capacity to charge the number of EVs expected to visit the site based on the fleet mix that would achieve statewide targets).

  - GHG emissions calculations evaluate the displaced emissions from diesel or gasoline passenger vehicles that would have been emitted in the absence of EVs based on the mileage derived in **Table OP-9A** of **Appendix.** Indirect GHG emissions from electricity used to charge the EVs are added based on the anticipated electricity grid intensity factors for each year. The resulting net GHG emissions reductions by year are shown in **Table OP-9B** of **Appendix.**

- **Potential Project Variant Emissions.** As discussed in the Initial AB734 Application, the Proposed Project may consider one or more variants. Updates to the application include:

  - One variant, the "altered edge configuration of the existing wharf" is no longer being considered as a variant of the Proposed Project and was thus removed from the application text.

  - GHG emissions calculations were included for the **Gondola Variant** and are included in Table 11. These emissions are not included in the overall emissions calculation for the Proposed Project, but instead are included here for informational purposes.

    The Gondola Variant would involve the addition of an aerial tram or gondola above Washington Street extending from downtown Oakland near 12th Street BART to Jack London Square. The gondola would transport up to approximately 6,000 passengers per hour per direction.

    Gondola variant avoided GHG emissions would be associated with a reduction of vehicle miles traveled using on-road vehicles. Between 5% and 10% of non-delivery vehicle trips were assumed to be replaced by gondola trips, with the

percentage varying based on land use scenario. The reduction in GHG emissions due to the decrease in on-road vehicle miles traveled would be 4,192 MT CO2e per year based on Table 25 in the Howard Terminal Project AB 734 Analysis provided by Fehr & Peers on August 21, 2019.

The Gondola Variant would also result in new GHG emissions associated with electricity use at the three gondola stations: Jack London Station, 10th Street Station, and Tower 3rd Street Station. The total electricity use rate for the Gondola Variant would be 4,887 MWh per hour. GHG emissions from this electricity use were calculated using the 2027 electricity use emission factor. The increase in GHG emissions due to electricity use at the gondola stations would be approximately 478 MT CO2e per year. Details of these calculations are shown in Tables OP-15 and OP-16 in Appendix.

This analysis also includes one-time construction emissions that would be associated with the construction of the Gondola Variant. These emissions were calculated using the same methods used for the Proposed Project and result in emissions of 914 MT CO2e per year.

The resulting net decrease in GHG emissions for the Gondola Variant would be 2,800 MT CO2e per year.

- GHG emissions calculations were also included for the **Oakland Power Plant (OPP) Variant** and are included in **Table 11**. As the OPP Variant has a high likelihood of being implemented, **Table 12** presents a year by year comparison of GHG emissions including the reductions from the OPP Variant.

  The OPP Variant would involve upgrading the existing power plant to provide a reliable source of clean energy. The three existing gas turbine units at the Oakland Power Plant have a combined jet fuel powered production of 165 megawatts (MW). The facility operates, on average, approximately 35 days per year for grid electrical support. As part of the OPP Variant, the three gas turbine units would be removed and replaced with a 40 MW battery energy storage system (ESS) that will have up to four hours of storage. The ESS would include approximately 15,000 battery modules to be stored in approximately 600 racks, with the potential for expansion.

  GHG emissions avoided by the closure of the existing power plant and replacement with battery ESS were calculated based on the average annual OPP electricity generation and fuel consumption for 2010 to 2018,[1] and the difference in GHG intensity between the gas turbines operating at the OPP (2010-2018 average) and the grid-averaged GHG intensity. While much of the electricity stored in the battery ESS is likely to be produced through OCEI which expected to have an electricity intensity of zero, this analysis conservatively assumes that the stored energy would be supplied at the grid-average intensity. The average annual direct GHG emissions avoided by the closure of the existing peaker plant is estimated to be 7,824 metric tons per year (MT CO_2e/yr) in the first full-buildout year of 2028; however, this estimate in full buildout year 2028 could range from 1,920 to 21,921

[1] Data from U.S. Energy Information Administration Form EIA-923 detailed data for 2010-2018 (https://www.eia.gov/electricity/data/eia923/) for Dynegy Oakland Power Plant.

MT CO_2e/yr based on historic OPP dispatching frequencies from 2010 to 2018. Details of these calculations are shown in **Tables OP-17** and **OP-18** in Appendix.

In addition to offsetting direct electricity generation from peaker plants, the ESS plays an important role in increasing grid reliability and stability with the rise of solar and wind inputs. The CEC, in their 2007 Integrated Energy Policy Report, recognized that "appropriate infrastructure, technology, and policies" are required to meet the State's RPS goals.[2] ARB's California 2017 Climate Change Scoping Plan further recognized that "As the energy sector continues to evolve and decarbonize, … some power plants may operate more flexibly to balance renewables, emerging technologies (examples include storage, smart inverters, renewably-fueled fuel cells, and others) will become more prevalent" and encouraged the State to "develop rules needed for the development of electricity storage technologies."[3] The State's AB2868 mandates the California Public Utilities Commission to direct the three largest Investor Owned Utilities in California to invest in distributed energy storage systems, which, among other benefits, is expected to "help reduce overall system peak energy demands."[4,5]

Battery ESS have rapid response times and are more efficient compared to fossil-fueled peaker plants, which are curtailed and ramped down during periods of low demand and require time to ramp up to meet peak energy demand.[5,6] This is because battery ESS store can energy from renewable sources during off-peak durations (e.g., wind farms which often generate more power at night[7] or midday solar) and time-shift the energy provision to peak usage periods. AES Energy Storage classifies its 20-MW battery ESS project for Indianapolis Power and Light as having the "equivalent of 40 MW of flexible capacity" for the grid.[8] Additionally, the CEC concludes in a 2010 study of the impact of renewable generation and storage impact on the California grid, that "storage can be up to two to three times as effective as adding a combustion turbine to the system for regulation purposes" and that a "30-50 MW storage device is as effective or more effective as a 100 MW combustion turbine used for regulation purposes".[9] The effectiveness of battery ESS over fossil-fueled plants would likely increase as the share of

[2] California Energy Commission (2007). Integrated Energy Policy Report 2007. Available online at: https://ww2.energy.ca.gov/2007publications/CEC-100-2007-008/CEC-100-2007-008-CMF.PDF (accessed August 23, 2019).
[3] CARB (2017). California's 2017 Climate Change Scoping Plan. Available online at: https://ww3.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf (accessed August 23, 2019).
[4] Assembly Bill No. 2868, Gatto. Chapter 681 Energy Storage. Available online at: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160AB2868 (accessed August 23, 2019).
[5] World Nuclear Association, "Electricity and Energy Storage", May 2019. Available online at: https://www.world-nuclear.org/information-library/current-and-future-generation/electricity-and-energy-storage.aspx (accessed August 23, 2019).
[6] Mosaic Energy, "How Grid Energy Storage is Becoming the New Peaker Plant". Available online at: https://www.mosaicenergy.com/grid-energy-storage/ (accessed August 23, 2019).
[7] Center for Climate and Energy Solutions, "Electric Energy Storage". Available online at: https://www.c2es.org/content/electric-energy-storage/ (accessed August 23, 2019).
[8] Green Tech Media (2015). "How Energy Storage Can Cut Peaker-Plant Carbon for the Clean Power Plan". Available online at: https://www.greentechmedia.com/articles/read/how-energy-storage-can-cut-peaker-plant-carbon-for-the-clean-power-plan#gs.yauz07 (accessed August 23, 2019).
[9] California Energy Commission (2010). "Research Evaluation of Wind Generation, Solar Generation, and Storage Impact on the California Grid". Available online at: https://ww2.energy.ca.gov/2010publications/CEC-500-2010-010/CEC-500-2010-010.PDF (accessed August 23, 2019).

electricity supplied by solar and wind generation grows. Thus, the battery ESS proposed by the OPP Variant would likely result in a ramping down of other fossil-fueled plants on the grid totaling a similar power capacity as the Oakland Power Plant due to reduced regulation/grid conditioning requirements.

In addition to the direct emissions avoided by replacing the OPP generation units with cleaner grid energy, therefore, the OPP Variant should also be able to take credit for avoided indirect GHG emissions due to the ramping down of fossil-fueled plants that would have otherwise been required to stabilize the grid. This is quantified in **Table OP-17B** in the Appendix, where the grid-averaged carbon intensity for non-renewable power generation for PG&E is combined with the annual average output of the OPP to yield a GHG emissions avoided of 1,658 MT CO_2e/yr. The total amount of annual GHG emissions avoided due to the introduction of the battery ESS in full-buildout year 2028 is then 9,482 MT CO_2e/yr.

This analysis also includes one-time construction emissions that would be associated with the construction of the OPP Variant. These emissions were calculated using the same methods used for the Proposed Project and result in emissions of 219 MT CO2e.

Results Summary

A summary of the Proposed Project GHG emissions (disaggregated between residential and nonresidential land uses, and projected year-by-year out to 30 years following a net increase in GHG emissions) and avoided GHG emissions is presented to demonstrate that the Project meets the GHG emissions requirements for AB734 CEQA streamlining. **Table 1**, which shows a summary of emissions for the Proposed Project for the Full Buildout year (2028), was revised in this supplemental submittal; values were revised based on updates discussed above, and formatting and information presented was revised for clarity. As shown in **Table 1**, when accounting for Project features and GHG reduction measures that are currently known and quantifiable, the Project at Full Buildout (2028) would result in net new GHG emissions of approximately 39,337 MT CO2e/year from nonresidential sources and approximately 14,627 MT CO_2e/year from residential sources.

In total, the Local GHG Reductions that are quantifiable at this time equal 48% of the net new nonresidential emissions, even without the potential reductions of the OPP or Gondola Variants, which is most of the way to the 50% requirement. The analysis presented here does not include anticipated additional reductions from Project features associated with LEED Gold design or from local air quality mitigation measures with GHG co-benefits. The Project is committed to achieving LEED Gold Standard, which requires projects to obtain points in the areas of Location & Transportation, Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation, and Regional Priority. Many of these measures, such as optimizing energy performance, demand response, and renewable energy production, would allow the Project to achieve further GHG reductions locally that are not captured in this analysis.

Additionally, **Table 10**, shows the year by year emissions, as well as the local reduction measures percentage over time. Over the course of the project time horizon of 30 years for each phase or sub-phase, the overall local reduction is approximately 53%. **Table 12** shows the similar year by year analysis, including reductions from the OPP Variant. This shows 70% local reduction

measures in the 2028 full-buildout year with an overall reduction of 80% over the full project time horizon.

While not quantified explicitly in **Table 10** or **Table 12**, the Gondola Variant, if implemented, will result in additional local GHG reductions.

The Project also proposes a clarification of the process proposed in the Application for calculating and meeting the obligations of AB 734 as follows:

> The Project will be constructed in phases or sub-phases, as market conditions dictate. Local Reduction Measures shall include project design features, on-site reduction measures and off-site reduction measures in neighboring communities (if any) (collectively, "Local Reduction Measures"). "Required Local Reduction Measures" shall be those Local Reduction Measures required to meet the obligations set forth in AB 734 pertaining to non-residential emissions. Construction Emissions will be calculated and required contracts for purchase of credits shall be entered into no later than the issuance of a grading permit for each construction phase or subphase for horizontal development and at the issuance of each building permit for vertical buildings. Operational Emissions will be calculated and any Required Local Reduction Measures will be identified and/or contracts for purchase of credits entered into no later than the issuance of a temporary certificate of occupancy for the each building in that phase or subphase, based on the net present value of a projected 30-year useful life for that building. If the purchase of credits is required, the As shall, to the extent feasible, place the highest priority on the purchase of offset credits that produce emission reduction within the neighboring communities of West Oakland, followed by the City of Oakland as a whole and the boundaries of the Bay Area Air Quality Management District. Any Required Local Reduction Measures identified in the calculations shall be implemented no later than the temporary certificate of occupancy of the final vertical building of the final phase of the Project unless: (i) calculations demonstrate that the obligations set forth in AB 734 pertaining to non-residential emissions have been achieved for the Project; or (ii) equivalent Local Reduction Measures have been provided; or (iii) equivalent monies have been escrowed or alternative equivalent security has been provided by the issuance of the temporary certificate of occupancy of the final vertical building in the final phase of the Project to fund a Local Offset project.
>
> In calculating the Construction and Operational emissions, the Oakland A's will provide to the City or the Port calculations and related evidence demonstrating compliance with AB 734, including at the time the calculations are required as set forth above, identifying the Local Reduction Measures (as defined above) that have or will be implemented by the completion of the Project, as well as contracts for the purchase of offset credits from projects, located within the United States, and verified by a third party accredited by the State Air Resources Board (Offset Credits). Any Required Local Offset shall be implemented by the temporary certificate of occupancy for the last vertical building in the final phase of the Project, unless: (i) calculations demonstrate that the Required Local Reduction Measures have been achieved for the Project; or (ii) equivalent Local Reduction Measures have been provided; or (iii) equivalent monies have been escrowed or alternative equivalent security has been provided by the issuance of the temporary certificate of occupancy of the final vertical building in the final phase of the Project to fund a Local Offset project.
>
> In considering off-site reduction measures in the neighboring communities, the City and/or the Port have expressed a willingness to discuss allowing the Oakland A's to fund measures that also reduce criteria air pollutants and toxic air contaminants, provided the Oakland A's

provide evidence that the funds directed to such off-site reduction measures are in an amount at least equal to the amount the Oakland A's would otherwise pay in the then-current market for Offset Credits for the amount of credits otherwise required to comply with the provisions of AB 734.

TABLES

Table 1. Emissions Reductions and Offsets Summary at Full Buildout (2028)
Oakland Waterfront Ballpark District Project
Oakland, California

Category	CO_2e Emissions (MT/year)			
	Ballpark	**Ancillary - Nonresidential**	**Ancillary - Residential**	**Total**
Existing Conditions Emissions (2020)	-10,600	-	-	-10,600
Project 1.0 Emissions at Full Buildout (without Project Design Features and Local Reduction Measures)	10,376	39,561	14,627	64,564
Net New Project Emissions (Project 1.0 - Existing)	-224	39,561	14,627	**53,964**
Net New Project Nonresidential Emissions	39,337		0	39,337
Reductions *Needed* from Local Measures (50% of Net New Nonresidential Emissions)[1]	19,668		0	19,668
Project 2.0 Emissions at Full Buildout (with Project Design Features, TDM, TMP, and EV Charging)	7,966	30,844	10,978	49,788
Reductions Achieved through TDM, TMP, and EV Charging (Project 2.0 - Project 1.0)	-2,409	-8,717	-3,650	**-14,776**
Reductions Achieved through Oakland Power Plant Variant	-9,482			**-9,482**
Achieved Local Reductions as a Percent of Net New Nonresidential Emissions[2]	**62%**			
Additional Reductions Achieved through Offset Credits, Mitigations, or Other Onsite/Offsite Projects to Reach Net Zero Target	**-29,706**			

Notes:
1. Per AB 734, at least 50% of the nonresidential (ballpark + nonresidential ancillary) emissions must be reduced by local measures.
2. Local reduction measures include TDM and TMP measures, EV chargers, and the Oakland Power Plant Variant.

Abbreviations:
CO_2e - carbon dioxide equivalents
MT - metric ton

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Table 2. Existing and Proposed Land Uses
Oakland Waterfront Ballpark District Project
Oakland, California

Land Use Type		Baseline		Project
		Coliseum	Jack London Square	Howard Terminal
Ballpark Uses				
MLB Uses	square feet	1,400,000	-	1,200,000
	capacity	47,170	-	35,000
	attendees	2,870,000	-	2,870,000
Other Events	attendees	-	-	779,000
A's Headquarters[1]	square feet	-	40,000	-
Parking	spaces	10,000	-	2000 permanent + 3,500 temporary interim parking spaces (between Phase 1 Buildout and Full Buildout)
Non-Ballpark Uses				
Office	square feet	-	-	1,500,000
Retail[2]	square feet	-	-	270,000
Residential	units	-	-	3,000
	square feet	-	-	3,300,000
Performance Venue	square feet	-	-	50,000
	seats			3,500
Hotel	square feet	-	-	280,000
	rooms	-	-	400
Parking Garages	spaces	-	-	6,900

Notes:

1. The Athletics headquarters is anticipated to move from its present location in Jack London Square to the new Howard Terminal ballpark land use and is therefore not separately listed under the Project scenario.
2. Proposed retail uses are approximately 90,000 GSF food and beverage, 90,000 GSF entertainment (theater, bowling alley, gaming, etc.), and 90,000 GSF soft goods retail including food retail.

Abbreviations:

GSF - gross square footage
MLB - Major League Baseball

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Table 3. Proposed Project Phasing Plan
Oakland Waterfront Ballpark District Project
Oakland, California

Land Use Type		Phase 1 Ballpark and Initial Ancillary Development[1] Construction from 2020-2023 Operations begin in 2023	Phase 2 Additional Ancillary Development Construction from 2023-2027 Operations begin in 2027
Ballpark	square feet	1,200,000	-
Ballpark Parking	spaces	3,500 (interim)	2,000
Office	square feet	250,000	1,250,000
Retail	square feet	30,000	240,000
Residential	units	540	2,460
Performance Venue	square feet	-	50,000
Hotel	square feet	280,000	-
Other Parking Garages	spaces	1,240	5,660

Notes:
[1] Phasing plan provided by Project sponsor and represents a reasonable and accelerated phasing schedule for the purposes of conservatively assessing impacts.

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Table 4. Emissions Sources
Oakland Waterfront Ballpark District Project
Oakland, California

Proposed Project		
Type	**Source**	**Description**
Construction	Off-Road Equipment	Direct emissions from diesel off-road equipment exhaust; Indirect emissions from electricity use for electric off-road equipment
	On-Road Mobile Sources	Direct emissions from running, idling, and starting exhaust
Operations	Energy	Indirect emissions from building electricity use; Indirect emissions from EV charger electricity use; Direct emissions from natural gas use
	On-Road Mobile Sources	Direct emissions from running exhaust; (Emissions reductions from EV chargers)
	Solid Waste	Direct emissions from treatment of solid waste
	Water	Direct emissions from water treatment; Indirect emissions from electricity use for water supply, distribution, and treatment
	Standby Emergency Generators	Direct emissions from combustion exhaust
	Area Sources	Various emissions from landscaping equipment

Table 5. Construction and Operational Timeline
Oakland Waterfront Ballpark District Project
Oakland, California

Construction Area	Construction Activity	Construction[1]			Operations
		Anticipated Start Date	Anticipated End Date	Number Work Days[2]	Start Date
Phase 1	Demolition	9/1/2020	11/9/2020	50	-
Phase 2	Demolition	11/10/2020	1/18/2021	50	-
DDC Area	Geotechnical Work	11/10/2020	4/15/2021	113	-
DPC Area	Geotechnical Work	11/10/2020	4/15/2021	113	-
Phase 1 Ballpark and Initial Mixed Use Development	Cut Off Wall	1/2/2021	3/2/2021	44	Opening Day Program: 4/20/2023 Mixed Use Program: 12/2/2023
	Grading and Site Preparation	3/5/2021	11/23/2021	188	
	Site Utilities	11/24/2021	4/28/2022	112	
	Ballpark Vertical Construction	4/12/2021	4/19/2023	633	
	Mixed Use Vertical Construction	11/24/2021	12/1/2023	528	
	Paving	7/1/2022	9/30/2022	66	
	Architectural Coating	2/15/2022	12/1/2023	469	
Phase 2 Additional Mixed Use Development	Grading and Site Preparation	12/4/2023	8/19/2024	186	Full Masterplan: 9/2/2027
	Site Utilities	8/20/2024	2/5/2025	122	
	Mixed Use Vertical Construction	8/20/2024	9/1/2027	792	
	Paving	7/1/2025	1/1/2026	133	
	Architectural Coating	6/20/2025	9/1/2027	574	

Notes:
[1] Construction schedule provided by Devcon Construction Inc.
[2] Ballpark Building Construction will have 6 work days per week.

Abbreviations:
DDC - Deep Dynamic Compaction
DPC - Direct Power Compaction

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Table 6. Construction GHG Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

Year	CO_2e Emissions (MT/year)			
	Diesel Off-Road Equipment	Electric Off-Road Equipment	On-Road Vehicles	Total
2020	366	0	36	402
2021	2,560	17	2,738	5,315
2022	2,814	71	3,205	6,089
2023	1,976	24	1,768	3,768
2024	2,287	0	1,346	3,632
2025	2,151	149	1,818	4,117
2026	2,926	193	1,893	5,012
2027	1,895	44	1,232	3,171
Total GHG Emissions from Construction (MT)				**31,507**

Notes:
[1] Construction inputs were provided by the Project sponsor and Devcon Construction Inc. based on Project-specific assumptions.

Abbreviations:
CO_2e - carbon dioxide equivalents
GHG - greenhouse gas
MT - metric ton

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Table 7. Existing Conditions Emissions Summary (2020)
Oakland Waterfront Ballpark District Project
Oakland, California

Category	CO_2e Emissions (MT/year)
Mobile	8,175
Electricity	1,302
Natural Gas	240
Water and Wastewater	119
Solid Waste	762
Area Sources	0.22
Stationary Sources	0
Transportation Refrigeration Units[2]	0.37
Total Emissions	**10,600**

Notes:

1. Existing conditions include A's games and other events at the Oakland Coliseum, as well as the A's headquarters at Jack London Square. NFL games are excluded.
2. Transportation Refrigeration Units (TRU) emissions account for emissions from the diesel-powered electrical generation units used to refrigerate or heat perishable goods transported by trucks.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric ton

Table 8. Project 1.0 Operational Emissions for Full Buildout Year (2028)
Oakland Waterfront Ballpark District Project
Oakland, California

Category	Project CO_2e Emissions (MT/year)		
	Ballpark	**Ancillary - Nonresidential**	**Ancillary - Residential**
Mobile	7,728	32,794	10,694
Electricity	1,204	3,098	1,138
Natural Gas	253	2,218	1,396
Water and Wastewater	190	353	550
Solid Waste	945	956	694
Area Sources	0.06	0.17	37
Stationary Sources[1]	53	118	118
EV Charging	--	--	--
Transportation Refrigeration Units[2]	0.41	0.05	0
Port Truck Idling Delays[3]	2.1	23	--
Total	**10,376**	**39,561**	**14,627**
	64,564		

Notes:

1. Stationary source emissions from emergency generators are not associated with particular types of land uses, but rather mixed-use buildings on the Project site. For the purpose of this preliminary estimate, stationary source emissions are equally split between the Ancillary - Nonresidential and Ancillary - Residential totals.
2. Transportation Refrigeration Units (TRU) emissions account for emissions from the diesel-powered electrical generation units used to refrigerate or heat perishable goods transported by trucks.
3. Traffic from the Project is estimated to contribute to truck delays in the surrounding areas, which results in truck idling emissions. Data was provided from Fehr & Peers for ballpark traffic-caused delays and ancillary development traffic-caused delays. However, no information was provided for the breakdown between non-residential ancillary and residential ancillary, so all emissions were considered to be from non-residential for this analysis.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric ton

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Table 9. Project 2.0 Operational Emissions for Full Buildout Year (2028)
Oakland Waterfront Ballpark District Project
Oakland, California

Category	Project CO_2e Emissions (MT/year)		
	Ballpark	**Ancillary - Nonresidential**	**Ancillary - Residential**
Mobile	5,829	26,658	8,015
Electricity	1,204	3,098	1,138
Natural Gas	253	2,218	1,396
Water and Wastewater	190	353	550
Solid Waste	945	956	694
Area Sources	0.06	0.17	37
Stationary Sources[1]	53	118	118
EV Charging[2]	-510	-2,581	-971
Transportation Refrigeration Units[3]	0.41	0.05	0
Port Truck Idling Delays[4]	2.1	23	--
Total	**7,966**	**30,844**	**10,978**
	49,788		

Notes:

1. Stationary source emissions from emergency generators are not associated with particular types of land uses, but rather mixed-use buildings on the Project site. For the purpose of this preliminary estimate, stationary source emissions are equally split between the Ancillary - Nonresidential and Ancillary - Residential totals.
2. This analysis assumes that electric vehicle chargers will be installed for 10% of all parking spaces.
3. Transportation Refrigeration Units (TRU) emissions account for emissions from the diesel-powered electrical generation units used to refrigerate or heat perishable goods transported by trucks.
4. Traffic from the Project is estimated to contribute to truck delays in the surrounding areas, which results in truck idling emissions. Data was provided from Fehr & Peers for ballpark traffic-caused delays and ancillary development traffic-caused delays. However, no information was provided for the breakdown between non-residential ancillary and residential ancillary, so all emissions were considered to be from non-residential for this analysis.

Abbreviations:

CO_2e - carbon dioxide equivalents

EV - electric vehicle

MT - metric ton

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Table 10. Year-by-Year Comparison of GHG Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2]	Project 2.0 Operational Emissions[2]	Construction Emissions	Net Project Emissions to Reduce or Offset	Local Reductions (TMP + TDM + EV Charging)	% Local Reduction Measures	Remaining Emissions[3]
	MT CO_2e/year						%	MT CO_2e/year
2020	0	0	0	402	402	0	--	402
2021	0	0	0	5,315	5,315	0	--	5,315
2022	0	0	0	6,089	6,089	0	--	6,089
2023	10,600	12,912	10,527	3,768	6,080	2,385	115%	3,695
2024	**10,600**	**24,575**	**19,825**	**3,632**	**17,608**	**4,750**	**43%**	**12,858**
2025	10,600	23,872	19,272	4,117	17,389	4,600	44%	12,789
2026	10,600	23,234	18,766	5,012	17,646	4,468	45%	13,178
2027	10,600	36,947	30,213	3,171	29,518	6,734	34%	22,784
2028	**10,600**	**64,564**	**49,788**	**0**	**53,964**	**14,776**	**38%**	**39,188**
2029	10,600	63,027	48,589	0	52,427	14,438	38%	37,989
2030	10,600	61,659	47,511	0	51,059	14,148	38%	36,911
2031	10,600	60,407	46,514	0	49,807	13,893	39%	35,914
2032	10,600	59,273	45,599	0	48,673	13,674	39%	34,999
2033	10,600	58,240	44,755	0	47,640	13,485	39%	34,155
2034	10,600	57,293	43,970	0	46,694	13,324	40%	33,370
2035	10,600	56,430	43,242	0	45,830	13,187	40%	32,642
2036	10,600	55,640	42,566	0	45,040	13,074	40%	31,966
2037	10,600	54,914	41,934	0	44,314	12,980	41%	31,334
2038	10,600	54,251	41,345	0	43,651	12,906	41%	30,745
2039	10,600	53,643	40,795	0	43,043	12,848	42%	30,195
2040	10,600	53,083	40,278	0	42,483	12,805	42%	29,678
2041	10,600	52,561	39,788	0	41,961	12,773	43%	29,188
2042	10,600	52,082	39,329	0	41,482	12,754	43%	28,729
2043	10,600	51,635	38,891	0	41,035	12,743	44%	28,291
2044	10,600	51,209	38,469	0	40,609	12,740	44%	27,869
2045	10,600	50,805	38,062	0	40,205	12,743	45%	27,462
2046	10,600	50,741	38,018	0	40,141	12,722	45%	27,418
2047	10,600	50,690	37,984	0	40,090	12,706	45%	27,384
2048	10,600	50,650	37,957	0	40,050	12,693	45%	27,357
2049	10,600	50,624	37,940	0	40,024	12,684	45%	27,340
2050	10,600	50,641	37,957	0	40,042	12,684	45%	27,357
2051	10,600	50,641	37,957	0	40,042	12,684	45%	27,357

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Table 10. Year-by-Year Comparison of GHG Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2]	Project 2.0 Operational Emissions[2]	Construction Emissions	Net Project Emissions to Reduce or Offset	Local Reductions (TMP + TDM + EV Charging)	% Local Reduction Measures	Remaining Emissions[3]
	MT CO_2e/year						%	MT CO_2e/year
2052	10,600	50,641	37,957	0	40,042	12,684	45%	27,357
2053	0	42,657	31,562	0	42,657	11,095	36%	31,562
2054	0	39,293	28,551	0	39,293	10,742	39%	28,551
2055	0	39,289	28,547	0	39,289	10,742	39%	28,547
2056	0	39,244	28,511	0	39,244	10,733	39%	28,511
2057	0	5,243	826	0	5,243	4,417	86%	0,826
Total Gross Emissions (MT)	**317,998**	**1,652,610**	**1,253,797**	**31,507**	**1,366,120**	**398,813**	**42%**	**967,306**

Notes:

[1] Emissions decrease over time due to transportation and electricity (for both building energy use and water treatment and distribution) becoming cleaner. A linear interpolation is used to take into account decrease in electricity intensity factor due to Renewable Portfolio Standards. The decrease in vehicle emission factors over time is based on Alameda County fleet-average emission factors from 2020-2050. The estimate assumes no change after 2050, since EMFAC2017 does not project past 2050.

[2] Emissions assume all buildings become operational as soon as Phase is constructed, based on percent of operational land uses by Phase and percent of operation per year. The first calendar year is adjusted for partial operation based on start date and the last calendar year is adjusted for partial operation such that total lifetime for each land use sums to 30 years.

[3] The analysis presented here does not include anticipated additional reductions from Project features associated with LEED Gold design or from local air quality mitigation measures with GHG co-benefits. The Project is committed to achieving LEED Gold Standard, which requires projects to obtain points in the areas of Location & Transportation, Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation, and Regional Priority. Many of these measures, such as optimizing energy performance, demand response, and renewable energy production, would allow the Project to achieve further GHG reductions locally that are not captured in this analysis.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric ton
NPV - net present value
yr - year

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Table 11. Project Variant Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

Emissions Source	GHG Emissions [MT/year] CO_2e
Aerial Gondola	
Construction Emissions	914
Energy Use Emissions	478
Mobile Emission Reductions (due to VMT Reductions)	-4,192
Total Emissions	**-2,800**
Oakland Power Plant	
Construction Emissions	219
Direct Energy Emission Avoided	-7,824
Indirect Energy Emission Avoided	-1,658
Total Emissions	**-9,264**
Total Emission Reductions	**-12,064**

Note:

1. GHG emissions were only calculated for the Aerial Gondola and Oakland Power Plant variants, since these are expected to potentially have significant impacts on the GHG analysis. All other variant projects are anticipated to have minimal GHG impacts or reductions.

Abbreviations:

CO_2e - carbon dioxide equivalent

GHG - greenhouse gas

MT - metric ton

VMT - vehicle miles traveled

Table 12. Year-by-Year Comparison of GHG Emissions With Oakland Power Plant
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2]	Project 2.0 Operational Emissions[2]	Construction Emissions	Net Project Emissions to Reduce or Offset	Reduction from Oakland Power Plant[3]	Reduction from TDM, TMP, EV Charging	Local Reductions (TMP + TDM + EV Charging + Oakland Power Plant)	% Local Reduction Measures	Remaining Emissions[4]
	MT CO_2e/year								%	MT CO_2e/year
2020	0	0	0	402	402	0	0	0	--	402
2021	0	0	0	5,315	5,315	0	0	0	--	5,315
2022	0	0	0	6,089	6,089	-184	0	-184	--	6,274
2023	10,600	12,912	10,527	3,768	6,080	-34	2,385	2,351	113%	3,729
2024	**10,600**	**24,575**	**19,825**	**3,632**	**17,608**	**9,304**	**4,750**	**14,054**	**127%**	**3,554**
2025	10,600	23,872	19,272	4,117	17,389	9,349	4,600	13,949	133%	3,441
2026	10,600	23,234	18,766	5,012	17,646	9,393	4,468	13,861	140%	3,785
2027	10,600	36,947	30,213	3,171	29,518	9,438	6,734	16,172	82%	13,347
2028	**10,600**	**64,564**	**49,788**	**0**	**53,964**	**9,482**	**14,776**	**24,258**	**62%**	**29,706**
2029	10,600	63,027	48,589	0	52,427	9,527	14,438	23,965	63%	28,462
2030	10,600	61,659	47,511	0	51,059	9,571	14,148	23,720	64%	27,340
2031	10,600	60,407	46,514	0	49,807	9,615	13,893	23,508	65%	26,299
2032	10,600	59,273	45,599	0	48,673	9,659	13,674	23,333	66%	25,340
2033	10,600	58,240	44,755	0	47,640	9,703	13,485	23,188	68%	24,452
2034	10,600	57,293	43,970	0	46,694	9,747	13,324	23,071	69%	23,623
2035	10,600	56,430	43,242	0	45,830	9,791	13,187	22,978	70%	22,851
2036	10,600	55,640	42,566	0	45,040	9,835	13,074	22,909	71%	22,131
2037	10,600	54,914	41,934	0	44,314	9,879	12,980	22,859	72%	21,455
2038	10,600	54,251	41,345	0	43,651	9,923	12,906	22,829	73%	20,822
2039	10,600	53,643	40,795	0	43,043	9,967	12,848	22,815	74%	20,228
2040	10,600	53,083	40,278	0	42,483	10,011	12,805	22,815	75%	19,667
2041	10,600	52,561	39,788	0	41,961	10,055	12,773	22,828	76%	19,133
2042	10,600	52,082	39,329	0	41,482	10,099	12,754	22,852	77%	18,630
2043	10,600	51,635	38,891	0	41,035	10,143	12,743	22,886	78%	18,149
2044	10,600	51,209	38,469	0	40,609	10,187	12,740	22,927	80%	17,683
2045	10,600	50,805	38,062	0	40,205	10,231	12,743	22,973	81%	17,232
2046	10,600	50,741	38,018	0	40,141	10,231	12,722	22,953	81%	17,188
2047	10,600	50,690	37,984	0	40,090	10,231	12,706	22,937	81%	17,153
2048	10,600	50,650	37,957	0	40,050	10,231	12,693	22,924	81%	17,127
2049	10,600	50,624	37,940	0	40,024	10,231	12,684	22,914	81%	17,109
2050	10,600	50,641	37,957	0	40,042	10,231	12,684	22,915	81%	17,127
2051	10,600	50,641	37,957	0	40,042	10,231	12,684	22,915	81%	17,127

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Table 12. Year-by-Year Comparison of GHG Emissions With Oakland Power Plant
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2]	Project 2.0 Operational Emissions[2]	Construction Emissions	Net Project Emissions to Reduce or Offset	Reduction from Oakland Power Plant[3]	Reduction from TDM, TMP, EV Charging	Local Reductions (TMP + TDM + EV Charging + Oakland Power Plant)	% Local Reduction Measures	Remaining Emissions[4]
	MT CO_2e/year								%	MT CO_2e/year
2052	10,600	50,641	37,957	0	40,042	10,231	12,684	22,915	81%	17,127
2053	0	42,657	31,562	0	42,657	10,231	11,095	21,325	69%	21,332
2054	0	39,293	28,551	0	39,293	0	10,742	10,742	39%	28,551
2055	0	39,289	28,547	0	39,289	0	10,742	10,742	39%	28,547
2056	0	39,244	28,511	0	39,244	0	10,733	10,733	39%	28,511
2057	0	5,243	826	0	5,243	0	4,417	4,417	86%	826
Total Gross Emissions (MT)	**317,998**	**1,652,610**	**1,253,797**	**31,507**	**1,366,120**	**296,532**	**398,813**	**695,346**	**72%**	**670,774**

Notes:

[1] Emissions decrease over time due to transportation and electricity (for both building energy use and water treatment and distribution) becoming cleaner. A linear interpolation is used to take into account decrease in electricity intensity factor due to Renewable Portfolio Standards. The decrease in vehicle emission factors over time is based on Alameda County fleet-average emission factors from 2020-2050. The estimate assumes no change after 2050, since EMFAC2017 does not project past 2050.

[2] Emissions assume all buildings become operational as soon as Phase is constructed, based on percent of operational land uses by Phase and percent of operation per year. The first calendar year is adjusted for partial operation based on start date and the last calendar year is adjusted for partial operation such that total lifetime for each land use sums to 30 years. A 30 year operation is also assumed for the Oakland Power Plant.

[3] Construction emissions associated with the conversion of the Oakland Power Plant are shown in 2022 and 2023. From 2024 to 2053, the emissions reduction from the Oakland Power Plant are presented each year as the combination of the direct emissions avoided (estimated from the shutdown of the peaker plant) and the indirect emissions avoided (estimated from the reduced need for fossil fueled plants due to increased grid stability provided by the battery storage system).

[4] The analysis presented here does not include anticipated additional reductions from Project features associated with LEED Gold design or from local air quality mitigation measures with GHG co-benefits. The Project is committed to achieving LEED Gold Standard, which requires projects to obtain points in the areas of Location & Transportation, Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation, and Regional Priority. Many of these measures, such as optimizing energy performance, demand response, and renewable energy production, would allow the Project to achieve further GHG reductions locally that are not captured in this analysis.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric ton
NPV - net present value
yr - year

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APPENDIX

Table CON-1. Project Land Use by Construction Phase
Oakland Waterfront Ballpark District Project
Oakland, California

Land Use Type		Phase			
		Phase 1A	Phase 1B	Phase 2	All Phases
		Ballpark	Initial Ancillary Development	Additional Ancillary Development	--
Ballpark	square feet	1,200,000	--	--	1,200,000
Ballpark Parking	spaces	3,500	--	2,000	5,500
Office	square feet	--	250,000	1,250,000	1,500,000
Retail	square feet	--	30,000	240,000	270,000
Residential	units	--	540	2,460	3,000
Performance Venue	square feet	--	--	50,000	50,000
Hotel	square feet	--	280,000	--	280,000
Parking Garages	spaces	--	1,240	5,660	6,900
Operational Date		4/20/2023	12/2/2023	9/2/2027	9/2/2027

Table CON-2. Construction Off-Road Equipment List
Oakland Waterfront Ballpark District Project
Oakland, California

Construction Area	Construction Activity	Equipment Type[1]	CalEEMod® Equipment Type	Fuel	Number	HP	kW	Load Factor[2]	Equipment Start Date	Equipment End Date	Number of Days	Hours per Day	Utilizations for Duration[3]	Equipment Tier - Without SCAs[4]	Equipment Tier - with SCAs[4]
Phase 1	Demolition	Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	1	81	--	0.73	9/1/2020	11/9/2020	50	8	50%	No Specific Tier	Tier 4 Final
		Excavators	Excavators	Diesel	6	158	--	0.38	9/1/2020	11/9/2020	50	8	80%	No Specific Tier	Tier 4 Final
		Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	2	97	--	0.37	9/1/2020	11/9/2020	50	8	100%	No Specific Tier	Tier 4 Final
		Crushing / Proc. Equipment	Crushing/Proc. Equipment	Diesel	1	85	--	0.78	9/1/2020	11/9/2020	50	8	75%	No Specific Tier	Tier 4 Final
Phase 2	Demolition	Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	1	81	--	0.73	11/10/2020	1/18/2021	50	8	50%	No Specific Tier	Tier 4 Final
		Excavators	Excavators	Diesel	6	158	--	0.38	11/10/2020	1/18/2021	50	8	80%	No Specific Tier	Tier 4 Final
		Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	2	97	--	0.37	11/10/2020	1/18/2021	50	8	100%	No Specific Tier	Tier 4 Final
		Crushing / Proc. Equipment	Crushing/Proc. Equipment	Diesel	1	85	--	0.78	11/10/2020	1/18/2021	50	8	75%	No Specific Tier	Tier 4 Final
DDC	Geotechnical Work	Excavators	Excavators	Diesel	2	158	--	0.38	11/10/2020	4/15/2021	113	8	90%	No Specific Tier	Tier 4 Final
		Dozer	Rubber Tired Loaders	Diesel	1	215	--	0.36	11/10/2020	4/15/2021	113	8	33%	No Specific Tier	Tier 4 Final
		Cranes	Cranes	Diesel	4	226	--	0.29	11/10/2020	4/15/2021	113	8	90%	No Specific Tier	No Specific Tier
		Water Trucks	Off-Highway Trucks	Diesel	3	402	--	0.38	11/10/2020	4/15/2021	113	8	75%	No Specific Tier	Tier 4 Final
		Generators	Generator Sets	Diesel	2	84	--	0.74	11/10/2020	4/15/2021	113	8	70%	No Specific Tier	Tier 4 Final
DPC	Geotechnical Work	Excavators	Excavators	Diesel	2	158	--	0.38	11/10/2020	4/15/2021	113	8	90%	No Specific Tier	Tier 4 Final
		Dozer	Rubber Tired Loaders	Diesel	1	215	--	0.36	11/10/2020	4/15/2021	113	8	33%	No Specific Tier	Tier 4 Final
		Cranes	Cranes	Diesel	4	226	--	0.29	11/10/2020	4/15/2021	113	8	90%	No Specific Tier	No Specific Tier
		Water Trucks	Off-Highway Trucks	Diesel	2	402	--	0.38	11/10/2020	4/15/2021	113	8	75%	No Specific Tier	Tier 4 Final
		Generators	Generator Sets	Diesel	1	84	--	0.74	11/10/2020	4/15/2021	113	8	70%	No Specific Tier	Tier 4 Final
Phase 1	Cut Off Wall	Drill	Bore/Drill Rigs	Diesel	2	433	--	0.50	1/2/2021	3/2/2021	44	8	90%	No Specific Tier	Tier 4 Final
		Gradall Type Forklifts	Forklifts	Diesel	2	111	--	0.20	1/2/2021	3/2/2021	44	8	90%	No Specific Tier	Tier 4 Final
		Manlift	Aerial Lifts	Diesel	2	58	--	0.31	1/2/2021	3/2/2021	44	8	75%	No Specific Tier	Tier 4 Final
		Cranes	Cranes	Diesel	2	286	--	0.29	1/2/2021	3/2/2021	44	8	90%	No Specific Tier	Tier 4 Final
		Excavators	Excavators	Diesel	2	189	--	0.38	1/2/2021	3/2/2021	44	8	75%	No Specific Tier	Tier 4 Final
		Rubber Tired Loaders	Rubber Tired Loaders	Diesel	2	90	--	0.36	1/2/2021	3/2/2021	44	8	70%	No Specific Tier	Tier 4 Final
	Grading and Site Preparation	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	20	97	--	0.37	3/5/2021	5/23/2021	56	8	90%	No Specific Tier	Tier 4 Final
		Scapers/Blades/Rollers	Scrapers	Diesel	10	500	--	0.48	3/5/2021	5/23/2021	56	8	90%	No Specific Tier	Tier 4 Final
		Water Trucks	Off-Highway Trucks	Diesel	5	402	--	0.38	3/5/2021	5/23/2021	56	8	75%	No Specific Tier	Tier 4 Final
		Water Trucks	Off-Highway Trucks	Diesel	1	402	--	0.38	5/24/2021	11/23/2021	132	8	100%	No Specific Tier	Tier 4 Final
		Generators	Generator Sets	Diesel	6	84	--	0.74	3/5/2021	4/11/2021	26	8	70%	No Specific Tier	Tier 4 Final
	Site Utilities	Excavators	Excavators	Diesel	4	162	--	0.38	11/24/2021	4/28/2022	112	8	95%	No Specific Tier	Tier 4 Final
		Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	97	--	0.37	11/24/2021	4/28/2022	112	8	100%	No Specific Tier	Tier 4 Final
		Rubber Tired Loaders	Rubber Tired Loaders	Diesel	2	199	--	0.36	11/24/2021	4/28/2022	112	8	100%	No Specific Tier	Tier 4 Final
		Water Trucks	Off-Highway Trucks	Diesel	1	402	--	0.38	11/24/2021	4/28/2022	112	8	75%	No Specific Tier	Tier 4 Final
	Ballpark Building Construction	Pile Driving Rigs	Bore/Drill Rigs	Diesel	4	206	--	0.50	4/12/2021	6/1/2021	44	8	100%	No Specific Tier	Tier 4 Final
		Grandall-type Forklifts	Forklifts	Diesel	4	93	--	0.20	4/12/2021	6/1/2021	44	8	100%	No Specific Tier	Tier 4 Final
		Concrete Boom Pumps	Other Construction Equipment	Diesel	2	480	--	0.42	4/12/2021	8/19/2022	425	8	15%	No Specific Tier	Tier 4 Final
		Bobcat	Rubber Tired Loaders	Diesel	2	71	--	0.36	4/12/2021	4/19/2022	320	8	90%	No Specific Tier	Tier 4 Final
		Small Excavator	Excavators	Diesel	2	404	--	0.38	4/12/2021	10/12/2021	158	8	90%	No Specific Tier	Tier 4 Final
		Large Excavator	Excavators	Diesel	2	523	--	0.38	4/12/2021	10/12/2021	158	8	90%	No Specific Tier	Tier 4 Final
		Crawler Cranes	Cranes	Diesel	4	530	--	0.29	10/12/2021	7/12/2022	235	8	95%	No Specific Tier	Tier 4 Final
		Mobile Cranes	Cranes	Diesel	4	530	--	0.29	4/1/2022	1/1/2023	236	8	85%	No Specific Tier	Tier 4 Final
		Grandall-type Forklifts	Forklifts	Diesel	6	93	--	0.20	4/12/2021	4/1/2023	618	8	100%	No Specific Tier	Tier 4 Final
		Cutting/chopping saws	Other Construction Equipment	Electric	15	--	5	0.42	4/12/2021	4/1/2023	618	8	100%	--	--
		Air Compressors	Air Compressors	Electric	4	--	7.5	0.48	4/1/2021	1/1/2023	549	8	75%	--	--
		Drywall stud impact guns	Other Construction Equipment	Electric	25	--	1	0.42	4/1/2022	2/1/2023	263	8	100%	--	--
		Concrete Boom Pumps	Other Construction Equipment	Diesel	1	480	--	0.42	10/1/2022	3/1/2023	130	8	20%	No Specific Tier	Tier 4 Final
		Bobcat	Rubber Tired Loaders	Diesel	2	71	--	0.36	10/1/2022	3/1/2023	130	8	90%	No Specific Tier	Tier 4 Final
		Small Excavator	Excavators	Diesel	2	404	--	0.38	10/1/2022	3/1/2023	130	8	90%	No Specific Tier	Tier 4 Final
		Water Trucks	Off-Highway Trucks	Diesel	1	402	--	0.38	4/29/2022	4/19/2023	305	8	90%	No Specific Tier	Tier 4 Final
		Generators	Generator Sets	Diesel	6	84	--	0.74	4/12/2021	4/19/2023	633	8	70%	No Specific Tier	Tier 4 Final
	Mixed Use Building Construction	Pile Driving Rigs	Bore/Drill Rigs	Diesel	2	206	--	0.50	11/24/2021	6/1/2022	136	8	100%	No Specific Tier	Tier 4 Final
		Grandall-type Forklifts	Forklifts	Diesel	2	93	--	0.20	11/24/2021	6/1/2022	136	8	100%	No Specific Tier	Tier 4 Final
		Concrete Boom Pumps	Other Construction Equipment	Diesel	1	480	--	0.42	1/1/2022	9/28/2022	193	8	50%	No Specific Tier	Tier 4 Final
		Bobcat	Rubber Tired Loaders	Diesel	2	71	--	0.36	1/1/2022	9/28/2022	193	8	50%	No Specific Tier	Tier 4 Final
		Small Excavator	Excavators	Diesel	2	404	--	0.38	1/1/2022	5/11/2022	93	8	50%	No Specific Tier	Tier 4 Final

Table CON-2. Construction Off-Road Equipment List
Oakland Waterfront Ballpark District Project
Oakland, California

Construction Area	Construction Activity	Equipment Type[1]	CalEEMod® Equipment Type	Fuel	Number	HP	kW	Load Factor[2]	Equipment Start Date	Equipment End Date	Number of Days	Hours per Day	Utilizations for Duration[3]	Equipment Tier - Without SCAs[4]	Equipment Tier - with SCAs[4]
Phase 1	Mixed Use Building Construction	Large Excavator	Excavators	Diesel	2	523	--	0.38	1/1/2022	5/10/2023	353	8	50%	No Specific Tier	Tier 4 Final
		Tower Cranes	Cranes	Electric	2	--	179	0.29	12/1/2021	2/1/2023	306	8	100%	--	--
		Mobile Cranes	Cranes	Diesel	2	530	--	0.29	5/1/2022	12/1/2023	415	8	75%	No Specific Tier	Tier 4 Final
		Grandall-type Forklifts	Forklifts	Diesel	6	93	--	0.20	11/24/2021	12/1/2023	528	8	75%	No Specific Tier	Tier 4 Final
		Cutting/chopping saws	Other Construction Equipment	Electric	15	--	5	0.42	11/24/2021	12/1/2023	528	8	75%	--	--
		Air Compressors	Air Compressors	Diesel	2	125	--	0.48	11/24/2021	12/1/2023	528	8	75%	No Specific Tier	Tier 4 Final
		Air Compressors	Air Compressors	Electric	2	--	7.5	0.48	11/24/2021	12/1/2023	528	8	75%	--	--
		Tile cutting saws	Other Construction Equipment	Electric	10	--	5	0.42	10/1/2022	12/1/2023	305	8	50%	--	--
		Drywall stud impact guns	Other Construction Equipment	Electric	25	--	1	0.42	9/1/2022	12/1/2023	327	8	50%	--	--
		Concrete Boom Pumps	Other Construction Equipment	Diesel	1	480	--	0.42	1/1/2023	12/1/2023	240	8	50%	No Specific Tier	Tier 4 Final
		Bobcat	Rubber Tired Loaders	Diesel	2	71	--	0.36	1/1/2023	12/1/2023	240	8	50%	No Specific Tier	Tier 4 Final
		Small Excavator	Excavators	Diesel	2	404	--	0.38	1/1/2023	12/1/2023	240	8	50%	No Specific Tier	Tier 4 Final
		Water Trucks	Off-Highway Trucks	Diesel	1	402	--	0.38	4/20/2023	12/1/2023	162	8	100%	No Specific Tier	Tier 4 Final
		Generators	Generator Sets	Diesel	6	84	--	0.74	4/20/2023	12/1/2023	162	8	70%	No Specific Tier	Tier 4 Final
	Paving	Water Trucks	Off-Highway Trucks	Diesel	1	402	--	0.38	1/1/2023	4/1/2023	65	8	100%	No Specific Tier	Tier 4 Final
		Pavers	Pavers	Diesel	2	130	--	0.42	7/1/2022	9/30/2022	66	8	75%	No Specific Tier	Tier 4 Final
		Paving Equipment	Paving Equipment	Diesel	2	132	--	0.36	7/1/2022	9/30/2022	66	8	75%	No Specific Tier	Tier 4 Final
		Rollers	Rollers	Diesel	2	80	--	0.38	7/1/2022	9/30/2022	66	8	75%	No Specific Tier	Tier 4 Final
	Architectural Coating	Air Compressors	Air Compressors	Diesel	3	125	--	0.48	2/15/2022	12/1/2023	469	8	100%	No Specific Tier	Tier 4 Final
		Air Compressors	Air Compressors	Electric	3	--	7.5	0.48	2/15/2022	12/1/2023	469	8	100%	--	--
Phase 2	Grading and Site Preparation	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	20	97	--	0.37	12/4/2023	2/15/2024	54	8	100%	No Specific Tier	Tier 4 Final
		Scapers/Blades/Rollers	Scrapers	Diesel	20	500	--	0.48	12/4/2023	2/15/2024	54	8	90%	No Specific Tier	Tier 4 Final
		Water Trucks	Off-Highway Trucks	Diesel	10	402	--	0.38	12/4/2023	2/15/2024	54	8	75%	No Specific Tier	Tier 4 Final
		Water Trucks	Off-Highway Trucks	Diesel	2	402	--	0.38	2/16/2024	8/19/2024	132	8	100%	No Specific Tier	Tier 4 Final
		Generators	Generator Sets	Diesel	6	84	--	0.74	12/4/2023	8/19/2024	186	8	70%	No Specific Tier	Tier 4 Final
	Site Utilities	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	97	--	0.37	8/20/2024	2/5/2025	122	8	100%	No Specific Tier	Tier 4 Final
		Rubber Tired Loaders	Rubber Tired Loaders	Diesel	2	199	--	0.36	8/20/2024	2/5/2025	122	8	100%	No Specific Tier	Tier 4 Final
		Water Trucks	Off-Highway Trucks	Diesel	2	402	--	0.38	8/20/2024	2/5/2025	122	8	100%	No Specific Tier	Tier 4 Final
		Generators	Generator Sets	Diesel	6	84	--	0.74	8/20/2024	2/5/2025	122	8	70%	No Specific Tier	Tier 4 Final
	Mixed Use Building Construction	Pile Driving Rigs	Bore/Drill Rigs	Diesel	2	206	--	0.50	8/20/2024	8/20/2025	262	8	90%	No Specific Tier	Tier 4 Final
		Grandall-type Forklifts	Forklifts	Diesel	2	93	--	0.20	8/20/2024	8/20/2025	262	8	100%	No Specific Tier	Tier 4 Final
		Concrete Boom Pumps	Other Construction Equipment	Diesel	4	480	--	0.42	8/20/2024	8/20/2025	262	8	40%	No Specific Tier	Tier 4 Final
		Bobcat	Rubber Tired Loaders	Diesel	4	71	--	0.36	8/20/2024	5/1/2025	183	8	100%	No Specific Tier	Tier 4 Final
		Small Excavator	Excavators	Diesel	4	404	--	0.38	8/20/2024	5/1/2025	183	8	100%	No Specific Tier	Tier 4 Final
		Large Excavator	Excavators	Diesel	4	523	--	0.38	8/20/2024	4/1/2025	161	8	100%	No Specific Tier	Tier 4 Final
		Tower Cranes	Cranes	Electric	8	--	179	0.29	5/1/2025	11/1/2026	392	8	100%	--	--
		Mobile Cranes	Cranes	Diesel	8	530	--	0.29	11/1/2025	6/1/2027	412	8	100%	No Specific Tier	Tier 4 Final
		Grandall-type Forklifts	Forklifts	Diesel	15	93	--	0.20	8/20/2024	8/1/2027	769	8	100%	No Specific Tier	Tier 4 Final
		Cutting/chopping saws	Other Construction Equipment	Electric	45	--	5	0.42	4/1/2025	8/1/2027	609	8	100%	--	--
		Air Compressors	Air Compressors	Diesel	5	125	--	0.48	10/1/2025	8/1/2027	478	8	75%	No Specific Tier	Tier 4 Final
		Air Compressors	Air Compressors	Electric	5	--	7.5	0.48	10/1/2025	8/1/2027	478	8	75%	--	--
		Tile cutting saws	Other Construction Equipment	Electric	35	--	5	0.42	4/1/2025	8/1/2027	609	8	100%	--	--
		Drywall stud impact guns	Other Construction Equipment	Electric	75	--	1	0.42	4/1/2025	8/1/2027	609	8	100%	--	--
		Concrete Boom Pumps	Other Construction Equipment	Diesel	3	480	--	0.42	8/1/2026	8/1/2027	260	8	40%	No Specific Tier	Tier 4 Final
		Bobcat	Rubber Tired Loaders	Diesel	6	71	--	0.36	8/1/2026	8/1/2027	260	8	100%	No Specific Tier	Tier 4 Final
		Small Excavator	Excavators	Diesel	6	404	--	0.38	8/1/2026	8/1/2027	260	8	80%	No Specific Tier	Tier 4 Final
		Water Trucks	Off-Highway Trucks	Diesel	2	402	--	0.38	2/6/2025	7/1/2027	626	8	75%	No Specific Tier	Tier 4 Final
		Generators	Generator Sets	Diesel	6	84	--	0.74	2/6/2025	9/1/2027	670	8	70%	No Specific Tier	Tier 4 Final
	Paving	Water Trucks	Off-Highway Trucks	Diesel	1	402	--	0.38	7/1/2025	1/2/2026	134	8	100%	No Specific Tier	Tier 4 Final
		Pavers	Pavers	Diesel	2	130	--	0.42	7/1/2025	1/2/2026	134	8	75%	No Specific Tier	Tier 4 Final
		Paving Equipment	Paving Equipment	Diesel	2	132	--	0.36	7/1/2025	1/2/2026	134	8	75%	No Specific Tier	Tier 4 Final
		Rollers	Rollers	Diesel	2	80	--	0.38	7/1/2025	1/2/2026	134	8	75%	No Specific Tier	Tier 4 Final
	Architectural Coating	Air Compressors	Air Compressors	Diesel	3	125	--	0.48	6/20/2025	9/1/2027	574	8	75%	No Specific Tier	Tier 4 Final
		Air Compressors	Air Compressors	Electric	3	--	7.5	0.48	6/20/2025	9/1/2027	574	8	75%	--	--

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Table CON-2. Construction Off-Road Equipment List
Oakland Waterfront Ballpark District Project
Oakland, California

Notes:

[1] Construction equipment list, fuel, size in HP or kW, start and end dates, hours of operation per day, and utilization were provided by the Project Sponsor.

[2] Equipment load factors were estimated from the Air Resource Board's OFFROAD database.

[3] Utilizations for duration represent the usage percentage during the indicated equipment date range.

[4] All construction equipment will be Tier 4 Final, as required by the Oakland Standard Conditions of Approval.

Abbreviations:

DDC - Deep Dynamic Compaction

DPC - Direct Power Compaction

HP - horsepower

kW - kilowatts

Table CON-3. Construction On-Road Trips
Oakland Waterfront Ballpark District Project
Oakland, California

Construction Area	Construction Activity	Construction Trips per Phase[1]		
		Worker	Vendor	Hauling
Phase 1	Demolition	2,000	--	54
Phase 2	Demolition	3,000	--	54
DDC	Geotechnical Work	4,520	1,130	--
DPC	Geotechnical Work	4,520	1,130	--
Phase 1 Ballpark and Mixed Use Development	Cut Off Wall	2,200	--	--
	Grading and Site Preparation	9,400	--	54,165
	Site Utilities	8,960	2,240	--
	Ballpark Building Construction	778,590	121,536	--
	Mixed Use Building Construction	316,800	50,688	--
	Paving	1,980	--	--
	Architectural Coating	343,308	--	--
Phase 2 Additional Mixed Use Development	Grading and Site Preparation	14,880	--	32,379
	Site Utilities	14,640	1,952	--
	Mixed Use Building Construction	633,600	326,304	--
	Paving	3,990	--	--
	Architectural Coating	229,600	--	--
Total One-Way Trips		**2,371,988**	**504,980**	**86,652**
		2,963,620		

CalEEMod® Default Trip Length (miles)[2]	10.8	7.3	20
Fleet Mix Assumptions[3]	50% LDA, 25% LDT1, and 25% LDT2, consistent with CalEEMod	T6 (MHDT) and T7 (HHDT), consistent with CalEEMod	T7 (HHDT), consistent with CalEEMod

Notes:

[1] Worker, vendor and hauling trips for each acitivity were provided by the Project Sponsor.

[2] CalEEMod® default trip lengths were used for each trip type.

[3] CalEEMod® default fleet mix assumptions were used for each trip type.

Abbreviations:

DDC - Deep Dynamic Compaction

DPC - Direct Power Compaction

LDA - All Passenger Vehicles

LDT1 - All Light-Duty Trucks in Weight Class 0-3750 lbs

LDT2 - Gas, Diesel Light-Duty Trucks in Weight Class 3751-5750 lbs

MHDT - Gas, Diesel Medium-Heavy-Duty vehicles in Weight Class 12001-33000

HHDT- Gas, Diesel Heavy-Heavy-Duty vehicles in Weight Class 33001-60000 lb

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Table CON-4. Variant Construction GHG Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

Variant	Phase	Year	Emissions (MT/year)			
			CO_2	CH_4	N_2O	CO_2e
Oakland Power Plant	Building Renovation	2022	181	0.022	0.009	184
		2023	34	0.0042	0.0016	34
Pedestrian Bike Overpass	Grading and Site Preparation	2022	80	0.018	0.0019	81
	Site Utilities	2022	52	0.014	0.0007	52
	Tower Construction	2022	80	0.016	0.0026	82
		2023	56	0.011	0.0017	57
	Sitework	2023	32	0.0066	0.0012	32
Crane Removal	Demolition	2021	141	0.042	3.6E-04	142
Embarcadero and Clay Lot	Grading and Site Preparation	2022	70	0.020	1.5E-04	71
	Site Utilities	2022	37	0.011	3.2E-04	37
	Paving	2022	6.1	0.0016	6.6E-05	6.2
Aerial Gondola	Grading and Site Preparation	2021	210	0.061	0.0004	212
	Foundations and Structure	2021	22	0.0063	2.4E-04	22
		2022	355	0.10	0.0039	358
	Architectural Finish/Escalators	2022	78	0.0032	0.0017	78
	Cabling and Equipment	2022	99	0.029	0.0006	100
		2023	142	0.042	0.0008	144

Year	Summary of CO_2e Emissions by Year (Metric tons)
2021	375
2022	1,049
2023	267
Total	**1,691**

Notes:

1. Global warming potentials used in the calculation of CO_2e are 1, 25 and 298 for CO_2, CH_4 and N_2O, respectively.
2. Emissions sources include gasoline and diesel on-road vehicles and diesel off-road equipment.
3. GHG emissions are not affected by off-road equipment engine tier selection. Thus, these emissions represent both CalEEMod® default and Tier 4 off-road emissions.

Abbreviations:

CH_4 - Methane
CO_2 - Carbon Dioxide
CO_2e - Carbon Dioxide Equivalent
GHG - greenhouse gas
MT - metric ton
N_2O - Nitrogen Oxide

Table OP-1. Existing and Project Conditions Mobile Assumptions
Oakland Waterfront Ballpark District Project
Oakland, California

Baseline Conditions

Land Use and Scenario			Fleet Type	Trips per Activity[1] (trips/event or trips/day)		VMT per Activity[1] (mi/event or mi/day)		Average Trip Length[1] (mi/trip)	Annual Activity[2,3]		Annual Trips (trips/yr)	Annual VMT (mi/yr)
				Weekday	Weekend	Weekday	Weekend		Weekday	Weekend		
Ballpark Stadium	A's Games[3]	Weekday Evening	Passenger	24,400	--	304,000	--	13	41	--	1,000,400	12,464,000
		Weekday Day	Passenger	24,500	--	315,000	--	14	14	--	343,000	4,410,000
		Weekend	Passenger	--	24,700	--	325,000	14	--	27	666,900	8,775,000
	A's Games Deliveries		Bus	3.0		22		7.3	82		246	1,796
			Truck	11	--	80	--	7.3	261	--	2,870	20,951
	Arena Management[4]		Passenger	72	--	685	--	10	261	--	18,829	178,875
	Sports Team Management[4]		Passenger	172	--	1,630	--	10	261	--	44,775	425,358

Phase 1 Buildout, Without TDM Plan

Land Use and Scenario			Fleet Type	Trips per Activity (trips/event or trips/day)		VMT per Activity (mi/event or mi/day)		Average Trip Length (mi/trip)	Annual Activity		Annual Trips (trips/yr)	Annual VMT (mi/yr)
				Weekday	Weekend	Weekday	Weekend		Weekday	Weekend		
Ballpark Stadium	A's Games	Weekday Evening	Passenger	27,300	--	299,000	--	13	41	--	1,119,300	12,259,000
		Weekday Day	Passenger	27,800	--	300,000	--	13	14	--	389,200	4,200,000
		Weekend	Passenger	--	28,600	--	336,000	14	--	27	772,200	9,072,000
	Other Events	Concerts	Passenger	22,800		213,000		11	9.0		205,200	1,917,000
		Other	Passenger	6,100		57,000		11	35		213,500	1,995,000
		Corporate/Community	Passenger	1,600		15,000		11	100		160,000	1,500,000
		Plaza	Passenger	3,200		30,000		11	16		51,200	480,000
	A's Games Deliveries		Bus	3.0		22		7.3	82		246	1,796
			Truck	11	--	80	--	7.3	261	--	2,870	20,951
	Event Deliveries		Truck	21	--	157	--	7.3	261	--	5,600	40,880
	Arena Management[4]		Passenger	37	--	347	--	10	261	--	9,527	90,502
	Sports Team Management[4]		Passenger	172	--	1,630	--	10	261	--	44,775	425,358
Residential			All	1,500	1,400	17,800	16,300	12	261	104	537,100	6,341,000
Office			All	2,000	300	24,500	3,500	12	261	104	553,200	6,758,500
Retail			All	1,300	1,500	15,400	18,200	12	261	104	495,300	5,912,200
Restaurant			All	700	800	8,600	10,000	12	261	104	265,900	3,284,600
Hotel			All	2,600	2,000	31,100	24,500	12	261	104	886,600	10,665,100
Performance Venue		Attendees	Passenger	--		--		--	--		--	--
		Deliveries	Truck	--		--		--	--		--	--
			Bus	--		--		--	--		--	--

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Table OP-1. Existing and Project Conditions Mobile Assumptions
Oakland Waterfront Ballpark District Project
Oakland, California

Phase 1 Buildout, With TDM Plan

Land Use and Scenario			Fleet Type	Trips per Activity[1] (trips/event or trips/day)		VMT per Activity[1] (mi/event or mi/day)		Average Trip Length[1] (mi/trip)	Annual Activity[2,3]		Annual Trips (trips/yr)	Annual VMT (mi/yr)
				Weekday	Weekend	Weekday	Weekend		Weekday	Weekend		
Ballpark Stadium	A's Games	Weekday Evening	Passenger	21,900	--	251,000	--	14	41	--	897,900	10,291,000
		Weekday Day	Passenger	20,100	--	213,000	--	14	14	--	281,400	2,982,000
		Weekend	Passenger	--	22,600	--	272,000	15	--	27	610,200	7,344,000
	Other Events	Concerts	Passenger	19,300		200,000		12	9.0		173,700	1,800,000
		Other	Passenger	5,300		56,000		12	35		185,500	1,960,000
		Corporate/Community	Passenger	1,400		15,000		12	100		140,000	1,500,000
		Plaza	Passenger	2,800		29,000		12	16		44,800	464,000
	A's Games Deliveries		Bus	3.0		22		7.3	82		246	1,796
			Truck	11	--	80	--	7.3	261	--	2,870	20,951
	Event Deliveries		Truck	21	--	157	--	7.3	261	--	5,600	40,880
	Arena Management[4]		Passenger	37	--	347	--	10	261	--	9,527	90,502
	Sports Team Management[4]		Passenger	172	--	1,630	--	10	261	--	44,775	425,358
Residential			All	1,100	1,000	13,200	12,300	12	261	104	391,100	4,724,400
Office			All	1,500	200	18,000	2,600	12	261	104	412,300	4,968,400
Retail			All	1,100	1,300	13,100	15,500	12	261	104	422,300	5,031,100
Restaurant			All	600	700	7,500	8,400	12	261	104	229,400	2,831,100
Hotel[6]			All	2,326	1,740	27,834	21,333	12	261	104	788,100	9,483,200
Performance Venue		Attendees	Passenger	--		--		--	--		--	--
		Deliveries	Truck	--		--		--	--		--	--
			Bus	--		--		--	--		--	--

Full Project Buildout, Without TDM Plan

Land Use and Scenario			Fleet Type	Trips per Activity (trips/event or trips/day)		VMT per Activity (mi/event or mi/day)		Average Trip Length (mi/trip)	Annual Activity		Annual Trips (trips/yr)	Annual VMT (mi/yr)
				Weekday	Weekend	Weekday	Weekend		Weekday	Weekend		
Ballpark Stadium	A's Games	Weekday Evening	Passenger	27,300	--	299,000	--	13	41	--	1,119,300	12,259,000
		Weekday Day	Passenger	27,800	--	300,000	--	13	14	--	389,200	4,200,000
		Weekend	Passenger	--	28,600	--	336,000	14	--	27	772,200	9,072,000
	Other Events	Concerts	Passenger	22,800		213,000		11	9.0		205,200	1,917,000
		Other	Passenger	6,100		57,000		11	35		213,500	1,995,000
		Corporate/Community	Passenger	1,600		15,000		11	100		160,000	1,500,000
		Plaza	Passenger	3,200		30,000		11	16		51,200	480,000
	A's Games Deliveries		Bus	3.0		22		7.3	82		246	1,796
			Truck	11	--	80	--	7.3	261	--	2,870	20,951
	Event Deliveries		Truck	21	--	157	--	7.3	261	--	5,600	40,880
	Arena Management[4]		Passenger	37	--	347	--	10	261	0	9,527	90,502
	Sports Team Management[4]		Passenger	172	--	1,630	--	10	261	0	44,775	425,358
Residential			All	7,600	7,000	91,200	84,000	12	261	104	2,711,600	32,539,200
Office			All	9,700	1,400	116,400	16,800	12	261	104	2,677,300	32,127,600
Retail			All	5,700	5,900	68,400	70,800	12	261	104	2,101,300	25,215,600
Restaurant			All	6,400	7,400	76,800	88,800	12	261	104	2,440,000	29,280,000
Hotel			All	2,600	2,000	31,100	24,500	12	261	104	886,600	10,665,100
Performance Venue		Attendees	Passenger	2,900		33,700		12	100		290,000	3,370,000
		Deliveries	Truck	6.0		44		7.3	100		600	4,380
			Bus	6.0		44		7.3	100		600	4,380

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Table OP-1. Existing and Project Conditions Mobile Assumptions
Oakland Waterfront Ballpark District Project
Oakland, California

Full Project Buildout, With TDM Plan

Land Use and Scenario			Fleet Type	Trips per Activity[1] (trips/event or trips/day)		VMT per Activity[1] (mi/event or mi/day)		Average Trip Length[1] (mi/trip)	Annual Activity[2,3]		Annual Trips (trips/yr)	Annual VMT (mi/yr)
				Weekday	Weekend	Weekday	Weekend		Weekday	Weekend		
Ballpark Stadium	A's Games	Weekday Evening	Passenger	20,200	--	220,000	--	14	41	--	828,200	9,020,000
		Weekday Day	Passenger	18,400	--	182,000	--	14	14	--	257,600	2,548,000
		Weekend	Passenger	--	21,000	--	239,000	15	--	27	567,000	6,453,000
	Other Events	Concerts	Passenger	17,700		173,000		12	9.0		159,300	1,557,000
		Other	Passenger	5,300		56,000		12	35		185,500	1,960,000
		Corporate/Community	Passenger	1,400		15,000		12	100		140,000	1,500,000
		Plaza	Passenger	2,800		29,000		12	16		44,800	464,000
	A's Games Deliveries		Bus	3.0		22		7.3	82		246	1,796
			Truck	11	--	80	--	7.3	261	--	2,870	20,951
	Event Deliveries		Truck	21	--	157	--	7.3	261	--	5,600	40,880
	Arena Management[4]		Passenger	37	--	347	--	10	261	0	9,527	90,502
	Sports Team Management[4]		Passenger	172	--	1,630	--	10	261	0	44,775	425,358
Residential			All	5,700	5,300	68,300	63,100	12	261	104	2,038,900	24,388,700
Office			All	7,100	1,100	85,600	12,700	12	261	104	1,967,500	23,662,400
Retail			All	4,800	4,900	57,200	59,400	12	261	104	1,762,400	21,106,800
Restaurant			All	5,400	6,200	64,400	74,600	12	261	104	2,054,200	24,566,800
Hotel[5]			All	2,326	1,583	27,834	19,417	12	261	104	771,767	9,283,933
Performance Venue		Attendees	Passenger	2,900		33,700		12	100		290,000	3,370,000
		Deliveries	Truck	6.0		44		7.3	100		600	4,380
			Bus	6.0		44		7.3	100		600	4,380

Notes:

1. Trip generation rate, trip length, and total vehicle miles traveled (VMT) for each trip type were provided by Fehr & Peers, and assume that all trips are primary trips. Ballpark trips account for attendees and event-day
2. Activity assumptions provided by the Athletics management staff.
3. Per Athletics management staff, the Athletics play on average one preseason game, 81 regular season games, and typically no post-season games. These conditions are assumed as the average scenario for both the Baseline and Project scenarios. Average breakdown of weekday evening, weekday day, and weekend MLB games were calculated based on game day schedule provided by the Athletics management staff.
4. Employee estimates provided by Athletics management staff. Arena management and sports team management trip generation were estimated by assuming each employee makes two daily commute trips. The vehicle trip length was assumed to be 9.5 miles one-way, consistent with the CalEEMod® default commercial-work trip length for Alameda County. A carpool rate and drive rate assumption was made based on US Census data for the Coliseum and Jack London Square census tracts. Ramboll assumes that Ballpark operations staff are based at the ballpark land use whereas all other employee types are based at the A's HQ.
5. For the Traffic Conditions with TDM measures, trips and VMT for the hotel were estimated by Fehr & Peers to represent operations on gamedays and non-gamedays. Gameday VMT and trip generation with TDM measures are 1,300 trips/day and 15,600 mi/day, respectively. For non-gamedays, hotel trips and VMT would be the same as in the conditions without TDM. Trip generation and VMT for the hotel with TDM shown annualize these numbers.

Abbreviations:

mi - mile(s)
VMT - vehicle miles travelled
yr - year

References:

U.S. Census. 2019. Factfinder. Available at: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk
California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod), Version 2016.3.2. Available online at http://www.caleemod.com/

Conversion Factors:

0.7214167 Coliseum drive rate multiplier
0.365 Jack London drive rate multiplier
261 weekdays per year

Table OP-2. Existing and Project Conditions Mobile Emissions
Oakland Waterfront Ballpark District Project
Oakland, CA

Emissions Factors[1]

Fleet Type	Year	CO_2e Emission Factor	Units
Passenger	2020	310	g/mi
Passenger	2028	240	g/mi
Truck	2020	1,290	g/mi
Truck	2028	1,092	g/mi
Bus	2020	1,712	g/mi
Bus	2028	1,572	g/mi
All	2020	406	g/mi
All	2028	329	g/mi

Mobile Source Emissions

Scenario	Trip Type	Location	Land Use		Trips (trip/yr)	VMT (mi/yr)	Fleet Mix	Emission Factor (g/mi)		Mobile Emissions (2020)	Mobile Emissions (2028)
								2020	2028	MT CO_2e/yr	MT CO_2e/yr
Baseline	Spectator & Event Staff	Coliseum Stadium	A's Games	Weekday Evening	1,000,400	12,464,000	Passenger	310	240	3,867	
				Weekday Day	343,000	4,410,000	Passenger	310	240	1,368	
				Weekend	666,900	8,775,000	Passenger	310	240	2,722	
			A's Games Deliveries		246	1,796	Bus	1,712	1,572	3.1	
					2,870	20,951	Truck	1,290	1,092	27	
	Employee Commute		Arena Management		18,829	178,875	Passenger	310	240	55	
		Jack London Square HQ	Sports Team Management		44,775	425,358	Passenger	310	240	132	
Project 1.0	Spectator & Event Staff	Howard Terminal Ballpark	A's Games	Weekday Evening	1,119,300	12,259,000	Passenger	310	240	3,803	2,939
				Weekday Day	389,200	4,200,000	Passenger	310	240	1,303	1,007
				Weekend	772,200	9,072,000	Passenger	310	240	2,815	2,175
			Other Events		629,900	5,892,000	Passenger	310	240	1,828	1,413
			A's Games Deliveries		246	1,796	Bus	1,712	1,572	3.1	2.8
					2,870	20,951	Truck	1,290	1092	27	23
			Event Deliveries		5,600	40,880	Truck	1,290	1092	53	45
	Employee Commute		Arena Management		9,527	90,502	Passenger	310	240	28	22
			Sports Team Management		44,775	425,358	Passenger	310	240	132	102
	Mixed-Use Visitors	Howard Terminal Ancillary Development	Retail		2,101,300	25,215,600	All	406	329	10,230	8,287
			Hotel		886,600	10,665,100	All	406	329	4,327	3,505
			Office		2,677,300	32,127,600	All	406	329	13,034	10,559
			Restaurant		2,440,000	29,280,000	All	406	329	11,879	9,623
			Performance Venue	Attendees	290,000	3,370,000	Passenger	310	240	1046	808
				Deliveries	600	4,380	Truck	1,290	1092	5.6	4.8
					600	4,380	Bus	1,712	1,572	7.5	6.9
			Residential		2,711,600	32,539,200	All	406	329	13,201	10,694
Project 2.0	Spectator & Event Staff	Howard Terminal Ballpark	A's Games	Weekday Evening	828,200	9,020,000	Passenger	310	240	2,798	2,163
				Weekday Day	257,600	2,548,000	Passenger	310	240	791	611
				Weekend	567,000	6,453,000	Passenger	310	240	2,002	1,547
			Other Events		529,600	5,481,000	Passenger	310	240	1,700	1,314
			A's Games Deliveries		246	1,796	Bus	1,712	1,572	3.1	2.8
					2,870	20,951	Truck	1,290	1092	27	23
			Event Deliveries		5,600	40,880	Truck	1,290	1092	53	45
	Employee Commute		Arena Management		9,527	90,502	Passenger	310	240	28	22
			Sports Team Management		44,775	425,358	Passenger	310	240	132	102
	Mixed-Use Visitors	Howard Terminal Ancillary Development	Retail		1,762,400	21,106,800	All	406	329	8,563	6,937
			Hotel		771,767	9,283,933	All	406	329	3,767	3,051
			Office		1,967,500	23,662,400	All	406	329	9,600	7,777
			Restaurant		2,054,200	24,566,800	All	406	329	9,967	8,074
			Performance Venue	Attendees	290,000	3,370,000	Passenger	310	240	1046	808
				Deliveries	600	4,380	Truck	1,290	1092	5.6	4.8
					600	4,380	Bus	1,712	1,572	7.5	6.9
			Residential		2,038,900	24,388,700	All	406	329	9,895	8,015

Notes:

1. Running emission factors for CO2e were estimated using EMFAC2017 for Alameda County. The default Alameda County fleet mix was adjusted for a passenger fleet mix of light-duty autos, motorcycles, light-duty trucks, and medium-duty vehicles to estimate passenger fleet-average emission factors.

Abbreviations:

CO_2e - carbon dioxide equivalents
g - grams
mi - miles
NFL - National Football League
yr - year

References:

Fehr & Peers, VMT Tables, February 13, 2019.

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Table OP-3. Existing and Project Conditions Energy Assumptions
Oakland Waterfront Ballpark District Project
Oakland, California

Determination of Historical Energy Use Rates

Input	Value[1]	
Coliseum A's Electricity Use	3,331,357	kWh/yr
Coliseum A's Natural Gas Use	1,361,000	kBtu/yr
Total Attendees for MLB Games	1,053,744	visitors/yr
Per Attendee Electricity Use Rate	3.2	kWh/attendee/yr
Per Attendee Natural Gas Use Rate	1.3	kBtu/attendee/yr

Electricity and Natural Gas Use Emission Factor

PG&E Electricity CO_2e Emission Factor[2]	2020	300	lb CO_2e/MWh
	2028	204	lb CO_2e/MWh
CalEEMod® Natural Gas CO_2e Emission Factor	-	118.3	lb CO_2e/MMBtu

Energy Use Rates and Unit Emission Factor Derivation

Scenario	Location	Land Use	CalEEMod® Land Use	Land Use Unit	Electricity			Natural Gas	
					Usage[3,4]	Unit Emissions (2020)	Unit Emissions (2028)	Usage[3,4]	Unit Emissions
				size unit	kWh/size unit-yr	MT CO_2e/size unit/yr		kBTU/size unit-yr	MT CO_2e/size unit/yr
Baseline	Coliseum Stadium	A's Games	-	attendees	3.2	4.3E-04	-	1.3	6.9E-05
		A's HQ	General Office Building	square feet	12	1.7E-03	-	19	1.0E-03
Project	Howard Terminal Ballpark	A's Games	-	attendees	2.7	3.7E-04	2.5E-04	1.3	6.9E-05
		Other Events	-	attendees	2.7	3.7E-04	2.5E-04	1.3	6.9E-05
	Howard Terminal Ancillary Development	Retail	Regional Shopping Center	square feet	9.7	1.3E-03	9.0E-04	4.6	2.4E-04
		Hotel	Hotel	square feet	7.6	1.0E-03	7.0E-04	36	0.0019
		Office	General Office Building	square feet	12	1.6E-03	1.1E-03	19	0.0010
		Parking	Enclosed Parking Garage with Elevator	square feet	5.3	7.1E-04	4.9E-04	0	0
		Performance Venue	Arena	square feet	7.1	9.7E-04	6.6E-04	25	0.0013
		Residential	High Rise Apartment	dwelling units	4,097	5.6E-01	3.8E-01	8,669	0.47

Notes:

1. Electricity and natural gas use rates were calculated based on actual 2017 MLB energy use at the Coliseum and attendance data for 2017 for MLB games. PG&E invoices for the MLB season (March through September) are provided in
2. Electricity CO_2e emission factor derivation for 2020 (Baseline scenario) and 2028 (Project Scenario) are shown in "Table OP-8 Electricity Intensity".
3. Electricity use for the Howard Terminal ballpark stadium was provided by Meyers+ on 4/29/2019. Natural gas use for the Howard Terminal ballpark stadium is scaled based on attendees from the historical data from the Coliseum.
4. Electricity and natural gas use for all ancillary land uses is based on CalEEMod defaults for Climate Zone 5, which account for 2016 Title 24. For the Phase 1 and Full Project scenarios, Title 24 electricity and lighting electricity use rates were reduced by 10.7% and Title 24 natural gas use rates were reduced by 1.0%, per the California Energy Commission (CEC) 2019 Title 24 Impact Analysis.

References:

California Emissions Estimator Model (CalEEMod®), version 2016.3.2. Available online at: http://www.caleemod.com/

California Energy Commission. 2019. Building Energy Efficiency Standards for Residential and Nonresidential Buildings. Available online at: https://www.energy.ca.gov/2018publications/CEC-400-2018-020/CEC-400-2018-020-CMF.pdf

California Energy Commission. 2019. Impact Analysis for 2019 Energy Efficiency Standards. Available online at: https://www.energy.ca.gov/title24/2019standards/post_adoption/documents/2019_Impact_Analysis_Final_Report_2018-

Abbreviations:

CalEEMod® - California Emissions Estimator Model
CO_2e - carbon dioxide equivalents
kWh - kilowatt-hour
kBTU - thousand British Thermal Units
lb - pound
MLB - Major League Baseball
MT - metric tons
MWh - megawatt-hour
NFL - National Football League
PG&E - Pacific Gas & Electric
yr - year

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Table OP-4. Existing and Project Conditions Water and Wastewater Assumptions
Oakland Waterfront Ballpark District Project
Oakland, California

Determination of Historical Water Use Rates

Input	Value[1]	
Coliseum A's Stadium Water Use Rate	17,892,655	gal/year
Total Attendees for MLB Games	1,053,744	visitors/yr
Per Attendee Water Use Rate	17	gal/attendee/yr

Electricity Use Emission Factor

PG&E Electricity CO_2e Emission Factor[2]	2020	300	lb CO_2e/MWh
	2028	204	lb CO_2e/MWh

Determination of Emission Factor for Indirect Electricity Uses[3]

Indirect Electricity Uses	Electricity Use (kWh/Mgal)	2020 Emission Factor (MT CO_2e/Mgal)	2028 Emission Factor (MT CO_2e/Mgal)
Supply	2117	0.48	0.32
Treatment	111		
Distribution	1272		
Wastewater Treatment	1911	0.26	0.18

Determination of Emission Factor for Direct Wastewater Treatment Uses[3]

Direct Wastewater Treatment Uses	Percent	Emission Factor by Pollutant (ton/gal)			Direct Emission Factor	
		CO_2	CH_4	N_2O	(ton CO_2e/gal)	(MT CO_2e/MGal)
Septic Tank	10%	0	2.50E-07	8.48E-10	6.73E-07	1.4
Aerobic	87%	3.90E-07	1.34E-09	8.48E-10	5.91E-07	
Anaerobic, Facultative Lagoons	2%	3.90E-07	4.02E-07	8.48E-10	2.36E-07	

Water Use Rates and Unit Emission Factor Derivation[3]

Scenario	Location	Land Use	CalEEMod® Land Use	Land Use Size Unit	Water Use Rate[4,5]		Unit Emissions		
					Indoor	Outdoor	Direct	Indirect Electricity (2020)	Indirect Electricity (2028)
					(gal/size unit/yr)		(MT CO_2e/size unit/yr)		
Baseline	Coliseum Stadium	A's Games	-	attendees	17	0	2.3E-05	1.3E-05	8.5E-06
		A's HQ	General Office Building	square feet	178	109	2.4E-04	1.8E-04	1.2E-04
Project	Howard Terminal Ballpark	A's Games	-	attendees	28	0	3.8E-05	2.1E-05	1.4E-05
		Other Events	-	attendees	28	0	3.8E-05	2.1E-05	1.4E-05
	Howard Terminal Ancillary Development	Retail	Regional Shopping Center	square feet	55	45	7.5E-05	6.2E-05	4.2E-05
		Hotel	Hotel	rooms	69,959	2,819	0.095	0.053	0.036
		Office	General Office Building	square feet	73	109	9.9E-05	1.1E-04	7.2E-05
		Parking	Enclosed Parking Garage with Elevator	spaces	0	0	0	0	0
		Performance Venue	Arena	square feet	128	27	1.7E-04	1.1E-04	7.3E-05
		Residential	High Rise Apartment	dwelling units	91,250	41,075	0.12	0.09	0.06

Notes:

1. Historical ballpark water use rates were calculated based on actual 2017 MLB water consumption at the Coliseum and attendance data for 2017 for MLB games. EBMUD invoices for the MLB season (March through September) are provided in Appendix 2.
2. Electricity CO_2e emission factor derivation for 2020 (Baseline scenario) and 2028 (Project Scenario) are shown in "Table OP-8 Electricity Intensity".
3. Indirect and direct water emissions are calculated per CalEEMod® 2016.3.2 methodology, using default factors presented in CalEEMod Appendix D Tables 9.1 (Water Use Rates), 9.2 (Water and Wastewater Electricity Intensity), 9.3 (Percent of Wastewater Distribution Types), and 9.4 (Wastewater Treatment Direct Emissions).
4. The per-attendee water use rate is applied for the MLB and Other Events uses for the Baseline case. For the purpose of this calculation, all stadium water use is conservatively treated as indoor water use that will result in emissions from wastewater treatment.
5. Project indoor water use rates are from the Meyers+ Utility Demand Report dated February 14, 2019. Outdoor water use was assumed from CalEEMod default factors.

References:

California Emissions Estimator Model (CalEEMod), version 2016.3.2. Available online at: http://www.caleemod.com/

Abbreviations:

CalEEMod - California Emissions Estimator Model
CO_2e - carbon dioxide equivalents
EBMUD - East Bay Municipal Utility District
gal - gallon
kWh - kilowatt-hour
lb - pound
Mgal - million gallons
MLB - Major League Baseball
MT - metric tons
MWh - megawatt-hour
NFL - National Football League
yr - year

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Table OP-5. Existing and Project Conditions Solid Waste Assumptions
Oakland Waterfront Ballpark District Project
Oakland, California

Determination of Historical Waste Disposal Rates

Input	Value[1]	
Coliseum A's Stadium Waste Rate	973	tons/yr
Diversion Rate	44%	%
Total Attendees for MLB Games	1,053,744	visitors/yr
Per Attendee Solid Waste Disposal Rate	5.1E-04	tons/attendee/yr

Determination of Emission Factor for Solid Waste Disposal[2]

Input		Value	
Solid Waste Landfill Gas Treatment Types[1]	Landfill, No Gas Capture	6.0	%
	Landfill, Capture Gas Flare	94	%
Solid Waste Landfill Gas Emission Factors[2]	CO_2, No Gas Capture	0.14	ton/ton waste
	CH_4, No Gas Capture	0.043	ton/ton waste
	CO_2, Capture Gas Flare	0.23	ton/ton waste
	CH_4, Capture Gas Flare	0.011	ton/ton waste
100-year Global Warming Potential of CH_4		25	ton CO_2e/ton CH_4
CO_2e Emission Factor		0.50	MT CO_2e/ton waste

Solid Waste Rates and Unit Emission Factor Derivation

Scenario	Location	Land Use	CalEEMod® Land Use	Land Use Unit	Solid Waste Generation Rate[3,4]	Solid Waste Emission Rate
				size unit	tons/size unit/year	MT CO_2e/size unit/yr
Baseline	Coliseum Stadium	A's Games	-	attendees	5.1E-04	2.6E-04
		A's HQ	General Office Building	square feet	9.3E-04	4.7E-04
Project	Howard Terminal Ballpark	A's Games	-	attendees	5.1E-04	2.6E-04
		Other Events	-	attendees	5.1E-04	2.6E-04
	Howard Terminal Ancillary Development	Retail	Regional Shopping Center	square feet	0.0011	5.3E-04
		Hotel	Hotel	rooms	0.55	0.28
		Office	General Office Building	square feet	9.3E-04	4.7E-04
		Parking	Enclosed Parking Garage with Elevator	spaces	0	0
		Performance Venue	Arena	square feet	3.0E-05	1.5E-05
		Residential	High Rise Apartment	dwelling units	0.46	0.23

Notes:

1. Waste generation rates were calculated based on actual 2017 MLB waste rates at the Coliseum and attendance data for 2017 for MLB games. Coliseum Stadium Waste Management and Recycling Report for the MLB season (March through September) are provided in Appendix 2.
2. Solid waste emissions are calculated per CalEEMod® 2016.3.2 methodology, using default factors presented in CalEEMod Appendix D Tables 10.1 (Solid Waste Disposal Rates) and 10.2 (Support for Solid Waste Emission
3. The per-attendee waste rate is applied for the MLB and Other Events uses for the Baseline and Project cases.
4. Solid waste generation estimates for Howard Terminal ancillary development land uses based on CalEEMod® 2016.3.2 defaults.

References:

California Emissions Estimator Model (CalEEMod®), version 2016.3.2. Available online at: http://www.caleemod.com/

Abbreviations:

CalEEMod® - California Emissions Estimator Model
CH_4 - methane
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalents
MLB - Major League Baseball
MT - metric tons
NFL - National Football League

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Table OP-6. Existing and Project Conditions Area Source Assumptions
Oakland Waterfront Ballpark District Project
Oakland, California

Baseline Area Source Emissions

Subcategory	Annual Greenhouse Gas Emissions (MT/yr)			
	CO_2	CH_4	N_2O	CO_2e
Landscaping	0.20	5.5E-04	0	0.22
			Total Emissions	**0.22**

Project Area Source Emissions

Subcategory[2]	Annual Greenhouse Gas Emissions (MT/yr)			
	CO_2	CH_4	N_2O	CO_2e
Ballpark Landscaping	0.06	1.5E-04	0	0.06
Ancillary Residential Landscaping	36	0.035	0	37
Ancillary Nonresidential Landscaping	0.16	4.2E-04	0	0.17
			Total Emissions	**37**

Notes:

1. Area emissions are from CalEEMod® outputs, provided in Appendix 2.
2. The Project Sponsor has confirmed that there will be no hearths in residential units.

References:

California Emissions Estimator Model (CalEEMod®), version 2016.3.2. Available online at: http://www.caleemod.com/

Abbreviations:

CalEEMod® - California Emissions Estimator Model
CH_4 - methane
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalents
N_2O - nitrous oxide
MT - metric tons
yr - year

Table OP-7. Existing and Project Conditions Stationary Source Assumptions
Oakland Waterfront Ballpark District Project
Oakland, California

Project Stationary Source Emissions[1]

Scenario	Location	Number of Generators	Size		Fuel Type	Operation[2]	CO_2e Emission Factors[3]	CO_2e Emissions
			kW	HP		hr/yr	g/bhp-hr	MT/yr
Phase 1	Ballpark	1	1,500	2,012	Diesel	50	523	53
	Ancillary	1	250	335	Diesel	50	523	8.8
	Ancillary	2	400	536	Diesel	50	523	28
	Ancillary	3	500	671	Diesel	50	523	53
							Total Emissions for Phase 1 Buildout	**142**
Full Buildout	Ballpark	1	1,500	2,012	Diesel	50	523	53
	Ancillary	2	250	335	Diesel	50	523	18
	Ancillary	6	300	402	Diesel	50	523	63
	Ancillary	3	400	536	Diesel	50	523	42
	Ancillary	3	500	671	Diesel	50	523	53
	Ancillary	1	750	1,006	Diesel	50	523	26
	Ancillary	1	1,000	1,341	Diesel	50	523	35
							Total Emissions for Full Project Buildout	**290**

Notes:

1. Number, size, and fuel of emergency generators were provided by the Project sponsor. Phasing information was also provided by the Project Sponsor.
2. Operation for routine maintenance and testing is conservatively assumed to be 50 hours per year, the maximum allowable by the Bay Area Air Quality Management District.
3. CO_2 emission factor based on AP-42 (USEPA 1995).

References:

California Building Code, Part 2, Volume 2, Chapter 27 - Electrical. Available online at: https://up.codes/viewer/california/ca-building-code-2016-v2/chapter/27/electrical#27.

USEPA. 1995. AP 42, Volume I, Fifth Edition. §3.4. Large Stationary Diesel and All Stationary Dual-Fuel Engines. Available online at: http://www.epa.gov/ttn/chief/ap42/ch03/final/c03s04.pdf

Abbreviations:

bhp - brake-horsepower
CO_2e - carbon dioxide equivalents
g - grams
HP - horsepower
hr - hour
kW - kilowatt
MT - metric tons
yr - year

Table OP-8. Electricity Intensity Factor Derivation
Oakland Waterfront Ballpark District Project
Oakland, CA

Historic Electricty Intensity

Annual Electricity Data	2015[1,2]	2016[1,3]	2017[1,4]	Average[5]	Units
CO_2 Intensity Factor per Total Energy Delivered	405	294	210	303	lbs CO_2/MWh delivered
% of Total Energy From Renewables	0.30	0.33	0.33	0.32	[-]
CO_2 Intensity Factor per Total Non-Renewable Energy[6]	574	437	314	444	lbs CO_2/MWh delivered

Estimated Intensity Factor for Total Energy Delivered[7,8]

Model Year	2015[1,3]	2016[1,4]	2017[1,4]	Average[5]	Units
2020 RPS (33%)	384	293	210	297	lbs CO_2/MWh delivered
	387	295	213	300	lbs CO_2e/MWh delivered
2030 RPS (60%)[9]	230	175	126	178	lbs CO_2/MWh delivered
	232	177	128	180	lbs CO_2e/MWh delivered
2045 RPS (100%)[9]	0	0	0	0	lbs CO_2/MWh delivered
	2.6	2.6	2.6	2.6	lbs CO_2e/MWh delivered

Notes:

[1] Total CO_2 emission factor from The Climate Registry. Available at: https://www.theclimateregistry.org/our-members/cris-public-reports/. Accessed: April 2018.

[2] Percent of total energy from eligible renewables is from the PGE 2015 Corporate Responsibility Report. Available at: http://www.pgecorp.com/corp_responsibility/reports/2015/PGE_CRSR_2015.pdf.

[3] Percent of total energy from eligible renewables is from the PGE 2016 Corporate Responsibility Report. Available at: http://www.pgecorp.com/corp_responsibility/reports/2016/PGE_CRSR_Environment.pdf.

[4] Percent of total energy from eligible renewables is from the PGE 2017 Corporate Responsibility Report. Available at: http://www.pgecorp.com/corp_responsibility/reports/2017/assets/PGE_CRSR_2017_Environment.pdf.

[5] This average uses the most recent three years of data.

[6] The emissions metric presented here is calculated based on the total CO_2 intensity factor divided by the percent of energy delivered from non-renewable sources.

[7] The intensity factor for total energy delivered is estimated by multiplying the percentage of energy delivered from non-renewable energy by the CO_2 emissions per total non-renewable energy metric calculated above. The estimate provided here and the energy reports issued by PGE assume that renewable energy sources do not result in any CO_2

[8] Global Warming Potentials (GWP) are based on the IPCC Fourth Assessment Report. CH_4 and N_2O emission factors are from the CalEEMod® version 2016.3.2 defaults for PGE, and are conservatively assumed not to change from these estimates. As more renewable energy is integrated into the electricity grid, these intensity factors will also decrease.

[9] Emission factor presented here is 60% projected RPS for 2030 and 100% carbon-free electricity for 2045 consistent with SB 100. Available at: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB100.

Abbreviations:

CARB - California Air Resources Board
CO_2 - carbon dioxide
GHG - greenhouse gases
lbs - pounds
MWh - megawatt-hour
RPS - Renewable Portfolio Standards
PGE - Pacific Gas & Electric
SB - Senate Bill
USEPA - US Environmental Protection Agency

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Table OP-9A. Phase 1 and Full Buildout Conditions EV Charging Assumptions
Oakland Waterfront Ballpark District Project
Oakland, California

EV Assumptions

Description	Units	Input
Miles Charged per Hour Charged[1]	(kWh/mile)	25
Percent Passenger VMT from EVs at Full Buildout[2]	%	23%
Percent All VMT from EVs at Full Buildout[2]	%	18%

Phase 1 Buildout, With TDM Plan

Land Use and Scenario[3]			Fleet Type	EV Trips per Activity[4]		EV VMT per Activity[4]		Number of EV Chargers Available[5]	Number of EV Chargers Used per Activity[6]		Hours for Charging per Activity[7]	EV Miles per Year[8]	Miles Charged by Project Chargers per Year[8]
				Weekday	Weekend	Weekday	Weekend		Weekday	Weekend			
Ballpark Stadium	A's Games	Weekday Evening	Passenger	5,025	--	57,597	--	0	--	--	3	2,361,480	--
		Weekday Day	Passenger	4,612	--	48,877	--	0	--	--	3	684,281	--
		Weekend	Passenger	--	5,186	--	62,416	0	--	--	3	1,685,231	--
	Other Events	Concerts	Passenger	4,429	--	45,894		0	--		3	413,047	--
		Other	Passenger	1,216	--	12,850		0	--		3	449,762	--
		Corporate/Community	Passenger	321	--	3,442		0	--		3	344,206	--
		Plaza	Passenger	643	--	6,655		0	--		3	106,474	--
	A's Games Deliveries		Bus	--	--	--	--	0	--	--	--	--	--
			Truck	--	--	--	--	0	--	--	--	--	--
	Event Deliveries		Truck	--	--	--	--	0	--	--	--	--	--
	Arena Management		Passenger	8.4	--	80	--	0	--	--	3	20,767	--
	Sports Team Management		Passenger	39	--	374	--	0	--	--	3	97,607	--
Residential			All	252	229	2,426	2,261	54	54	54	1.8	868,390	868,390
Office			All	344	46	3,309	478	50	16	2	8	913,239	876,800
Retail			All	252	298	2,408	2,849	4	4	4	10	924,764	365,000
Restaurant			All	138	161	1,379	1,544	4	4	4	10	520,383	365,000
Hotel			All	534	399	5,116	3,921	20	20	20	2	1,743,103	365,000
Performance Venue		Attendees	Passenger	--	--	--		0	--		3	--	--
		Deliveries	Truck	--	--	--	--	--	--	--	--	--	--
			Bus	--	--	--	--	--	--	--	--	--	--
Total Phase 1 Buildout Miles Charged by Project Chargers Per Year													**2,840,190**

Table OP-9A. Phase 1 and Full Buildout Conditions EV Charging Assumptions
Oakland Waterfront Ballpark District Project
Oakland, California

Full Project Buildout, With TDM Plan

Land Use and Scenario[3]			Fleet Type	EV Trips per Activity[4]		EV VMT per Activity[4]		Number of EV Chargers Available[5]	Number of EV Chargers Used per Activity[6]		Hours for Charging per Activity[7]	EV Miles per Year[8]	Miles Charged by Project Chargers per Year[8]
				Weekday	Weekend	Weekday	Weekend		Weekday	Weekend			
Ballpark Stadium	A's Games	Weekday Evening	Passenger	4,635	--	50,483	--	200	200	--	3	2,069,823	615,000
		Weekday Day	Passenger	4,222	--	41,764	--	200	200	--	3	584,691	210,000
		Weekend	Passenger	--	4,819	--	54,843	200	--	200	3	1,480,773	405,000
	Other Events	Concerts	Passenger	4,062		39,698		200	200		3	357,285	135,000
		Other	Passenger	1,216		12,850		200	171		3	449,762	448,875
		Corporate/Community	Passenger	321		3,442		200	45		3	344,206	337,500
		Plaza	Passenger	643		6,655		200	88		3	106,474	105,600
	A's Games Deliveries		Bus	--	--	--	--	200	--	--	--	--	--
			Truck	--	--	--	--	200	--	--	--	--	--
	Event Deliveries		Truck	--	--	--	--	200	--	--	--	--	--
	Arena Management		Passenger	8	--	80	--	200	1	--	3	20,767	19,575
	Sports Team Management		Passenger	39	--	374	--	200	4	--	3	97,607	78,300
Residential			All	1,308	1,216	12,554	11,598	300	300	300	1.6	4,482,876	4,482,876
Office[9]			All	1,629	252	15,734	2,334	300	78	11	8	4,349,375	4,300,400
Retail			All	1,101	1,124	10,514	10,918	36	36	36	10	3,879,631	3,239,375
Restaurant			All	1,239	1,423	11,837	13,712	36	36	36	10	4,515,612	3,239,375
Hotel			All	534	363	5,116	3,569	20	20	20	2	1,706,476	365,000
Performance Venue		Attendees	Passenger	665		7,733		200	103		3	773,315	772,500
		Deliveries	Truck	--	--	--	--	--	--	--	--	--	--
			Bus	--	--	--	--	--	--	--	--	--	--
												Total Full Buildout Miles Charged by Project Chargers Per Year	**18,754,376**

Notes:

1. This is representative of a typical charge rate for an EV of 6.25 kWh per hour and a fuel economy of 0.25 kWh per mile. The charge rate is based on capability of existing battery-electric vehicles and Level 2 charging stations. Reference: Chargepoint. 2017. Level Up Your EV Charging Knowledge. Available at: https://www.chargepoint.com/blog/level-your-ev-charging-knowledge/. The fuel economy is based on National Renewable Energy Laboratory (NREL). 2018. California Plug-In Electric Vehicle Infrastructure Projections: 2017-2025 (Table C.1). Available at: https://www.nrel.gov/docs/fy18osti/70893.pdf.

2. The State goal from Executive Order B-48-18 is to achieve 5 million ZEVs in California by 2030, shortly after Project buildout. Based on EMFAC2017 projections, passenger vehicles (LDA, LDT1, LDT2) in the BAAQMD region would represent 17.4% of total statewide passenger vehicles and 19% of total statewide passenger EVs. 19% of 5 million is 952,108 EVs that would be the minimum number expected in the BAAQMD region to be consistent with statewide goals; in reality, given unequal distribution of EVs by region and current trends, this number could be higher. 952,108 out of the total BAAQMD projected passenger vehicle population of 4,593,670 results in 21% of all passenger vehicles in the BAAQMD region as EVs. EMFAC projects that the daily trips and VMT are higher for EVs than for internal combustion engine (ICE) cars (which is confirmed by studies on EV driving behavior and preferences). Based on the EMFAC proportions, 22.9% of all passenger VMT and 18.4% of all total VMT in the BAAQMD region will be e-VMT. The abundance of chargers at the Project site will incentivize further EV preference, so e-VMT will likely be greater than the assumed percentage. While the percentage may be lower in the interim buildout years, this percentage is conservatively assumed to remain constant after full buildout for the year-by-year analysis even though the market share of EVs is expected to continue to increase after 2030; to achieve the State's 2045 carbon neutrality goal, the vast majority of passenger vehicles will likely be ZEVs.

3. Land use and scenario assumptions for overall activity, trip generation, and VMT are summarized in Table OP-1.
4. EV trips and VMT per activity represent the estimated vehicle trips and vehicle miles traveled by an EV for each activity. These were estimated by scaling total trips or VMT per activity per land use provided by Fehr & Peers by the percent of VMT from EV assumed for each fleet type.
5. Per Project Sponsor, this assumes that 10 percent of parking spaces are serviced by Level 2 (208/240V 40-amp) EV charging stations. The 10 percent was applied to the parking spaces associated with each individual landuse. Additionally, this analysis assumes that there are no EV chargers installed in the Interim Parking Lot associated with the ballpark after Phase 1 buildout since these are temporary and will not be part of Full Buildout.

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Table OP-9A. Phase 1 and Full Buildout Conditions EV Charging Assumptions
Oakland Waterfront Ballpark District Project
Oakland, California

6. EV charging at residential land uses assumes that all available chargers are consistently used on a daily basis, consistent with the general practice that most owners charge during off peak hours while at home.

   EV charging at non-residential is different in that sometimes there is a surplus of chargers relative to EVs coming to the site. For land uses or events with lower trip generation relative to available chargers (smaller concerts at ballpark, office), only a fraction of chargers will be used as the number of EVs coming to the site are fewer than the total number of charger capacity. For land uses or events with high trip generation relative to available chargers (baseball games, hotel retail), the site is charger limited and all chargers will be used.

   For example, at 3-hour ball games, each of the 200 available chargers could feasibly charge 6 vehicles each for 30 minutes (12.5 miles/charge x 6 vehicles = 75 miles of EV range), or equivalent scenarios such as 3 vehicles each for 60 minutes (25 miles/charge x 3 vehicles = 75 miles of EV range), resulting in a maximum of 75 x 200 = 15,000 miles of EV range and around 1,200 cars to charge per ballgame in total. With EV VMT of over 50,000 miles and over 5,000 EV trips per ballgame, on average, the ballgame chargers are thus fully utilized. However, if the EV VMT is less than the capacity of the chargers, the EV VMT to be charged is calculated based on the number of chargers to be used; for the office land use, if chargers are used 8 hours per day, only 78 of the 300 chargers would be used in this scenario (for a total of 624 hours/day charging). This is equivalent to using all 300 chargers at 2.08 hours/day. If EV penetration increases beyond the assumed percentages, these chargers would be used more.

7. The hours of charging per activity assume realistic time windows during which a car could feasibly be charged for each non-residential activity. For ballpark land uses, it is assumed that vehicles can be charged throughout the duration of a ballgame (approximately 3 hours). For the ancillary non-residential land uses, it is assumed that charging can occur at the office for a standard 8-hour workday, at the retail and restaurant land uses for 10 hours, and at the hotel for 2 hours. The performance venue was assumed to share EV chargers with the ballpark and charge for a 3-hour performance. The residential land use charging duration was back-calculated to assume that residential chargers are used to supply all of the residential EV charging needs. If EV penetration increases beyond the assumed percentages, the residential chargers could be used much more.

8. The EV miles per year reported represent all miles driven to and from the Project site that are anticipated to be from EVs, whereas the miles charged by project chargers per year represents the subset of these miles that are charged by Project EV chargers.

9. Additional incentives for EV charging at the office land use (e.g., partially or fully subsidizing the parking, providing a valet service) would increase EV charger usage beyond what is reported here.

Abbreviations:

mi - mile(s)
VMT - vehicle miles travelled
yr - year
EV - electric vehicle (includes battery electric or plug-in hybrid technology)

References:

U.S. Census. 2019. Factfinder. Available at: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk
California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod), Version 2016.3.2. Available online at http://www.caleemod.com/

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Table OP-9B. EV Charging Emissions Reductions
Oakland Waterfront Ballpark District Project
Oakland, California

Vehicle Miles Traveled Conversion from Replacement of Gasoline Vehicle with EVs

Project Buildout Condition[1]	Units	Ballpark	Ancillary - Nonresidential	Ancillary - Residential
Phase 1 Buildout Conditions	(miles/year)	0	1,971,800	868,390
Full Project Buildout Conditions	(miles/year)	2,354,850	11,916,650	4,482,876

Emissions Reductions from EV Charging

Year	Conditions	Emission Factors		Net Emissions Reduction[4] (MT CO_2e/yr)			
		Fleet Average Vehicle[2] (g CO_2e/mi)	Electricity Intensity[3] (lb CO_2e/MWh)	Ballpark	Ancillary - Nonresidential	Ancillary - Residential	Total
2020	Baseline	310	300	0	0	0	0
2021	Baseline	301	288	0	0	0	0
2022	Baseline	291	276	0	0	0	0
2023	Baseline	282	264	0	0	0	0
2024	Phase 1 Buildout	272	252	0	-480	-211	-691
2025	Phase 1 Buildout	262	240	0	-464	-204	-668
2026	Phase 1 Buildout	254	228	0	-450	-198	-648
2027	Phase 1 Buildout	247	216	0	-438	-193	-631
2028	Full Project Buildout	240	204	-510	-2,581	-971	-4,063
2029	Full Project Buildout	234	192	-499	-2,526	-950	-3,975
2030	Full Project Buildout	228	180	-490	-2,478	-932	-3,901
2031	Full Project Buildout	224	168	-482	-2,438	-917	-3,837
2032	Full Project Buildout	220	156	-475	-2,405	-905	-3,785
2033	Full Project Buildout	216	145	-470	-2,378	-894	-3,742
2034	Full Project Buildout	213	133	-466	-2,356	-886	-3,708
2035	Full Project Buildout	210	121	-462	-2,340	-880	-3,682
2036	Full Project Buildout	208	109	-460	-2,328	-876	-3,664
2037	Full Project Buildout	206	97	-458	-2,320	-873	-3,652
2038	Full Project Buildout	204	85	-458	-2,316	-871	-3,645
2039	Full Project Buildout	203	74	-458	-2,316	-871	-3,644
2040	Full Project Buildout	201	62	-458	-2,318	-872	-3,648
2041	Full Project Buildout	201	50	-459	-2,322	-874	-3,655
2042	Full Project Buildout	200	38	-460	-2,329	-876	-3,665
2043	Full Project Buildout	199	26	-462	-2,337	-879	-3,678
2044	Full Project Buildout	199	14	-464	-2,347	-883	-3,693
2045	Full Project Buildout	198	2.6	-466	-2,357	-887	-3,710
2046	Full Project Buildout	198	2.6	-465	-2,353	-885	-3,703
2047	Full Project Buildout	197	2.6	-464	-2,350	-884	-3,698
2048	Full Project Buildout	197	2.6	-464	-2,347	-883	-3,693
2049	Full Project Buildout	197	2.6	-463	-2,344	-882	-3,689
2050	Full Project Buildout	197	2.6	-463	-2,342	-881	-3,686
2051	Full Project Buildout	197	2.6	-463	-2,342	-881	-3,686
2052	Full Project Buildout	197	2.6	-463	-2,342	-881	-3,686
2053	Full Project Buildout	197	2.6	-463	-2,342	-881	-3,686
2054	Full Project Buildout	197	2.6	-463	-2,342	-881	-3,686
2055	Full Project Buildout	197	2.6	-463	-2,342	-881	-3,686
2056	Full Project Buildout	197	2.6	-463	-2,342	-881	-3,686
2057	Full Project Buildout	197	2.6	-463	-2,342	-881	-3,686

Notes:

1. Vehicle miles traveled for each buildout condition and each land use type is estimated in Table OP-9A.
2. Emission Factors in grams CO_2e per mile shown here are based on EMFAC 2017 for Alameda County, aggregated for all model years and speeds, averaged over all seasons for calendar years 2024 and 2028, respectively. Emission factors were weighted for the fleet mix of vehicles that may be replaced with EVs (LDA, LDT1, LDT2, MCY, and MDV). Only emissions estimated from running are included. Tire wear and brake wear are not considered, as these emissions are also expected to occur for EVs. Idling and starting are conservatively not included since their emission factors are in units of g/trip and are not expected to contribute as greatly to the overall emissions reduction. However, emissions from these sources for the conventional fleet are considerably higher than for the EVs, and thus these assumptions are conservative. The emission factors are converted to units of MT CO_2e per year for purposes of calculating reductions in the Net Emissions Reduction columns.
3. CO_2e weighted intensity factor for PGE accounts shown here in units of pounds CO_2e per megawatt-hour for CO_2, CH_4, and N_2O emissions rates are consistent with Table OP-8. The emission factors are converted to units of MT CO_2e per year for purposes of calculating reductions in the Net Emissions Reduction columns.
4. Net emissions reduction per land use category is found by subtracting EV emissions from fleet average emissions to determine the reduction benefit from EV charging.

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Table OP-9B. EV Charging Emissions Reductions
Oakland Waterfront Ballpark District Project
Oakland, California

Abbreviations:

CARB - California Air Resources Board
CH_4 - methane
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalents
EF - Emission Factors
EMFAC - EMission FACtors model
EV - electric vehicle (includes battery electric or plug-in hybrid technology)
GHG - greenhouse gas
lb - pound
LDA - Light Duty Auto (passenger cars)
LDT - Light Duty trucks
MT - metric tonnes
MWh - megawatt-hour
PGE - Pacific Gas & Electric
VMT - vehicles miles traveled

Table OP-10. Existing and Project Conditions Transportation Refrigeration Unit (TRU) Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

TRU Usage Inputs			Value	Units
TRU Usage for Ballpark Events			10	TRU/event
				TRU trips/event
TRU Usage for Performance Venue Events			1	TRU/event
				TRU trips/event
TRU Horsepower[1]			34	hp
TRU Load Factor[1]			0.45	--
Number of Ballpark Events[2]	Baseline Operating Condition		82	events/yr
	Full Coliseum Operating Condition		93	events/yr
	Phase 1 Buildout and Full Buildout Conditions		91	events/yr
Number of Performance Venue Events at Full Buildout Conditions			100	events/yr
Operation During Travel	Average Speed Traveled by Truck[3]		25	mi/hr
	Average Miles Traveled by Truck[4]		7.3	mi/TRU trip
	Annual Hours of Operation During Travel	Baseline Operating Condition	239	hr/yr
		Full Coliseum Operating Condition	272	hr/yr
		Phase 1 Buildout Condition	266	hr/yr
		Full Buildout Condition	295	hr/yr
Operation During Unloading	Unloading Time per TRU[5]		0.50	hr/TRU
	Annual Hours of Operation During Unloading	Baseline Operating Condition	410	hr/yr
		Full Coliseum Operating Condition	465	hr/yr
		Phase 1 Buildout Condition	455	hr/yr
		Full Buildout Condition	505	hr/yr

Year	Conditions	Emission Factor (g CO_2/hp-hr)	Emissions (MT CO_2/yr)		
			Travel	Unloading	Total
2020	Baseline	37	0.14	0.23	0.37
2021	Baseline	37	0.14	0.23	0.37
2022	Baseline	37	0.14	0.23	0.37
2023	Baseline	37	0.14	0.23	0.37
2024	Phase 1 Buildout	37	0.15	0.26	0.41
2025	Phase 1 Buildout	37	0.15	0.26	0.41
2026	Phase 1 Buildout	37	0.15	0.26	0.41
2027	Phase 1 Buildout	37	0.15	0.26	0.41
2028	Full Project Buildout	37	0.17	0.29	0.46
2029	Full Project Buildout	37	0.17	0.29	0.46
2030	Full Project Buildout	37	0.17	0.29	0.46
2031	Full Project Buildout	37	0.17	0.29	0.46
2032	Full Project Buildout	37	0.17	0.29	0.46
2033	Full Project Buildout	37	0.17	0.29	0.46
2034	Full Project Buildout	37	0.17	0.29	0.46
2035	Full Project Buildout	37	0.17	0.29	0.46
2036	Full Project Buildout	37	0.17	0.29	0.46
2037	Full Project Buildout	37	0.17	0.29	0.46
2038	Full Project Buildout	37	0.17	0.29	0.46
2039	Full Project Buildout	37	0.17	0.29	0.46
2040	Full Project Buildout	37	0.17	0.29	0.46
2041	Full Project Buildout	37	0.17	0.29	0.46
2042	Full Project Buildout	37	0.17	0.29	0.46
2043	Full Project Buildout	37	0.17	0.29	0.46
2044	Full Project Buildout	37	0.17	0.29	0.46

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Table OP-10. Existing and Project Conditions Transportation Refrigeration Unit (TRU) Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

2045	Full Project Buildout	37	0.17	0.29	0.46
2046	Full Project Buildout	37	0.17	0.29	0.46
2047	Full Project Buildout	37	0.17	0.29	0.46
2048	Full Project Buildout	37	0.17	0.29	0.46
2049	Full Project Buildout	37	0.17	0.29	0.46
2050	Full Project Buildout	37	0.17	0.29	0.46
2051	Full Project Buildout	37	0.17	0.29	0.46
2052	Full Project Buildout	37	0.17	0.29	0.46
2053	Full Project Buildout	37	0.17	0.29	0.46
2054	Full Project Buildout	37	0.17	0.29	0.46
2055	Full Project Buildout	37	0.17	0.29	0.46
2056	Full Project Buildout	37	0.17	0.29	0.46
2057	Full Project Buildout	37	0.17	0.29	0.46

Notes:

1. The engine size and load factor for TRU are based on the CARB 2011 off-road inventory, available for download at https://ww3.arb.ca.gov/msei/ordiesel.htm.
2. NFL and Other Events are not included in the Baseline ballpark events in order to conservatively estimate net new emissions attributable to the Project. These events are included in the Full Coliseum Operating Conditions. Phase 1 and Full Buildout Conditions include all baseball games and concerts but do not include the other events, corporate/community events, or plaza events because these events are much smaller.
3. Per Oakland Code of Ordinances 10.20.040 "Prima facie speed limits", the standard speed limit for business or residential districts in CA is 25 MPH. Some streets near the Project have limits of 30 MPH and a portion of each delivery trip will be on highways, but 25 MPH was conservatively assumed for the entire trip.
4. Truck trip length is consistent with the trip length assumed for truck deliveries. All other emissions from the truck's engine during travel are included in the mobile emissions and are therefore not estimated separately.
5. Assumes TRU will operate for maximum of 30 minutes, consistent with maximum amount of time that trucks were found to idle during unloading processes in the West Oakland Truck Survey (2009).

Abbreviations:

CO_2 - carbon dioxide
EF - Emission Factors
GHG - greenhouse gas
hp - horsepower
hr - hour
mi - miles
TRU - transportation refrigeration unit
yr - year

Table OP-11. Idling Emissions from Delays to Port Trucks
Oakland Waterfront Ballpark District Project
Oakland, California

Port Truck Delay Inputs

Intersection[1]	Daily Delay[2] (idle-hr/day)		
	Full Buildout No Ballgame	Full Buildout Plus Weekday Day Ballgame	Full Buildout Plus Weekday Evening Ballgame
Adeline Street and 3rd Street	-1.5	3.5	6.7
Adeline Street and 5th Street	8.1	4.9	1.6
Market Street and 3rd Street	10	18.6	12.9
Market Street and 5th Street	2.0	3.7	4.1
Martin Luther King Jr. Way and 3rd Street	-0.84	0.4	-0.56
Martin Luther King Jr. Way and 5th Street	0.93	2.5	2.0
Broadway and 5th Street	-1.3	-4.9	-4.1
Activity (days/yr)	206	14	41

Emissions from Port Truck Idling Delays due to Project

Year	CO_2e Idle EF[3] (g/idle-hr)	Weekday Idling Emissions (MT/day)			Net Annual Project Emissions (MT/yr)
		Full Buildout No Ballgame	Full Buildout Plus Weekday Day Ballgame	Full Buildout Plus Weekday Evening Ball Game	
2024	5,602	0.10	0.16	0.13	27
2025	5,525	0.094	0.16	0.13	27
2026	5,446	0.092	0.16	0.12	26
2027	5,363	0.091	0.15	0.12	26
2028	5,278	0.090	0.15	0.12	25
2029	5,192	0.088	0.15	0.12	25
2030	5,113	0.087	0.15	0.12	25
2031	5,039	0.086	0.14	0.11	24
2032	4,970	0.084	0.14	0.11	24
2033	4,905	0.083	0.14	0.11	24
2034	4,846	0.082	0.14	0.11	23
2035	4,791	0.081	0.14	0.11	23
2036	4,742	0.081	0.14	0.11	23
2037	4,697	0.080	0.13	0.11	23
2038	4,658	0.079	0.13	0.11	23
2039	4,622	0.078	0.13	0.11	22
2040	4,591	0.078	0.13	0.10	22
2041	4,564	0.077	0.13	0.10	22
2042	4,540	0.077	0.13	0.10	22
2043	4,520	0.077	0.13	0.10	22
2044	4,502	0.076	0.13	0.10	22
2045	4,486	0.076	0.13	0.10	22
2046	4,471	0.076	0.13	0.10	22
2047	4,459	0.076	0.13	0.10	22
2048	4,448	0.076	0.13	0.10	21
2049	4,439	0.075	0.13	0.10	21
2050	4,457	0.076	0.13	0.10	22
2051	4,457	0.076	0.13	0.10	22
2052	4,457	0.076	0.13	0.10	22
2053	4,457	0.076	0.13	0.10	22
2054	4,457	0.076	0.13	0.10	22
2055	4,457	0.076	0.13	0.10	22
2056	4,457	0.076	0.13	0.10	22
2057	4,457	0.076	0.13	0.10	22

Table OP-11. Idling Emissions from Delays to Port Trucks
Oakland Waterfront Ballpark District Project
Oakland, California

Notes:

1. Hourly truck delays at each intersection were estimated by Fehr & Peers from the four traffic scenarios shown. Existing truck volumes were also estimated by Fehr & Peers at the major intersections listed. Delays and truck volumes were provided hourly from 3 PM to 8 PM. Truck volumes were also provided hourly from 7 AM to 9 AM for all intersections, and from 9 AM to 12 PM for the Adeline Street intersections. Morning traffic volumes for the intersections only studied from 7 AM to 9 AM were estimated based on the Adeline Street intersections and the data provided for 7 AM to 9 AM. According to Fehr & Peers, existing truck volumes are expected to remain constant in the future Project scenarios.

2. Total daily truck delays at each intersection were estimated by multiplying PM delays per truck by existing truck volumes for each hour between 7 AM and 12 PM and between 3 PM to 8 PM. It is assumed that the delays durations are relatively consistent between AM traffic and PM traffic. Negative truck delays indicate a decrease in truck delays due to Project TDM measures, including improved signalization.

3. Emission factors were estimated using EMFAC2017 to generate emission rates for Alameda County from HHDT, LHDT1, LHDT2, and MHDT vehicle classes.

4. Port activity is assumed to be operational only on weekdays. Ballpark delays are assumed to occur only during weekday ballgames.

Abbreviations

CO_2e - carbon dioxide equivalents
EF - emission factor
g - grams
HHDT - heavy heavy duty truck
idle-hr - hour spent idling
LHDT - light heavy duty truck
MHDT - medium heavy duty truck
MT - metric ton
yr - year

Table OP-12. Electricity and Mobile Emission Factors
Oakland Waterfront Ballpark District Project
Oakland, CA

Year	Electricity Emission Factors[1]	Mobile Emission Factors[1,2,3]			
		Passenger Vehicles Only	All Vehicles	Trucks	Buses
	lb CO2e/MWh	g CO_2e/mi	g CO_2e/mi	g CO_2e/mi	g CO_2e/mi
2020	**300**	**310**	**406**	**1,290**	**1,712**
2021	288	301	396	1269	1,687
2022	276	291	385	1240	1,671
2023	264	282	373	1193	1,644
2024	252	272	364	1176	1,620
2025	240	262	354	1157	1,618
2026	228	254	345	1136	1,604
2027	216	247	337	1114	1,587
2028	204	240	329	1092	1,572
2029	192	234	321	1066	1,559
2030	**180**	**228**	**315**	**1046**	**1,549**
2031	168	224	309	1028	1,539
2032	156	220	304	1012	1,531
2033	145	216	300	998	1,523
2034	133	213	296	985	1,516
2035	121	210	292	974	1,509
2036	109	208	290	964	1,503
2037	97	206	287	955	1,497
2038	85	204	285	947	1,491
2039	74	203	283	940	1,487
2040	62	201	282	934	1,483
2041	50	201	281	929	1,479
2042	38	200	280	925	1,476
2043	26	199	279	921	1,473
2044	14	199	279	918	1,471
2045	**2.6**	**198**	**278**	**916**	**1,468**
2046	2.6	198	278	914	1,466
2047	2.6	197	278	912	1,463
2048	2.6	197	277	910	1,461
2049	2.6	197	277	908	1,458
2050	2.6	197	277	910	1,455

Notes:

1. Uses a linear interpolation between the electricity intensity factors derived in Table OP-8.
2. Approximation of the decrease in vehicle emission factors over time, based on Alameda fleet-average emission factors from 2020-2050. Assumes no change after 2050, since EMFAC2017 does not project past 2050.
3. A passenger vehicle fleet mix is used for all events-based and employee commute trips for the Baseline and Project scenario. Bus and truck fleet mixes are used for bus trips and delivery trips associated with events, respectively. Thus, the vehicle emission factor scaling is done separately for each fleet's emissions.

Abbreviations:

CO_2e - carbon dioxide equivalents
lb - pound
mi - mile
MWh - megawatt-hour
MT - metric tons

Table OP-13. Project 1.0 Operational CO_2e Emissions by Year
Oakland Waterfront Ballpark District Project
Oakland, California

Year	Greenhouse Gas Emissions from Project 1.0 (MT CO_2e/yr)[1]											
	Area	Energy		Mobile[3,4]	EV Charging	Waste	Water		Stationary Source[5]	Transportation Refrigeration Unit Emissions	Truck Delay Idling	Total
		Electricity[2]	Natural Gas				Direct	Indirect Electricity[2]				
2020	0	0	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0	0	0	0
2023	0.5	1,438	337	9,896	0	974	150	73	44	0	0	12,912
2024	7	2,442	1,313	18,915	0	1,313	271	144	142	0.41	27	24,575
2025	7	2,326	1,313	18,335	0	1,313	271	137	142	0.41	27	23,872
2026	7	2,210	1,313	17,821	0	1,313	271	130	142	0.41	26	23,234
2027	17	3,299	2,153	28,896	0	1,734	421	210	191	0.41	26	36,947
2028	**37**	**5,440**	**3,867**	**51,216**	**0**	**2,594**	**728**	**365**	**290**	**0.46**	**25**	**64,564**
2029	37	5,121	3,867	50,020	0	2,594	728	344	290	0.46	25	63,027
2030	37	4,801	3,867	48,994	0	2,594	728	323	290	0.46	25	61,659
2031	37	4,486	3,867	48,079	0	2,594	728	301	290	0.46	24	60,407
2032	37	4,170	3,867	47,282	0	2,594	728	280	290	0.46	24	59,273
2033	37	3,855	3,867	46,586	0	2,594	728	259	290	0.46	24	58,240
2034	37	3,539	3,867	45,977	0	2,594	728	238	290	0.46	23	57,293
2035	37	3,224	3,867	45,450	0	2,594	728	217	290	0.46	23	56,430
2036	37	2,908	3,867	44,997	0	2,594	728	195	290	0.46	23	55,640
2037	37	2,592	3,867	44,608	0	2,594	728	174	290	0.46	23	54,914
2038	37	2,277	3,867	44,282	0	2,594	728	153	290	0.46	23	54,251
2039	37	1,961	3,867	44,011	0	2,594	728	132	290	0.46	22	53,643
2040	37	1,646	3,867	43,787	0	2,594	728	111	290	0.46	22	53,083
2041	37	1,330	3,867	43,602	0	2,594	728	89	290	0.46	22	52,561
2042	37	1015	3,867	43,461	0	2,594	728	68	290	0.46	22	52,082
2043	37	699	3,867	43,350	0	2,594	728	47	290	0.46	22	51,635
2044	37	384	3,867	43,261	0	2,594	728	26	290	0.46	22	51,209
2045	37	68	3,867	43,193	0	2,594	728	4.6	290	0.46	22	50,805
2046	37	68	3,867	43,129	0	2,594	728	4.6	290	0.46	22	50,741
2047	37	68	3,867	43,079	0	2,594	728	4.6	290	0.46	22	50,690
2048	37	68	3,867	43,039	0	2,594	728	4.6	290	0.46	21	50,650
2049	37	68	3,867	43,013	0	2,594	728	4.6	290	0.46	21	50,624
2050	37	68	3,867	43,030	0	2,594	728	4.6	290	0.46	22	50,641

Notes:

1. Assumes all buildings become operational as soon as phase is constructed, taking into account the percent of year operational for the first year. The only changes in emissions are due to transportation and electricity becoming cleaner.
2. Uses a linear interpolation between the electricity intensity factors derived in Table OP-8.
3. Approximation of the decrease in vehicle emission factors over time, based on Alameda fleet-average emission factors from 2020-2050. Assumes no change after 2050, since EMFAC2017 does not project past 2050.
4. A passenger vehicle fleet mix is used for event attendee and employee commute trips for the Baseline and Project scenario. Bus and truck fleet mixes are used for bus trips and delivery trips associated with events, respectively.
5. Assumes generators are operational as soon as phase is constructed, taking into account the percent of year operational for the first year.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric tons
yr - year

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Table OP-14. Project 2.0 Operational CO_2e Emissions by Year
Oakland Waterfront Ballpark District Project
Oakland, California

Year	Greenhouse Gas Emissions from Project 2.0 (MT CO_2e/yr)[1]											
	Area	Energy		Mobile[3,4]	EV Charging	Waste	Water		Stationary Source[5]	Transportation Refrigeration Unit Emissions	Truck Delay Idling	Total
		Electricity[2]	Natural Gas				Direct	Indirect Electricity[2]				
2020	0	0	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0	0	0	0
2023	0.54	1,438	337	7,510	0	974	150	73	44	0	0	10,527
2024	6.7	2,442	1,313	14,857	-691	1,313	271	144	142	0.41	27	19,825
2025	6.7	2,326	1,313	14,404	-668	1,313	271	137	142	0.41	27	19,272
2026	6.7	2,210	1,313	14,001	-648	1,313	271	130	142	0.41	26	18,766
2027	17	3,299	2,153	22,792	-631	1,734	421	210	191	0.41	26	30,213
2028	**37**	**5,440**	**3,867**	**40,503**	**-4,063**	**2,594**	**728**	**365**	**290**	**0.46**	**25**	**49,788**
2029	37	5,121	3,867	39,557	-3,975	2,594	728	344	290	0.46	25	48,589
2030	37	4,801	3,867	38,746	-3,901	2,594	728	323	290	0.46	25	47,511
2031	37	4,486	3,867	38,023	-3,837	2,594	728	301	290	0.46	24	46,514
2032	37	4,170	3,867	37,393	-3,785	2,594	728	280	290	0.46	24	45,599
2033	37	3,855	3,867	36,843	-3,742	2,594	728	259	290	0.46	24	44,755
2034	37	3,539	3,867	36,361	-3,708	2,594	728	238	290	0.46	23	43,970
2035	37	3,224	3,867	35,945	-3,682	2,594	728	217	290	0.46	23	43,242
2036	37	2,908	3,867	35,587	-3,664	2,594	728	195	290	0.46	23	42,566
2037	37	2,592	3,867	35,279	-3,652	2,594	728	174	290	0.46	23	41,934
2038	37	2,277	3,867	35,021	-3,645	2,594	728	153	290	0.46	23	41,345
2039	37	1,961	3,867	34,807	-3,644	2,594	728	132	290	0.46	22	40,795
2040	37	1,646	3,867	34,630	-3,648	2,594	728	111	290	0.46	22	40,278
2041	37	1,330	3,867	34,484	-3,655	2,594	728	89	290	0.46	22	39,788
2042	37	1,015	3,867	34,372	-3,665	2,594	728	68	290	0.46	22	39,329
2043	37	699	3,867	34,284	-3,678	2,594	728	47	290	0.46	22	38,891
2044	37	384	3,867	34,214	-3,693	2,594	728	26	290	0.46	22	38,469
2045	37	68	3,867	34,161	-3,710	2,594	728	4.6	290	0.46	22	38,062
2046	37	68	3,867	34,110	-3,703	2,594	728	4.6	290	0.46	22	38,018
2047	37	68	3,867	34,070	-3,698	2,594	728	4.6	290	0.46	22	37,984
2048	37	68	3,867	34,039	-3,693	2,594	728	4.6	290	0.46	21	37,957
2049	37	68	3,867	34,018	-3,689	2,594	728	4.6	290	0.46	21	37,940
2050	37	68	3,867	34,032	-3,686	2,594	728	4.6	290	0.46	22	37,957

Notes:

1. Assume all buildings become operational as soon as phase is constructed, taking into account the percent of year operational for the first year. The only changes in emissions are due to transportation and electricity becoming cleaner.
2. Uses a linear interpolation between the electricity intensity factors derived in Table OP-8.
3. Approximation of the decrease in vehicle emission factors over time, based on Alameda fleet-average emission factors from 2020-2050. Assumes no change after 2050, since EMFAC2017 does not project past 2050.
4. A passenger vehicle fleet mix is used for event attendee and employee commute trips for the Baseline and Project scenario. Bus and truck fleet mixes are used for bus trips and delivery trips associated with events, respectively.
5. Assumes generators are operational as soon as phase is constructed, taking into account the percent of year operational for the first year.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric tons
yr - year

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Table OP-15. Gondola Energy Use CO2e Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

Gondola Station	Annual Electricity Use (kWh)
Jack London Station	3,387,500
10th St. Station	1,456,250
Tower 3rd St. Station	43,050
Total	**4,886,800**

Gondola Energy Use

Electricity Use Rate[2] (kWh/unit-yr)	Annual Electricity Use (MWh/yr)	Natural Gas Use Rate[2] (kBTU/unit-yr)	Annual Natural Gas Use (MMBtu/yr)
4,886,800	4,887	--	--

Gondola Energy Use Emissions

CO_2e Emissions (MT CO_2e/yr)
478

Notes:

1. Electricity and natural gas use rates were calculated based on energy use rates per attendee and actual attendance data for 2017 for MLB games (3.2 kWh/attendee/year and 1.3 kBtu/attendee/year) scaled up for the MLB, other events, and NFL games attendees. PG&E invoices for the MLB season (March through September) are provided in Appendix X.

2. A's headquarters energy use rate is based on CalEEMod version 2016.3.2 defaults for climate zone 5.

3. Electricity use for the ballpark stadium was provided by Meyers+ on 3/2/2019. Natural gas use for the ballpark stadium is scaled based on attendees from the historical data from the Coliseum. Electricity and natural gas use for all ancillary land uses is based on CalEEMod defaults for Climate Zone 5, which account for 2016 Title 24. For the Phase 1 and Full Project scenarios, lighting electricity use rates were adjusted by 50% for 2019 Title 24 performance improvements.

4. Electricity use from the Gondola is estimated by Fehr & Peers.

Abbreviations:

CalEEMod - California Emissions Estimator Model
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
MT - metric ton
MWh - mega watt(s)
yr - year

References:

CalEEMod Version 2016.3.2 Available Online at: http://www.caleemod.com

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Table OP-16. Gondola Mobile Emissions Reduction
Oakland Waterfront Ballpark District Project
Oakland, California

Gondola Trip Rate and VMT Reduction

Land Use and Scenario			Gondola VTR (%)[2]	Annual Trip Reduction (trips/year)	Annual VMT Reduction (mi/year)
Ballpark Stadium	A's Games	Weekday Evening	6%	-49,692	-680,780
		Weekday Day	8%	-20,608	-282,330
		Weekend	5%	-28,350	-411,075
	Other Events[1]	Concerts	4%	-6,372	-75,190
		Other	1%	-1,988	-23,453
		Corporate/Community	0.3%	-400	-4,720
		Plaza	1%	-256	-3,021
	A's Games Deliveries		0%	0	0
	Event Deliveries		0%	0	0
	Arena Management		10%	-993	-9,438
	Sports Team Management		10%	-4,669	-44,359
Residential			10%	-212,628	-2,551,538
Office			10%	-205,182	-2,462,186
Retail			10%	-183,793	-2,205,518
Restaurant			10%	-214,224	-2,570,685
Hotel			10%	-80,484	-965,811
Performance Venue		Attendees	10%	-30,243	-362,914
		Deliveries	0%	0	0
			0%	0	0
				Total	**-12,653,016**

Gondola Emissions Reductions

Trip Type	Mobile Exhaust Emissions Reduction from Gondola Use CO_2e [MT/yr]
A's Games	-358
Events	-27
Non-Residential Ancillary	-2,926
Residential Ancillary	-881
Total	**-4,192**

Notes:

1. Corporate/Community, plaza, and other activities at ballpark are assumed to have the same VTR % as "Other Events" Concerts.
2. Gondola Vehicle Trip Rates were provided by F&P on June 26, 2019

Table OP-17A. Direct Power Plant Green House Gas Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

CO_2 Intensity of Jet Fuel Combustion [1]

72.22	kg CO_2/MMBtu
159	lb CO_2/MMBtu

Historical Power Generation of Oakland Power Plant (2010-2018)

Year	Electricity Fuel Consumption (MMBTU)[2]	Net Electricity Generation (MWh)	Electricity energy intensity (MMBTU/MWh)	CO_2 intensity (lb CO_2/MWh)
2010	147,254	10,746	13.70	2,181
2011	85,493	6,144	13.91	2,215
2012	164,195	11,966	13.72	2,184
2013	40,744	2,996	13.60	2,165
2014	109,277	7,404	14.76	2,349
2015	330,211	22,938	14.40	2,291
2016	83,245	5,625	14.80	2,356
2017	29,287	2,009	14.58	2,320
2018	65,556	3,852	17.02	2,709
Average		**8,187**	**--**	**2,308**

Direct Greenhouse Gas Energy Emission Factors

Greenhouse Gas	CO_2	CH_4	N_2O	CO_2e	Units
Global Warming Potential[3]	1.0	25	298	-	CO_2e
Oakland Power Plant (2010-2018 average)[3]	2,308	0.029	0.0062	2,310	lb/MWh
Estimated Intensity Factor for Grid-Averaged Electricity Delivered in 2028[4]	--	--	--	204	lb/MWh
Difference in GHG Intensity				2,106	lb/MWh

Avoided Direct GHG Emissions from Oakland Power Plant Conversion

Parameter	Low	Average	High	Units
Range of Oakland Electricity Generation over 2010-2018	2,009	8,187	22,938	MWh/year
Direct GHG Avoided[5]	1,920	7,824	21,921	MT CO_2e/year

Notes:

1. The carbon intensity of jet fuel is based on data from US EPA (2018), "Emission Factors for Greenhouse Gas Inventories". Available at: https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
2. Data from Form EIA-923 detailed data for 2010-2018 (https://www.eia.gov/electricity/data/eia923/) for Dynegy Oakland Power Plant.
3. Data obtained from The Climate Registry CRIS Public Reports (https://www.theclimateregistry.org/our-members/cris-public-reports/)
4. The intensity factor for 2028 is estimated using a linear interpolation between the electricity intensity factors derived in Table OP-8.
5. CO_2 avoided is calculated using the minimum, average, and maximum electricity generated annually by Vistra Oakland over 2010-2018 multiplied by the difference in CO_2 intensity between Vistra Oakland and PG&E.

Abbreviations:

CH_4 - methane
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
kg - kilogram
lb - pound
MMBtu - million british thermal units
MT - metric ton
MWh - megawatt-hour
N_2O - nitrous oxide

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Table OP-17B. Indirect Power Plant Green House Gas Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

CO_2e Intensity Factor per Total Non-Renewable Electricity[1]

444	lbs CO_2/MWh delivered
0.029	lbs CH_4/MWh delivered
0.0062	lbs N_2O/MWh delivered
446	lbs CO_2e/MWh delivered

Avoided Indirect GHG Emissions from Oakland Power Plant Conversion

Parameter	Low	Average	High	Units
Range of Oakland Electricity Generation over 2010-2018	2,009	8,187	22,938	MWh/year
Indirect GHG Avoided[2]	407	1,658	4,646	MT CO_2e/year

Notes:

1. The CO_2 intensity factor presented here is calculated in Table OP-8. The CH_4 and N_2O intensity factors are consistent with the CalEEMod® version 2016.3.2. defaults for PGE.
2. Battery energy storage systems have rapid response times and are more efficient compared to fossil-fueled peaker plants because they can store energy from renewable sources during off-peak durations and supply them back during peak demand periods. The installation of the energy storage system would likely result in a ramping down of existing fossil fueled plants and/or eliminate the need for additional fossil fueled plants to provide grid stability and conditioning formerly supplemented by the Oakland Power Plant. The indirect GHG emissions presented here represent the reduced GHG emissions that occur across the grid as the battery energy storage system would provide improvements to grid reliability and promote the transition to more renewably sourced electricity.

Abbreviations:

CH_4 - methane
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
kg - kilogram
lb - pound
MT - metric ton
MWh - megawatt-hour
N_2O - nitrous oxide
PGE - Pacific Gas & Electric

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Table OP-18. Power Plant Emissions Reduction
Oakland Waterfront Ballpark District Project
Oakland, California

Emissions Source	GHG Emissions[1] [MT/year] CO_2e
Direct Emissions from Oakland Power Plant Gas Turbines[2]	-7,824
Indirect Emissions from Increased Renewables	-1,658
Emergency Standby Diesel Engine	--
Wipe Cleaning[3]	--
Total Emissions	**-9,482**

Notes:

1. GHG emissions avoided are based on average historical operating conditions for facility from 2010-2018.
2. Gas turbine emissions based on average historical operating conditions for facility from 2010-2018.
3. Wipe cleaning emissions based on solvent evaporation rate and assume that 100% of solvent volatilizes.

Abbreviations:

CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
MT - metric ton

APPENDIX D
SECOND SUPPLEMENTAL MEMO

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November 1, 2019

VIA ELECTRONIC MAIL

Kate Gordon
Director
Office of Planning and Research
1400 10th Street
Sacramento, CA 95814

Re: Clarifications Regarding Oakland A's AB 734 Application

Dear Director Gordon:

This firm represents the Oakland Athletics (the "Oakland A's"). This letter clarifies, at the request of the California Air Resources Board ("CARB"), certain aspects of the Oakland A's Application and Supplemental Information for the proposed ballpark and mixed-use development at Howard Terminal (the "Howard Terminal Project") under AB 734 (collectively, the "AB 734 Application").

1. Timing.

First, we address the seeming confusion about the temporal status of applications under AB 734 and similar laws (such as AB 900) at the time the Governor certifies the applications as qualifying for expedited judicial review under those statutes. Because the core purpose of AB 734 and AB 900 is to provide a mechanism for expedited judicial review of challenges to the project approvals and analysis under the California Environmental Quality Act (CEQA) of qualifying projects, the Governor's determination regarding the qualification for expedited review inevitably occurs before completion of the CEQA review or the approval or construction of the projects which are the subject of applications under those statutes. The Governor's determination, therefore, is based on evidence which, in light of the timing, invariably includes projections of future circumstances such as projected emissions, offsets or vehicle trip reductions. Certifications under AB 734 or AB 900 are issued based on those projections if the projections and methodology demonstrate that the projects can and will comply with the requirements of the statutes in the future. Of necessity, the certifications are not based on a determination that the projects are already constructed and have complied with the respective statute's requirements as a retrospective determination. The AB 734 Application provides both the evidence that the proposed project can meet the requirements of AB 734 and a commitment from the lead agency to enforce all the obligations of AB 734. As

in comparable AB 900 projects, the AB 734 certification process establishes the framework by which the lead agency will monitor and enforce the statute's obligations if and when a certified project is approved and constructed. The monitoring and enforcement occurs as any certified project is constructed, based on contemporaneous actual measurements and reflecting the final project approvals. In the case of the proposed Howard Terminal Project, the final project approvals will include any measures or conditions imposed by the Port and the City in their respective discretion and the monitoring and enforcement will reflect the final approved Project and all its conditions, including the impact (if any) of those conditions, such as seaport compatibility measures. The AB 734 Application demonstrates that the Howard Terminal Project can comply with AB 734's requirements and the City and Port of Oakland have committed to enforcing all the obligations of AB 734 on the Howard Terminal Project thereby demonstrating that the Howard Terminal Project, if approved, will comply. We would also note that we have included with this letter as Attachment 1 a brief clarification of how the Howard Terminal Project can achieve the 50% local offset requirement.

2. Future Activities at the Coliseum.

We wish to provide clarification about the assumptions pertaining to the existing activities at the Oakland Coliseum. As explained in the AB 734 Application, the Oakland A's are not seeking a credit for any aspects of the current operations at the Coliseum (i.e. football games, concerts or other non-baseball events) other than the relocation of the existing baseball games to the Howard Terminal site. However, we understand the issue of potential future use of the Coliseum requires some further clarification. As you know, the Oakland A's are proposing to program additional events at the new ballpark and related entertainment venue at Howard Terminal, and these events are included in the AB 734 analysis. In addition, the new state of the art Chase Center arena just opened in San Francisco and in addition to serving as the home court for the Golden State Warriors NBA team, will host major concerts, events and family shows throughout the year. Additionally, the Oakland Arena (formerly Oracle Arena) may continue to host concerts and other events. Thus, in the submarket of Oakland and San Francisco, the Oakland Coliseum (if retained, which is uncertain at this time) would be competing with a number of venues, all of which are in better physical condition than the Coliseum, which has not had a major infusion of capital or improvements in many years. The Coliseum will have to compete with the existing Oakland (formerly Oracle) arena (which now has an additional 40 plus number of nights to fill to replace the Warriors' games), the new state of the art Chase Center, the existing Oracle (formerly AT&T) ballpark in San Francisco (home field of the San Francisco Giants), the new state of the art Howard Terminal ballpark and entertainment venue, not to mention the major outdoor concerts programmed in Golden Gate Park in San Francisco, such as Outside Lands and Hardly Strictly Bluegrass. If the Coliseum is retained, in addition to the 81 annual MLB games it must replace, there will be 9 additional free days after the Oakland Raiders move to Las Vegas, leaving no less than 90 additional days

and nights to fill. Both the NFL and MLB are regulated industries and the NFL owners recently voted to allow the Raiders to relocate to Las Vegas, and the Oakland area is the geographic MLB territory of the Oakland A's. It is therefore highly unlikely that any major league team will relocate to the Coliseum and support the significant reinvestment or the construction of a new stadium at the Coliseum that would be necessary for the Coliseum to effectively divert concerts or events of any size to the Coliseum in the future. Further, a review of the number of concerts and other events held at the Coliseum in recent years shows that very few concerts are booked at the stadium now, even before the opening of the new Chase Center or the proposed new venues at Howard Terminal. Since the year 2006, only 9 concert events have occurred at the Coliseum, two of which were music events that occurred in the parking lot, rather than in the stadium itself. In addition, we understand that the Coliseum has historically hosted two monster truck and one motocross events annually. This year, however, there will be two monster truck events and two motocross events. Please see Attachment 2 to this letter. Further, without an anchor tenant to support a refurbishment or capital investment, it is unclear whether the facility would be maintained.

In summary, the Bay Area is saturated with state of the art entertainment venues and the Oakland Coliseum is not a competitive option for performers coming to the Bay Area, as evidenced by the extremely low number of concerts held at the Coliseum in the last 13 years. Additionally, we note the fact that the Coliseum already has a significant number of non-event days that could conceivably be booked by a performer but in fact go unused.

3. Length of the Howard Terminal Ballpark Lease.

We wish to clarify why the current proposal for the lease term at Howard Terminal is for a sixty-six (66) year lease but the operational life assumption for proposed improvements is 30 years in length. Both the Charter of the City of Oakland and the state legislative trust grant currently limit the lease terms for trust properties to sixty-six years. Consistent with AB 900 precedent and best practices established in the air quality and greenhouse gas analysis industry, the AB 734 analysis contemplates a 30 year operational life for the new ballpark. As you know, most AB 900 projects involve projects proposed to be constructed on land owned by the project applicant. Although fee ownership represents a perpetual relationship to the land, in those approved AB 900 applications, the assumed operational life of the proposed improvements to be constructed on the land was 30 years. The same 30 year operational life assumption for the improvements is proposed in the AB 734 Application, both as to improvements proposed for land to be held in fee title and those to be held under a 66 year ground lease. A list of approved AB 900 projects assuming a 30 year operational life of the improvements is attached as Attachment 3 to this letter.

4. Truck Delay Analysis.

We wish to provide further clarification about the potential delays (and therefore potential additional emissions due to delays) from the relocation of trucks from Howard Terminal to other locations. Truck delay and emissions are already included in the AB 734 analysis but please see Attachment 4 for further clarification.

5. The Oakland Power Plant Variant.

We wish to provide further clarification regarding the Oakland Power Plan ("OPP") Variant. In addition, the Comment letter from PMSA on the Oakland A's Supplemental Application challenges the OPP analysis and makes several incorrect assertions about the status of the power plant and its future. Attached as Attachment 5 to this letter is a letter from Vistra Power Company ("Vistra") clarifying the status of the OPP and the proposed transaction between the Oakland A's and Vistra. To briefly address the current status of the plant, PMSA claims that the power generating components of the jet-fuel powered OPP "have already been taken off-line." This statement is incorrect. As described in the attached letter from Vistra, the plant continues to operate and generate power and the California ISO just renewed the Reliability Must Run ("RMR") Agreement for the plant through the end of 2020, a copy of which is attached to the Vistra letter.

The attached letter from Vistra also explains that while there have been aspirations to shut down the plant in the past, none have come to fruition because it was not be economically viable to do so until now. The letter also sets out the timing of the negotiations between the A's and Vistra, which was in the planning stages before Vistra responded to the Oakland Clean Energy Initiative RFO. The letter makes it clear that the proposed transaction with the Oakland A's, combined with the ECBE contract have helped secure sufficient demand to make the conversion feasible. As confirmed by Vistra, no other party will seek or obtain GHG credits for the conversion other than the Oakland A's. Please note that Attachment 1 includes a refinement of the calculations for the OPP Variant.

Thank you for the opportunity to provide these clarifications.

Sincerely,

GIBSON, DUNN & CRUTCHER LLP

Mary G. Murphy

MGM/nf

ATTACHMENT 1

RAMBOLL

ENVIRONMENT
& HEALTH

MEMORANDUM

To: **Shannon Hatcher**
California Air Resources Board
Shannon.Hatcher@arb.ca.gov

From: **Michael Keinath**

Subject: **Updates to Oakland Power Plant Methodology, EV Charging Inputs, and Additional Quantified Reductions for the Oakland Waterfront Ballpark District Project**

October 29, 2019

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INTRODUCTION

The purpose of this document is to provide additional background and references supporting the Oakland Power Plant (OPP) variant for the Oakland Waterfront Ballpark District Project ("Project") and to outline additional reductions to be taken to achieve the 50% local reduction measure. Prior to this update, implementation of the OPP variant would surpass the 50% local reduction required by Assembly Bill 734 (AB734). In order to ensure that this reduction measure could be achieved without OPP, we have provided clarification of Project reductions that could be implemented to allow the Project to meet the 50% local reduction measure if the OPP variant is not implemented. We have also clarified how more vehicle (EV) chargers lead to GHG reductions and incorporated minor updates to construction. Unless specified below, methodology and assumptions in these updates are consistent with the previous AB734 application update submitted on August 28, 2019. Only tables that have been added and key summary tables with values that have updated since the previous application are included. Calculations provided in the application demonstrate methodology but may be updated with best available and current data at the time of Project implementation.

OPP METHODOLOGY

The OPP variant would involve replacing the three existing jet-fueled turbines with a 90 MW battery energy storage system (ESS) with up to four hours of storage. The updated approach to estimate avoided greenhouse gas (GHG) emissions resulting from the OPP variant comprises two components: (1) a direct reduction in GHG emissions from closure of the existing jet-fueled turbines and replacement with cleaner grid energy; and (2) avoided indirect GHG emissions from the ramping down of fossil-fueled plants that would have been required to regulate and condition the grid, a function now served by the battery ESS.

- **Avoided Direct Emissions:** The previous application assumed that energy stored in the battery ESS would be supplied at the grid-average intensity. Based on conversations with ARB and the OPP operator, we understand that one-third of the energy supplied to the battery ESS is guaranteed to be from zero-carbon sources with the remaining two-thirds from the grid.
- **Avoided Indirect Emissions:** The methodology to quantify the magnitude of fossil-fueled plant ramp-down has been updated to be based on solar and wind power curtailment data from the California Independent System Operator (CAISO) to better reflect how the ESS will allow for the deployment of more renewable sources of power. The calculation assumes that the battery storage system stores electricity from renewable power sources such as solar and wind power generation during off-peak periods, based on average renewable curtailment rates.[1] The ESS is assumed to be charged to its maximum capacity (270 MWh/day) during peak curtailment months and proportionally lower charge rates during other months of the year. This is a conservative estimate as it is based on historical curtailment. As California increases solar and wind generation capacity, the battery energy

[1] Monthly curtailment data for May 2014 through August 2019 available online at: http://www.caiso.com/informed/Pages/ManagingOversupply.aspx (Accessed: September 2019).

storage system could potentially be fully charged using renewable sources all year, even in the historically low-curtailment months.

UPDATES TO EMISSION INVENTORY INPUTS

Only inputs to EV charging and construction were updated in this analysis.

- **EV Charging Assumptions**: Previously, it was assumed that 10% of parking spaces across all land uses would have EV chargers. In order to achieve the 50% local reduction measure without the OPP Variant, the number of on-site EV charging-capable parking spaces could be increased in specific land uses which were previously charger-limited at 10%, resulting in the following breakdown:
  - Residential and Hotel: 15% of spaces
  - Office: 10% of spaces
  - Retail and Restaurant: 15% of spaces
  - Ballpark: 30% of spaces
- **Construction Assumptions**: In this update, minor updates to construction GHG emissions include:
  - Emission factors from water trucks exhaust were updated to use EMFAC2017 instead of OFFROAD2011;
  - Cranes used in the mitigated construction inventory are assumed to have Tier 3 engines; and
  - Emissions were estimated from electricity used by electric equipment and by water pumping.

  Corresponding updates were made for the variant construction projects. Construction-related tables have been updated accordingly.

ADDITIONAL REDUCTION MEASURES

In addition to the additional EV chargers and traffic reductions due to TDM and TMP, there are a variety of potential additional measures that could be considered to achieve the 50% local reduction for the Project. Ramboll has quantified several of these as part of the path to 50% (without the OPP Variant).

- **Reduced Generator Operation:** This analysis updated the previous assumption of 50 hours per year of routine maintenance of the Project generators to 20 hours of operation per year**.**
- **Installation of Solar PV Panels on 50% of Rooftop Areas:** This analysis analyzed potential emissions reductions from on-site solar photovoltaic (PV) energy on 50% of the available rooftops of the ancillary buildings. Annual electricity generated is calculated using the National Renewable Energy Laboratory's PVWatts®, version 6.[2] Details are shown in new **Table OP-19**.
- **No Natural Gas for 50% of Residential Units:** This analysis estimates the reduction in emissions from natural gas consumption by assuming that natural gas usage from 50% of the Project residential units is replaced by grid electricity, as shown in new **Table OP-20**. It is assumed that the all-electric residences have a 40% higher kilowatt-hour usage compared to buildings with natural gas domestic hot water, space heating and appliances, as estimated by Meyers+ Engineers.

RESULTS SUMMARY

A summary of the Proposed Project GHG emissions (disaggregated between residential and nonresidential land uses, and projected year-by-year out to 30 years following a net increase in GHG emissions) and avoided GHG emissions with additional reductions is presented in new **Table 13**, representing a potential path to 50% local reduction without reliance on the OPP Variant, as is required for AB734 CEQA streamlining. As shown, when accounting for Project features and GHG reduction measures that are currently known and quantifiable, the total Local GHG Reduction over the 30-year Project lifetime equals 50% of the net new nonresidential emissions, without the potential reductions of the OPP and Gondola Variants. This analysis still does not include anticipated additional reductions from Project features associated with LEED Gold design, which would allow the Project to achieve further GHG reductions locally. In addition, the OPP and Gondola Variants, if implemented, would result in Local GHG reductions well in excess of the 50% requirement.

[2] PVWatts, using default assumptions for Oakland, California. Available online at https://pvwatts.nrel.gov/pvwatts.php

Table 1. Emissions Reductions and Offsets Summary at Full Buildout (2028)
Oakland Waterfront Ballpark District Project
Oakland, California

Category	CO_2e Emissions (MT/year)			
	Ballpark	**Ancillary - Nonresidential**	**Ancillary - Residential**	**Total**
Existing Conditions Emissions (2020)	-10,600	-	-	-10,600
Project 1.0 Emissions at Full Buildout (without Project Design Features and Local Reduction Measures)	10,344	39,490	14,556	64,390
Net New Project Emissions (Project 1.0 - Existing)	-256	39,490	14,556	**53,790**
Net New Project Nonresidential Emissions	39,234		0	39,234
Reductions *Needed* from Local Measures (50% of Net New Nonresidential Emissions)[1]	19,617		0	19,617
Project 2.0 Emissions at Full Buildout (with Project Design Features and Local Reduction Measures)[2]	7,271	30,333	10,907	48,510
Reductions Achieved through Local Measures (Project 2.0 - Project 1.0)	-3,073	-9,157	-3,650	**-15,880**
Achieved Local Reductions as a Percent of Net New Nonresidential Emissions	**40%**			
Additional Reductions Achieved through Offset Credits, Mitigations, or Other Onsite/Offsite Projects to Reach Net Zero Target	**-37,910**			

Notes:

1. Per AB 734, at least 50% of the nonresidential (ballpark + nonresidential ancillary) emissions must be reduced by local measures.
2. Local reduction measures include TDM and TMP measures as well as EV chargers.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric ton

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Table 6. Construction GHG Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

Year	CO_2e Emissions (MT/year)[1]				
	Diesel Off-Road Equipment[2,3]	Electric Off-Road Equipment[2]	Indirect Emissions from Water Use[4]	On-Road Vehicles[5]	Total
2020	282	0	14	36	333
2021	2,182	14	70	3,314	5,580
2022	2,664	58	12	3,205	5,939
2023	1,739	20	17	1,768	3,543
2024	1,872	0	39	1,662	3,572
2025	1,836	123	17	1,818	3,794
2026	2,696	160	12	1,893	4,760
2027	1,781	36	6.2	1,232	3,056
				Total GHG Emissions from Construction (MT)	**30,577**

Notes:

1. Construction inputs were provided by the Project sponsor and Devcon Construction Inc. based on Project-specific assumptions.

2. Construction equipment list, fuel, size in HP or kW, start and end dates, hours of operation per day, and utilization were provided by the Project sponsor. Utilization refers to the percentage of the phase that equipment is expected to be in use. Equipment load factors were estimated from the Air Resource Board's OFFROAD database. Emission factors were from OFFROAD2011 for diesel equipment and PG&E for electric equipment.

   Emissions = Σ(N * P * LF * Hr * U * EF)

   N: number of Equipment Pieces
   P: equipment power, either horsepower or kilowatts (OFFROAD2011)
   LF: Load Factor
   U: Utilization
   EF: Emissions Factor

   The greenhouse gas emission factor calculations for electric equipment calculations are shown in Table OP-8. For CO_2, the 2020 emission factor was conservatively used (297 lb/Mwh) for all construction years. For CH_4 and N_2O, the CalEEMod default factors were used (0.029, and 0.00617 lb/MWh, respectively).

3. Emissions from water trucks were calculated using EMFAC2017 emission factors as they are on-road trucks. Emissions from water trucks were calculated using the following assumptions:
   - EMFAC2017 was run in emissions rates mode and output by vehicle class and fuel for Alameda County and averaged across model years for EMFAC 2007 vehicle classes for a specific fuel type.
   - Hours are calculated as number of equipment * utilization percent * number of construction days * hours/day * load factor.
   - Starts are calculated as hours * 1 start/hour.
   - Miles are calculated as hours * 10 miles per hour.
   - Idle-hrs are calculated as starts * 1 idle/start * 2 minutes/idle.
   - Number of water trucks and schedule are provided in the off-road equipment list table.
   - Water trucks are assumed to be diesel fueled and similar to medium heavy duty trucks (MHDT).
   - Idling is restricted to 2 minutes/idle.
   - Water trucks start once per hour.

4. Indirect electricity emissions from water use in the water trucks were calculated using CalEEMod methodology for electricity intensity and PG&E's greenhouse gas emission factor. Total water use was based on the total acreage of the phase area and the water ysage rate provided by Devcon. Electric intensity factors were taken from Table 9.2 in Appendix D of the CalEEMod User's Guide as the sum of supply water, treat water and distribute water electric intensity factors. Since the water use reported here is only for fugitive dust control, indoor water use-related emissions and wastewater treatment-related emissions are not estimated here. Greenhouse gas emission factor calculations are shown in Table OP-8. For CO_2, the 2020 emission factor was conservatively used (297 lb/MWh) for all construction years. For CH_4 and N_2O, the CalEEMod default factors were used (0.029, and 0.00617 lb/MWh, respectively).

5. CalEEMod® default fleet mixes were used for Worker (LD_Mix), Vendor (MHDT/HHDT), and Hauling (HHDT) trips. LD_Mix was assumed to be 100% gasoline vehicles and MHDT/HHDT and HHDT were assumed to be 100% diesel vehicles. For Worker, Vendor, and Hauling emission factors, EMFAC2017 was run for each year of construction. Annual number of trips and VMT were output by vehicle class and fuel for Alameda County and averaged across model years for EMFAC 2007 vehicle classes for a specific fuel type. From these, emission factors were calculated by dividing the emissions by either the number of trips or the VMT, where appropriate. Emission factors were calculated using the equations below:

   $E_{g/mi} = E / VMT$
   $E_{g/trip} = E / T$

   Where $E_{g/mi}$ is the emission factor in g/mi, $E_{g/trip}$ is the emission factor in g/trip, VMT is annual vehicle miles traveled and T is the annual number of trips.

6. Global warming potentials used in the calculation of CO2e are 1, 25 and 298 for CO2, CH4 and N2O, respectively, and are from IPCC AR4.

Abbreviations:

CO_2e - carbon dioxide equivalents
GHG - greenhouse gas
MT - metric ton

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Table 8. Project 1.0 Operational Emissions for Full Buildout Year (2028)
Oakland Waterfront Ballpark District Project
Oakland, California

Category	Project CO_2e Emissions (MT/year)		
	Ballpark	**Ancillary - Nonresidential**	**Ancillary - Residential**
Mobile	7,728	32,794	10,694
Electricity	1,204	3,098	1,138
Natural Gas	253	2,218	1,396
Water and Wastewater	190	353	550
Solid Waste	945	956	694
Area Sources	0.06	0.17	37
Stationary Sources[1]	21	47	47
EV Charging	--	--	--
Transportation Refrigeration Units[2]	0.41	0.05	0
Port Truck Idling Delays[3]	2.1	23	--
Total	**10,344**	**39,490**	**14,556**
	64,390		

Notes:

1. Stationary source emissions from emergency generators are not associated with particular types of land uses, but rather mixed-use buildings on the Project site. For the purpose of this preliminary estimate, stationary source emissions are equally split between the Ancillary - Nonresidential and Ancillary - Residential totals.
2. Transportation Refrigeration Units (TRU) emissions account for emissions from the diesel-powered electrical generation units used to refrigerate or heat perishable goods transported by trucks.
3. Traffic from the Project is estimated to contribute to truck delays in the surrounding areas, which results in truck idling emissions. Data was provided from Fehr & Peers for ballpark traffic-caused delays and ancillary development traffic-caused delays. However, no information was provided for the breakdown between non-residential ancillary and residential ancillary, so all emissions were considered to be from non-residential for this analysis.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric ton

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Table 9. Project 2.0 Operational Emissions for Full Buildout Year (2028)
Oakland Waterfront Ballpark District Project
Oakland, California

Category	Project CO_2e Emissions (MT/year)		
	Ballpark	**Ancillary - Nonresidential**	**Ancillary - Residential**
Mobile	5,829	26,658	8,015
Electricity	1,204	3,098	1,138
Natural Gas	253	2,218	1,396
Water and Wastewater	190	353	550
Solid Waste	945	956	694
Area Sources	0.06	0.17	37
Stationary Sources[1]	21	47	47
EV Charging[2]	-1,174	-3,022	-971
Transportation Refrigeration Units[3]	0.41	0.05	0
Port Truck Idling Delays[4]	2.1	23	--
Total	**7,271**	**30,333**	**10,907**
	48,510		

Notes:

1. Stationary source emissions from emergency generators are not associated with particular types of land uses, but rather mixed-use buildings on the Project site. For the purpose of this preliminary estimate, stationary source emissions are equally split between the Ancillary - Nonresidential and Ancillary - Residential totals.
2. This analysis assumes that electric vehicle chargers will be installed for 10% of all parking spaces.
3. Transportation Refrigeration Units (TRU) emissions account for emissions from the diesel-powered electrical generation units used to refrigerate or heat perishable goods transported by trucks.
4. Traffic from the Project is estimated to contribute to truck delays in the surrounding areas, which results in truck idling emissions. Data was provided from Fehr & Peers for ballpark traffic-caused delays and ancillary development traffic-caused delays. However, no information was provided for the breakdown between non-residential ancillary and residential ancillary, so all emissions were considered to be from non-residential for this analysis.

Abbreviations:

CO_2e - carbon dioxide equivalents

EV - electric vehicle

MT - metric ton

Table 10. Year-by-Year Comparison of GHG Emissions Without Additional Reductions
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2]	Project 2.0 Operational Emissions[2]	Construction Emissions	Net Project Emissions to Reduce or Offset	Local Reductions (TMP + TDM + EV Charging)	% Local Reduction Measures	Remaining Emissions[3]
	MT CO_2e/year						%	MT CO_2e/year
2020	0	0	0	333	333	0	--	333
2021	0	0	0	5,580	5,580	0	--	5,580
2022	0	0	0	5,939	5,939	0	--	5,939
2023	10,600	12,889	10,504	3,543	5,833	2,385	116%	3,448
2024	**10,600**	**24,490**	**19,578**	**3,572**	**17,462**	**4,912**	**45%**	**12,550**
2025	10,600	23,786	19,030	3,794	16,980	4,756	46%	12,224
2026	10,600	23,149	18,529	4,760	17,309	4,619	47%	12,689
2027	10,600	36,832	29,951	3,056	29,289	6,882	35%	22,407
2028	**10,600**	**64,390**	**48,510**	**0**	**53,790**	**15,880**	**40%**	**37,910**
2029	10,600	62,853	47,335	0	52,253	15,518	41%	36,735
2030	10,600	61,485	46,277	0	50,886	15,208	41%	35,677
2031	10,600	60,233	45,297	0	49,633	14,936	42%	34,697
2032	10,600	59,099	44,397	0	48,499	14,702	42%	33,797
2033	10,600	58,066	43,564	0	47,467	14,502	42%	32,965
2034	10,600	57,120	42,789	0	46,520	14,331	43%	32,189
2035	10,600	56,256	42,068	0	45,656	14,188	43%	31,468
2036	10,600	55,466	41,397	0	44,867	14,069	44%	30,797
2037	10,600	54,741	40,768	0	44,141	13,973	44%	30,168
2038	10,600	54,077	40,181	0	43,477	13,896	45%	29,581
2039	10,600	53,469	39,631	0	42,869	13,838	45%	29,031
2040	10,600	52,909	39,113	0	42,309	13,796	46%	28,513
2041	10,600	52,387	38,621	0	41,787	13,766	46%	28,021
2042	10,600	51,909	38,159	0	41,309	13,749	47%	27,559
2043	10,600	51,461	37,718	0	40,861	13,743	47%	27,118
2044	10,600	51,035	37,292	0	40,436	13,743	48%	26,692
2045	10,600	50,631	36,880	0	40,031	13,751	48%	26,280
2046	10,600	50,567	36,838	0	39,967	13,728	48%	26,238
2047	10,600	50,516	36,806	0	39,916	13,711	48%	26,206
2048	10,600	50,477	36,780	0	39,877	13,697	48%	26,180
2049	10,600	50,450	36,764	0	39,850	13,686	48%	26,164
2050	10,600	50,468	36,782	0	39,868	13,686	48%	26,182
2051	10,600	50,468	36,782	0	39,868	13,686	48%	26,182
2052	10,600	50,468	36,782	0	39,868	13,686	48%	26,182

Table 10. Year-by-Year Comparison of GHG Emissions Without Additional Reductions
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2]	Project 2.0 Operational Emissions[2]	Construction Emissions	Net Project Emissions to Reduce or Offset	Local Reductions (TMP + TDM + EV Charging)	% Local Reduction Measures	Remaining Emissions[3]
	MT CO_2e/year						%	MT CO_2e/year
2053	0	42,462	30,370	0	42,462	12,092	39%	30,370
2054	0	39,040	27,348	0	39,040	11,692	43%	27,348
2055	0	39,037	27,345	0	39,037	11,692	43%	27,345
2056	0	38,992	27,312	0	38,992	11,679	43%	27,312
2057	0	4,971	2,798	0	4,971	2,173	44%	2,798
Total Gross Emissions (MT)	**317,998**	**1,646,649**	**1,220,299**	**30,577**	**1,359,228**	**426,351**	**44.6%**	**932,878**

Notes:

[1] Emissions decrease over time due to transportation and electricity (for both building energy use and water treatment and distribution) becoming cleaner. A linear interpolation is used to take into account decrease in electricity intensity factor due to Renewable Portfolio Standards. The decrease in vehicle emission factors over time is based on Alameda County fleet-average emission factors from 2020-2050. The estimate assumes no change after 2050, since EMFAC2017 does not project past 2050.

[2] Emissions assume all buildings become operational as soon as Phase is constructed, based on percent of operational land uses by Phase and percent of operation per year. The first calendar year is adjusted for partial operation based on start date and the last calendar year is adjusted for partial operation such that total lifetime for each land use sums to 30 years.

[3] The analysis presented here does not include anticipated additional reductions from Project features associated with LEED Gold design or from local air quality mitigation measures with GHG co-benefits. The Project is committed to achieving LEED Gold Standard, which requires projects to obtain points in the areas of Location & Transportation, Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation, and Regional Priority. Many of these measures, such as optimizing energy performance, demand response, and renewable energy production, would allow the Project to achieve further GHG reductions locally that are not captured in this analysis.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric ton
NPV - net present value
yr - year

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Table 11. Project Variant Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

Emissions Source	GHG Emissions [MT/year] CO_2e
Aerial Gondola	
Construction Emissions	848
Energy Use Emissions	478
Mobile Emission Reductions (due to VMT Reductions)	-4,192
Total Emissions	**-2,866**
Oakland Power Plant	
Construction Emissions	219
Direct Energy Emission Avoided	-8,076
Indirect Energy Emission Avoided	-9,129
Total Emissions	**-16,987**
Total Emission Reductions	**-19,853**

Note:

1. GHG emissions were only calculated for the Aerial Gondola and Oakland Power Plant variants, since these are expected to potentially have significant impacts on the GHG analysis. All other variant projects are anticipated to have minimal GHG impacts or reductions.

Abbreviations:

CO_2e - carbon dioxide equivalent

GHG - greenhouse gas

MT - metric ton

VMT - vehicle miles traveled

Table 12. Year-by-Year Comparison of GHG Emissions With Oakland Power Plant
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2]	Project 2.0 Operational Emissions[2]	Construction Emissions	Net Project Emissions to Reduce or Offset	Reduction from Oakland Power Plant[3]	Reduction from TDM, TMP, EV Charging	Local Reductions (TMP + TDM + EV Charging + Oakland Power Plant)	% Local Reduction Measures	Remaining Emissions[4]
	MT CO_2e/year								%	MT CO_2e/year
2020	0	0	0	333	333	0	0	0	--	333
2021	0	0	0	5,580	5,580	0	0	0	--	5,580
2022	0	0	0	5,939	5,939	-185	0	-185	--	6,124
2023	10,600	12,889	10,504	3,543	5,833	-34	2,385	2,351	115%	3,482
2024	**10,600**	**24,490**	**19,578**	**3,572**	**17,462**	**16,775**	**4,912**	**21,687**	**197%**	**-4,224**
2025	10,600	23,786	19,030	3,794	16,980	16,819	4,756	21,576	208%	-4,596
2026	10,600	23,149	18,529	4,760	17,309	16,864	4,619	21,483	219%	-4,174
2027	10,600	36,832	29,951	3,056	29,289	16,908	6,882	23,790	122%	5,499
2028	**10,600**	**64,390**	**48,510**	**0**	**53,790**	**16,953**	**15,880**	**32,833**	**84%**	**20,957**
2029	10,600	62,853	47,335	0	52,253	16,997	15,518	32,516	85%	19,737
2030	10,600	61,485	46,277	0	50,886	17,042	15,208	32,250	87%	18,635
2031	10,600	60,233	45,297	0	49,633	17,086	14,936	32,022	89%	17,612
2032	10,600	59,099	44,397	0	48,499	17,130	14,702	31,832	91%	16,667
2033	10,600	58,066	43,564	0	47,467	17,174	14,502	31,676	92%	15,791
2034	10,600	57,120	42,789	0	46,520	17,218	14,331	31,549	94%	14,971
2035	10,600	56,256	42,068	0	45,656	17,262	14,188	31,450	96%	14,206
2036	10,600	55,466	41,397	0	44,867	17,306	14,069	31,375	97%	13,491
2037	10,600	54,741	40,768	0	44,141	17,350	13,973	31,322	99%	12,818
2038	10,600	54,077	40,181	0	43,477	17,394	13,896	31,290	101%	12,187
2039	10,600	53,469	39,631	0	42,869	17,438	13,838	31,276	102%	11,593
2040	10,600	52,909	39,113	0	42,309	17,482	13,796	31,277	104%	11,032
2041	10,600	52,387	38,621	0	41,787	17,526	13,766	31,292	105%	10,495
2042	10,600	51,909	38,159	0	41,309	17,569	13,749	31,319	106%	9,990
2043	10,600	51,461	37,718	0	40,861	17,613	13,743	31,356	108%	9,505
2044	10,600	51,035	37,292	0	40,436	17,657	13,743	31,401	109%	9,035
2045	10,600	50,631	36,880	0	40,031	17,701	13,751	31,452	111%	8,579
2046	10,600	50,567	36,838	0	39,967	17,701	13,728	31,430	111%	8,537
2047	10,600	50,516	36,806	0	39,916	17,701	13,711	31,412	111%	8,504
2048	10,600	50,477	36,780	0	39,877	17,701	13,697	31,398	111%	8,479
2049	10,600	50,450	36,764	0	39,850	17,701	13,686	31,387	111%	8,463
2050	10,600	50,468	36,782	0	39,868	17,701	13,686	31,387	111%	8,481

Table 12. Year-by-Year Comparison of GHG Emissions With Oakland Power Plant
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2]	Project 2.0 Operational Emissions[2]	Construction Emissions	Net Project Emissions to Reduce or Offset	Reduction from Oakland Power Plant[3]	Reduction from TDM, TMP, EV Charging	Local Reductions (TMP + TDM + EV Charging + Oakland Power Plant)	% Local Reduction Measures	Remaining Emissions[4]
	MT CO_2e/year								%	MT CO_2e/year
2051	10,600	50,468	36,782	0	39,868	17,701	13,686	31,387	111%	8,481
2052	10,600	50,468	36,782	0	39,868	17,701	13,686	31,387	111%	8,481
2053	0	42,462	30,370	0	42,462	17,701	12,092	29,793	97%	12,669
2054	0	39,040	27,348	0	39,040	0	11,692	11,692	43%	27,348
2055	0	39,037	27,345	0	39,037	0	11,692	11,692	43%	27,345
2056	0	38,992	27,312	0	38,992	0	11,679	11,679	43%	27,312
2057	0	4,971	2,798	0	4,971	0	2,173	2,173	44%	2798
Total Gross Emissions (MT)	**317,998**	**1,646,649**	**1,220,299**	**30,577**	**1,359,228**	**520,655**	**426,351**	**947,006**	**99%**	**412,222**

Notes:

[1] Emissions decrease over time due to transportation and electricity (for both building energy use and water treatment and distribution) becoming cleaner. A linear interpolation is used to take into account decrease in electricity intensity factor due to Renewable Portfolio Standards. The decrease in vehicle emission factors over time is based on Alameda County fleet-average emission factors from 2020-2050. The estimate assumes no change after 2050, since EMFAC2017 does not project past 2050.

[2] Emissions assume all buildings become operational as soon as Phase is constructed, based on percent of operational land uses by Phase and percent of operation per year. The first calendar year is adjusted for partial operation based on start date and the last calendar year is adjusted for partial operation such that total lifetime for each land use sums to 30 years. A 30 year operation is also assumed for the Oakland Power Plant.

[3] Construction emissions associated with the conversion of the Oakland Power Plant are shown in 2022 and 2023. From 2024 to 2053, the emissions reduction from the Oakland Power Plant are presented each year as the combination of the direct emissions avoided (estimated from the shutdown of the peaker plant) and the indirect emissions avoided (estimated from the reduced need for fossil fueled plants due to increased grid stability provided by the battery storage system).

[4] The analysis presented here does not include anticipated additional reductions from Project features associated with LEED Gold design or from local air quality mitigation measures with GHG co-benefits. The Project is committed to achieving LEED Gold Standard, which requires projects to obtain points in the areas of Location & Transportation, Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation, and Regional Priority. Many of these measures, such as optimizing energy performance, demand response, and renewable energy production, would allow the Project to achieve further GHG reductions locally that are not captured in this analysis.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric ton
NPV - net present value
yr - year

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Table 13. Year-by-Year Comparison of GHG Emissions without Oakland Power Plant
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2]	Project 2.0 Operational Emissions[2]	Construction Emissions	Net Project Emissions to Reduce or Offset	Local Reductions (TMP + TDM + EV Charging)	Additional Local Reductions (Solar PV, No Residential NG)[3]	% Local Reduction Measures	Remaining Emissions[4]
	MT CO_2e/year							%	MT CO_2e/year
2020	0	0	0	333	333	0	0	--	333
2021	0	0	0	5,580	5,580	0	0	--	5,580
2022	0	0	0	5,939	5,939	0	0	--	5,939
2023	10,600	12,889	10,504	3,543	5,833	2,385	33	118%	3,448
2024	**10,600**	**24,490**	**19,578**	**3,572**	**17,462**	**4,912**	**402**	**48%**	**12,550**
2025	10,600	23,786	19,030	3,794	16,980	4,756	395	50%	12,224
2026	10,600	23,149	18,529	4,760	17,309	4,619	388	51%	12,689
2027	10,600	36,832	29,951	3,056	29,289	6,882	906	40%	22,407
2028	**10,600**	**64,390**	**48,510**	**0**	**53,790**	**15,880**	**1,940**	**45%**	**37,910**
2029	10,600	62,853	47,335	0	52,253	15,518	1,908	46%	36,735
2030	10,600	61,485	46,277	0	50,886	15,208	1,876	46%	35,677
2031	10,600	60,233	45,297	0	49,633	14,936	1,844	47%	34,697
2032	10,600	59,099	44,397	0	48,499	14,702	1,813	47%	33,797
2033	10,600	58,066	43,564	0	47,467	14,502	1,781	48%	32,965
2034	10,600	57,120	42,789	0	46,520	14,331	1,750	48%	32,189
2035	10,600	56,256	42,068	0	45,656	14,188	1,718	48%	31,468
2036	10,600	55,466	41,397	0	44,867	14,069	1,687	49%	30,797
2037	10,600	54,741	40,768	0	44,141	13,973	1,655	49%	30,168
2038	10,600	54,077	40,181	0	43,477	13,896	1,624	50%	29,581
2039	10,600	53,469	39,631	0	42,869	13,838	1,592	50%	29,031
2040	10,600	52,909	39,113	0	42,309	13,796	1,561	51%	28,513
2041	10,600	52,387	38,621	0	41,787	13,766	1,529	51%	28,021
2042	10,600	51,909	38,159	0	41,309	13,749	1,498	52%	27,559
2043	10,600	51,461	37,718	0	40,861	13,743	1,466	52%	27,118
2044	10,600	51,035	37,292	0	40,436	13,743	1,434	53%	26,692
2045	10,600	50,631	36,880	0	40,031	13,751	1,403	53%	26,280
2046	10,600	50,567	36,838	0	39,967	13,728	1,403	53%	26,238
2047	10,600	50,516	36,806	0	39,916	13,711	1,403	53%	26,206
2048	10,600	50,477	36,780	0	39,877	13,697	1,403	53%	26,180
2049	10,600	50,450	36,764	0	39,850	13,686	1,403	53%	26,164
2050	10,600	50,468	36,782	0	39,868	13,686	1,403	53%	26,182
2051	10,600	50,468	36,782	0	39,868	13,686	1,403	53%	26,182
2052	10,600	50,468	36,782	0	39,868	13,686	1,403	53%	26,182

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Table 13. Year-by-Year Comparison of GHG Emissions without Oakland Power Plant
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2]	Project 2.0 Operational Emissions[2]	Construction Emissions	Net Project Emissions to Reduce or Offset	Local Reductions (TMP + TDM + EV Charging)	Additional Local Reductions (Solar PV, No Residential NG)[3]	% Local Reduction Measures	Remaining Emissions[4]
	MT CO_2e/year							%	MT CO_2e/year
2053	0	42,462	30,370	0	42,462	12,092	1,383	44%	30,370
2054	0	39,040	27,348	0	39,040	11,692	1,150	47%	27,348
2055	0	39,037	27,345	0	39,037	11,692	1,150	47%	27,345
2056	0	38,992	27,312	0	38,992	11,679	1,150	47%	27,312
2057	0	4,971	2,798	0	4,971	2,173	770	59%	2,798
Total Gross Emissions (MT)	**317,998**	**1,646,649**	**1,220,299**	**30,577**	**1,359,228**	**426,351**	**47,625**	**50%**	**932,878**

Notes:

1. Emissions decrease over time due to transportation and electricity (for both building energy use and water treatment and distribution) becoming cleaner. A linear interpolation is used to take into account decrease in electricity intensity factor due to Renewable Portfolio Standards. The decrease in vehicle emission factors over time is based on Alameda County fleet-average emission factors from 2020-2050. The estimate assumes no change after 2050, since EMFAC2017 does not project past 2050.

2. Emissions assume all buildings become operational as soon as Phase is constructed, based on percent of operational land uses by Phase and percent of operation per year. The first calendar year is adjusted for partial operation based on start date and the last calendar year is adjusted for partial operation such that total lifetime for each land use sums to 30 years.

3. The avoided GHG emissions quantified under Additional Local Reductions show a potential path to the required 50% local reduction under AB734 should the OPP Variant not be implemented. These are not necessarily Project commitments and may not be necessary if the OPP Variant is implemented.

4. The analysis presented here does not include anticipated additional reductions from Project features associated with LEED Gold design or from local air quality mitigation measures with GHG co-benefits. The Project is committed to achieving LEED Gold Standard, which requires projects to obtain points in the areas of Location & Transportation, Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation, and Regional Priority. Many of these measures, such as optimizing energy performance, demand response, and renewable energy production, would allow the Project to achieve further GHG reductions locally that are not captured in this analysis.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric ton
NPV - net present value
yr - year

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Table OP-17B. Indirect Power Plant Green House Gas Emissions
Oakland Waterfront Ballpark District Project
Oakland, California

Electricity Provided by Battery Storage

Input	Units
90	MW battery capacity[1]
4	hours of maximum storage per day[1]
40%	Annual Average Charge Rate[2]
85%	Round Trip Efficiency[3]
45,068	MWh/yr Battery Electricity

CO_2e Intensity Factor per Total Non-Renewable Electricity[4]

Input	Units
444	lbs CO_2/MWh delivered
0.029	lbs CH_4/MWh delivered
0.0062	lbs N_2O/MWh delivered
446	lbs CO_2e/MWh delivered

Avoided Indirect GHG Emissions from Oakland Power Plant Conversion

Parameter	Average	Units
Indirect GHG Avoided[5]	9,129	MT CO_2e/year

Notes:

1. Battery energy storage system specifications are provided by the Project sponsor.
2. The annual average charge rate of the battery energy storage system is calculated based on the monthly curtailment of solar and wind renewable power sources from May 2014 through August 2019, as reported by the California Independent System Operator (CAISO 2019). The battery energy storage system is assumed to be fully charged using solar and wind power that would have otherwise been curtailed during peak curtailment months and proportionally lower charge rates during other months of the year. This is a conservative estimate as it is based on historical curtailment. As California increases solar and wind generation capacity, the battery energy storage system could potentially be fully charged even in the historically low-curtailment months.

   Monthly curtailment data available online at:
   http://www.caiso.com/informed/Pages/ManagingOversupply.aspx (Accessed: September 2019).
3. The battery round-trip efficiency is the fraction of energy put into the storage that can be retrieved, and is a combination of the charge efficiency and discharge efficiency of the storage bank. More details available at:
   https://www.homerenergy.com/products/pro/docs/latest/battery_roundtrip_efficiency.html
4. The CO_2 intensity factor presented here is calculated in Table OP-8. The CH_4 and N_2O intensity factors are consistent with the CalEEMod® version 2016.3.2. defaults for PGE.

Notes, Continued:

5. Battery energy storage systems have rapid response times and are more efficient compared to fossil-fueled peaker plants because they can store energy from renewable sources, which are often generated during off-peak demand periods and supply it back to the grid during peak demand periods. Thus, the installation of the energy storage system would result in a ramping down of existing fossil fueled peaker plants and/or eliminate the need for additional fossil fueled peaker plants to provide grid stability. The calculation assumes that the battery storage system is charged from renewable power sources such as solar and wind power generation during off-peak periods, based on average renewable curtailment rates from CAISO in the period from May 2014 through August 2019. The indirect GHG emissions presented here represent the avoided GHG emissions that would not occur across the grid as the battery energy storage system would provide improvements to grid reliability, promote the transition to more renewably sourced electricity, and eliminate the need for additional fossil fueled peaker plant operation.

Abbreviations:

CH_4 - methane
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
kg - kilogram
lb - pound
MT - metric ton
MWh - megawatt-hour
N_2O - nitrous oxide
PGE - Pacific Gas & Electric

Table OP-18. Power Plant Emissions Reduction
Oakland Waterfront Ballpark District Project
Oakland, California

Emissions Source	GHG Emissions[1] [MT/year] CO_2e
Direct Emissions from Oakland Power Plant Gas Turbines[2]	-8,076
Indirect Emissions from Increased Renewables	-9,129
Emergency Standby Diesel Engine	--
Wipe Cleaning[3]	--
Total Emissions	**-17,206**

Notes:

1. GHG emissions avoided are based on average historical operating conditions for facility from 2010-2018.
2. Gas turbine emissions based on average historical operating conditions for facility from 2010-2018.
3. Wipe cleaning emissions based on solvent evaporation rate and assume that 100% of solvent volatilizes.

Abbreviations:

CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
MT - metric ton

Table OP-19: Potential GHG Reductions from Rooftop Solar Photovoltaics
Oakland Waterfront Ballpark District Project
Oakland, California

Phase 1 Buildout

Rooftop Area for Solar PV[1]	Solar System Size[2]	Electricity Generation[2]
(m^2)	(kW)	(MWh/yr)
7,695	1,154	1,762

Full Project Buildout (2028)

Rooftop Area for Solar PV[1]	Solar System Size[2]	Electricity Generation[2]	CO_2e Emissions Reduction[3]
(m^2)	(kW)	(MWh/yr)	(MT CO_2e/yr)
36,385	5,458	8,329	771

Notes:

1. For the purpose of this calculation, it was assumed that 50% of the available rooftop space could be utilized for rooftop solar PV panels. Rooftop area was estimated from Project site plans.
2. Annual electricity generated is calculated using the National Renewable Energy Laboratory's PVWatts®, version 6. Input parameters are all defaults for Oakland, California, including a standard module type, fixed (roof mount) array type, system losses of 14.08%, tilt of 20 degrees, and azimuth of 180 degrees. Solar system size is calculated using the DC System Size for PVWatts: Size (kW) = Array Area (m^2) x 1 kW/m^2 x Module Efficiency (%), with a default module efficiency of 15%.
3. CO_2e emissions reductions assume that zero-carbon electricity replaces electricity otherwise supplied by PGE with the intensity factors shown in Table OP-3 for 2028.

Abbreviations:

CO_2e - carbon dioxide equivalents
m - meter
MT - metric ton(s)
MWh - megawatt-hour
PGE - Pacific Gas and Electric
PV - photovoltaic
kW - kilowatt
yr - year

References:

PVWatts. Available online at https://pvwatts.nrel.gov/pvwatts.php

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Table OP-20: Potential GHG Reductions from Replacing 50% of Residential Natural Gas Heating
Oakland Waterfront Ballpark District Project
Oakland, California

Emissions Avoided from No Natural Gas Usage for 50% of Units

Land Use Type	CO_2e Emissions Reductions[1] ($MT\ CO_2e/yr$)	
	Phase 1 Buildout	Full Buildout
Residential	126	698

Additional Electricity Use from Replacing Natural Gas and GHG Emissions if Using Grid Electricity Rather Than Zero-Carbon Electricity

Scenario	Electricity Use That Replaces Natural Gas Use[2] (MWh/yr)	Additional CO_2e Emissions[1] ($MT\ CO_2e/yr$)
Full Project Buildout (2028)	2,458	228

Notes:

1. This calculation shows the reduction in emissions from natural gas consumption for residential land uses. If replaced by zero-carbon electricity, this is the total reduction. If replaced by grid electricity, additional emissions will be added as shown in the bottom table. Natural gas emissions are from Table OP-3.
2. According to communication with Meyers+, it is assumed that about 40% of residential electricity usage should be added to account for heating.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric ton(s)
MWh - megawatt hours
yr - year

ATTACHMENT 2

Coliseum Events

Sources:
Colby Tucker, AEG
Gretchen Claffey, AEG
Dave Rinetti, VP Stadium Operations, Oakland A's
Jason Silva, Stadium Operations System Manager, Oakland A's

Super Cross – Annual (historically one per year, two planned for 2019)
Monster Jam – Annual (twice per year)
Gigantour – 09/08/2006
U2 – 06/07/2011
Beyond Wonderland -9/29/12 (held in parking lot)
Kenny Chesney and Tim McGraw – 07/15/2012
Super City 50 – 02/06/2016
Super City Summer – 08/19/2016
Green Day – 08/05/2017
State of Trance – 06/29/2019

Rolling Loud- 9/28/19 (held in parking lot)

ATTACHMENT 3

Table A. Treatment of Project Lifetimes from AB900 Applications
Oakland Athletics Howard Terminal Ballpark
Oakland, California

Project	Summary	Project Lifetime
2017092053 – 3333 California Street Project	mixed-use redevelopment of former UCSF campus.	30 year emissions from full buildout (2028-2057)
2019050019 – California Northstate University Medical Center Project	mixed-use expansion of facilities, medical college, hospital, dormitories, retail, parking	30 years from full buildout of final phase, (2030 through 2060)
2019080493 – Downtown West Mixed Use Plan	7.3 MSF mixed use commercial office/retail/hotel/event facility/housing units/parking	30-year emissions from full buildout per phase (final buildout 2030-2060)
2018102028 – Balboa Reservoir	17.6 acres of mixed-income housing, open space, childcare facilities, retail space	30 year emissions from full buildout (2027-2057)
2017051079 – Hollywood & Wilcox Mixed-Use Project	mixed-use development project; 260 multifamily DUs; 11 ksf Retail; 3.6 ksf Office; 3.2 ksf Restaurant	30-year emissions from full buildout (2023- 2053)
2018021056 – Inglewood Basketball and Entertainment Center	New sports arena and offices for LA Clippers to replace Staples Center	30 year emissions from full buildout (July 2024 - 2054)
2017112005 – Potrero Power Station Mixed-use Project	5.4 MSF residential/commercial/entertainment use.	30 year emissions calculated from start of construction; (2020-2050); full buildout is 2034. Project never exceeds existing emissions.
2018051002 – Hollywood Center Project	Mixed-use development on existing parking & rental car & Capitol Records buildings.	30 year emissions from full buildout (2027-2056); cites SCAQMD 2008 for 30-year project life
2017121047 – 1045 Olive Street Project	Mixed-use development on existing commercial buildings & parking	30 year emissions from full buildout (2023-2052)
2017072018 – 10 Van Ness Avenue Mixed-Use Project	Mixed use residential building on existing auto dealership/service center	30 year emissions from full buildout (2022-2052)
2015111073 – 6220 West Yucca Project	Mixed use development on existing residential	30 year emissions from full buildout (2021-2050)
2015101073 – Crossroads Hollywood	Mixed use development on existing residential and commercial/retail/office space while preserving the Crossroads of the World historic site.	References emissions beyond full buildout year being the same as full buildout. 30-year lifetime from 2022
2015061061 – Qualcomm Stadium Reconstruction Project	San Diego Chargers stadium design	15 year emissions from full buildout (2020-2035)
2014112045 – Event Center and Mixed-Use Development at Mission Bay Blocks	Golden State Warriors stadium & other land uses on current parking lots	18 year emissions from full buildout (2017 - 2035)
2014011087 – 8150 Sunset Boulevard	Mixed-use development on existing commercial buildings	8 year emissions (2017-2025)
2013011007 – Soitec Solar Energy Project	Currently undeveloped land	construction emissions are ammortized over 30 years but operational emissions are just given annually
2011082055 – Apple Campus 2	New Apple Campus redeveloping former HP campus.	4 year emissions (2016 - 2020)
2012011019 – McCoy Solar Energy Project	Currently undeveloped land	construction emissions are ammortized over 30 years but operational emissions are just given annually

tes:

Details from California Governor's Office of Planning and Research. Available at: http://opr.ca.gov/ceqa/california-jobs.html. Accessed: October, 2019.

ATTACHMENT 4

FEHR PEERS

Memorandum

Date: November 1, 2019

To: Noah Rosen, Oakland Athletics

From: Rob Rees, Fehr & Peers

Subject: Truck Delay Clarifications to Oakland A's AB 734 Application

OK16-0125.05

Following is Fehr & Peers clarification about the potential delays (and therefore potential additional emissions due to delays) from relocating trucks from Howard Terminal to other locations. Truck delay and emissions are already included in the AB734 analysis. The intersection delay and truck volumes in the Fehr & Peers memorandum were based on traffic data collected in September 2018 at several intersections near the Adeline and Market Street corridors adjacent to the Port and Howard Terminal, respectively. The data was collected on a weekday from 3 to 8 PM and included vehicles to and from the existing Howard Terminal operations including gate transactions. The analysis was completed for the Existing Conditions based on the collected data.

Then Fehr & Peers conducted a Future Conditions analysis including the existing traffic, buildout of the non-ballpark commercial and residential development at Howard Terminal, and redistributed vehicle trips from the existing Howard Terminal to the Port. The Port Staff requested in the transportation modeling, that all existing Howard Terminal-related traffic be redistributed to the Seaport access including Adeline, 7th, and Maritime Streets. While it cannot be known for certain where the Howard Terminal activities will be relocated, several of the Howard Terminal tenants were relocated to Howard Terminal from other Port properties. Thus, the analysis carries this assumption forward that the uses will be relocated to other Port properties after Howard Terminal site is redeveloped.

The Future Conditions also included recommended roadway and intersection improvements to be installed with the development. The road and intersection improvements include additional lanes on Adeline Street serving the Port as well as improved lane designations at the I-880 Off-Ramp at Union Street and 5th Street connecting the off-ramp to Adeline Street. These roadway changes will reduce the existing delay experienced by truck drivers today who use the Adeline Street Port access. In addition, the intersections on Adeline Street, Market Street, and Martin Luther King Jr Way would all be upgraded to meet current City Standards including the latest traffic signal timing / coordination technologies. With these recommended roadway and intersection changes day-to-day traffic operations would improve at some intersections even with the added traffic from the development.

ATTACHMENT 5

Eric Cherniss
Sr. Director, Corporate Development & Strategy

6555 Sierra Dr.
Irving, TX 75039
(669) 216-7312
Email: eric.cherniss@vistraenergy.com

October 28, 2019

California Air Resources Board
Attn: Shannon Hatcher
1001 I Street
Sacramento, California 95814

Dear Mr. Hatcher,

The Oakland Athletics (the "Oakland A's") have requested we provide an update on the status of the Oakland Power Plant (the "OPP"). This letter provides further clarification to our original letter dated July 31, 2019 describing the proposed conversion of the OPP to a battery energy by Vistra Energy ("Vistra").

First, we would like to confirm that the OPP continues to operate and generate power supporting local reliability in the East Bay. In the most recent PG&E blackouts we saw demand for the OPP increase significantly. It appears that in the month of October the OPP has been called upon more than in each of the previous two years demonstrating an increased reliance on the plant. In addition, the California ISO just renewed the Reliability Must Run ("RMR") Agreement for the plant through the end of 2020. As you may recall RMR contracts are entered into as a way to ensure there is enough on-hand generation to satisfy local reliability needs, especially during heat waves and now it appears to help with grid stability in the event of blackouts. The renewal letter is attached as Attachment A to this letter.

Second, we would like to confirm that there are no legal requirements or mandates requiring the conversion of the plant to battery energy storage. As discussed in the July 31 letter, there have been aspirations to either repower or shutdown the plant in the past, but none of these endeavors have come to fruition. In fact, the owners of the OPP have sought to retire the facility since 1998 and at that time were prevented from retiring the facility by the California ISO through the newly created RMR process. The facility has been renewed under a RMR agreement each year for the last 20 years. The OPP has remained a RMR facility because the California ISO and PG&E have found no other economic way of retiring or repowering the plant. We expect the California ISO will continue to extend the contract through 2022 but have no assurance that it will not extend the RMR contract further. As we explained in the July 31 letter, the plant could remain in service in its current form for many years to come without modification. There are no legal prohibitions precluding the continued renewal of the RMR agreements, nor are there any legal mandates requiring the conversion of the power plant to battery energy storage.

Third, we would like to reiterate a point made in the July 31 letter that if the transactions contemplated with the Oakland A's come to fruition then no party other than the Oakland A's will seek or obtain GHG credits for the conversion.

Finally, we believe it would be helpful to CARB to better understanding of the events leading up to the announcements of the East Bay Community Energy (ECBE) contract with the OPP and how the Oakland A's were integral in achieving such an outcome.

- Oakland A's and Vistra agree to a partnership around the OPP – May 2018
- Oakland A's send PG&E a formal letter supporting the OPP conversion – June 2018
- Vistra responds to PG&E and East Bay Community Energy RFO – June 2018
- Vistra issues a letter granting the Oakland A's authorization to include the OPP in the environmental review of the Oakland Waterfront Ballpark District- November 2018
- Vistra and the Oakland A's sign indicative letter of interest for a real estate transaction and energy management agreement – November 2018
- EBCE approves energy storage contract with Vistra for a new battery energy storage project at the OPP site – June 2019

The contract entered into with ECBE represents a portion of the proposed battery storage facility capacity. The remaining portion of the facility's products have not yet been contracted. Without additional procurement above and beyond the EBCE contract the existing units could remain online in parallel with the new battery facility. The proposed transactions with the Oakland A's, combined with the EBCE contract have helped to secure sufficient demand for a battery storage facility to make the proposed conversion project feasible. The parties involved understand that there are still risks to achieving conversion and are working collaboratively to make this project a success.

Please let us know if we can provide any further details or clarification.

Sincerely,

Eric Cherniss

Eric Cherniss
Sr. Director, Corporate Development & Strategy

APPENDIX E
THIRD SUPPLEMENTAL MEMO

RAMBOLL

ENVIRONMENT
& HEALTH

MEMORANDUM

To: **Shannon Hatcher**
California Air Resources Board
Shannon.Hatcher@arb.ca.gov

From: **Michael Keinath, PE**

Subject: **Emissions Reductions Pathways to AB734 Compliance**
Oakland Waterfront Ballpark District Project

March 10, 2020

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1. INTRODUCTION

The purpose of this document is to provide additional support and emissions calculations showing how the Oakland Athletics ("A's") could achieve no net new greenhouse gas (GHG) emissions and meet their 50% local reduction target for the Oakland Waterfront Ballpark District Project ("Project") Assembly Bill 734 (AB734) application. This submittal addresses the approach outlined in the February 28, 2020 letter from Oakland Mayor Libby Schaaf to Mr. Richard Corey of the California Air Resources Board (ARB), a copy of which is attached for your convenience and commits the A's to be responsible to provide offsets for each backfill event in excess of the rounded historic average of four events per year.

The calculation of operational GHG emissions for the ballpark component of the Howard Terminal Project will assume, as set forth in the A's Application, that GHG emissions from ballgames will be the same whether occurring at the Coliseum or Howard Terminal because team performance drives attendance. This yields a baseline assumption of no net additional ballpark operational GHG emissions from A's ballgames. Additional GHG emissions from the backfilled events will be measured and added to the operational GHG emissions for the ballpark component of the Howard Terminal Project in accordance with the following:

> The City of Oakland (the "City"), as the lead agency, will require the Oakland A's to submit for its review and approval, an annual report to the City documenting the number of events, including information regarding the number of attendees of such events, held in the immediately preceding year at the existing Oakland Coliseum and its surrounding parking lot (the "Coliseum") (the "Annual Event Report"). The Annual Event Report shall be submitted to the City commencing twelve (12) months following the opening day of the new ballpark at the Howard Terminal Project until the earlier of: the closing or demolition of the Coliseum or thirty (30) years.

Currently the Coliseum averages approximately four (4) non-A's, non-Raiders events per year. As such, the Annual Event Report will document all events at the Coliseum above the existing four (4) total events (the "Additional Events"). The total attendance for the Additional Events will be the average attendance at all events at the Coliseum times the total number of events minus the four existing events:

$$Additional\ Event\ Attendance = \left[\frac{Total\ Attendance\ for\ All\ Events}{Total\ Number\ of\ Events}\right] \times [(Total\ Number\ of\ Events) - 4]$$

The intensity of emissions associated with each attendee will be calculated by applying the average attendee emission factor from the existing A's games:

$$Additional\ Event\ Emissions\ Factor = \frac{10{,}600\ MT\ CO2e}{82\ games\ \times 35{,}000\ attendees} = 0.0037\ \frac{MT\ CO2e}{attendee\ \cdot\ event}$$

The total quantity of GHG emissions associated with the Additional Events will be calculated by multiplying the additional event attendance by the additional event emissions factor:

$$Additional\ Event\ GHG\ Emissions\ = 0.0037\ \frac{MT\ CO2e}{attendee\ \cdot\ event} \times Additional\ Event\ Attendance$$

If the Annual Event Report documents that in the prior year there were Additional Events, the report will include the Additional Event GHG Emissions, as calculated above.[1]

Upon the City's review and approval of the Annual Event Report, the City shall require the Oakland A's to offset the Additional Event GHG Emissions such that the operational GHG emissions from the ballpark will continue to be no net additional emissions and that the Project maintains its compliance with the requirement that no less than fifty percent (50%) of non-residential operational GHG emissions are offset through project design features, onsite reduction measures, or offsite reduction measures in the neighboring communities (collectively, the "Local Reduction Measures"). To the extent Local Reduction Measures are required, implementation of such measures shall be required to commence as soon as feasibly possible and the A's shall enter into contracts for the purchase of additional offsets (if any necessary) no later than six months after the City's review and approval of the Annual Event Report. If the implementation of Local Reduction Measures cause the Project to exceed the requirements of AB 734, then any excess offsets can be applied against future GHG Emission reduction requirements, including, without limitation, those resulting from future Additional Events. The A's shall document compliance with the Additional Events obligations in subsequent Annual Event Reports.

To ensure the implementation of the Local Reduction Measures associated with the Additional Events, the project applicant agrees to fund an escrow account for the amount required to

[1] If, in any given year, the number of Additional Events exceeds 82, which reflects more than 86 total events at the Coliseum, then the Additional Event GHG Emissions shall be calculated by (Average Event Attendance) x (0.0037 MT CO2e/attendee event) x (82 events).

mitigate the emissions associated with 43 Additional Events. The amount to be provided is $290,910, based on the following:

Additional Events	43
Attendance	35,000
Emission Factor (MT CO_2e/attendee/event)	0.0037
Total Emissions (MT CO_2e)	5,558
Local Direct Reductions Required (MT CO_2e)	2,779
Approximate Cost for Local Direct Reduction[2] ($/MT CO_2e)	$86.61
Local Direct Reduction Cost	**$241,156**
Offsets Required (MT CO_2e)	2,779
Cost for Offsets[3] ($/MT CO_2e)	$17.87
Offset Cost	**$8,337**
Total Cost	**$290,910**

The escrow account would be funded prior to the issuance of the Temporary Certificate of Occupancy for the new Howard Terminal ballpark if, and when, the A' leave the Coliseum for a new ballpark at Howard Terminal. The escrow account will be terminated upon the earlier of (a) demolition of the Coliseum or (b) 30-years of Project operation.

Prior to this update, Ramboll showed that implementation of the Oakland Power Plant (OPP) variant would surpass the 50% local reduction required by AB734 assuming activity at the Coliseum stadium would end when the A's moved to the new stadium in 2023. For purposes of demonstrating that this reduction measure could be achieved without OPP and with any amount of backfill, we have provided updates to our emissions inventory and a menu of potential reductions to ensure that no less than 50% of net new non-residential emissions will be reduced locally.

Unless specified below, methodology and assumptions in these updates are consistent with the previous AB734 application update submitted on October 29, 2019. Only tables that have been added and key summary tables with values that have updated since the previous application are included.

2. IMPLEMENTATION

The following information is not new and has been submitted to ARB and discussed previously. It is reiterated below to provide a clarification as to how construction emissions are to be mitigated in light of recent clarifications by ARB on its understanding of the requirements of AB 734.

The Project will be constructed in phases or sub-phases, as market conditions dictate. Local Reduction Measures shall include project design features, on-site reduction measures and off-site reduction measures in neighboring communities (if any) (collectively, "Local Reduction Measures"). "Required

[2] See Section 4 for the derivation of the approximate cost for a local direct reduction.

[3] According to *Financing Emissions Reductions for the Future: State of the Voluntary Carbon Markets 2019* from Ecosystem Marketplace (hubs.ly/H0m5qf60), in 2018, a total of $295.7 million was spent purchasing 98.4 million MT CO_2e, indicating, on average, the cost of a voluntary offset is approximately $3. However, this may underestimate as many of these offsets may not have been from an ARB accredited offset registry. Unfortunately, those registries do not release transaction and costs data. As a conservative measure, we assume that the cost of a voluntary offset would not exceed the cost of an AB 32 Cap-and-Trade compliance allowance, which was $17.87 as of the February 2020 Joint Auction #22 (https://ww3.arb.ca.gov/cc/capandtrade/auction/results_summary.pdf).

Local Reduction Measures" shall be those Local Reduction Measures required to meet the obligations set forth in AB 734 pertaining to non-residential emissions.

Construction Emissions for horizontal development will be calculated and required contracts for purchase of offsets accounting for not more than 50% of non-residential horizontal construction emissions and the requisite amount of residential horizontal construction emissions shall be entered into no later than the issuance of a grading permit for each construction phase or subphase. Local Reduction Measures for 50% of non-residential horizontal construction emissions will be identified by the issuance of the first building permit for the first vertical building in the applicable phase and shall be implemented by the end of the applicable phase that encompasses those construction emissions.

Operational Emissions and vertical building construction emissions from non-residential buildings will be calculated based on the projected 30-year useful life for that building and any Required Local Reduction Measures will be identified and/or contracts for purchase of offsets entered into no later than the issuance of a temporary certificate of occupancy for each non-residential building in that phase or subphase. Operational Emissions and vertical construction emissions from residential buildings will be calculated based on the projected 30-year useful life of that building, including the calculation of the contribution such residential buildings make (if any) to Required Local Reduction Measures. Contracts for the purchase of requisite offsets shall be entered into no later than the issuance of a temporary certificate of occupancy for each residential building in that phase or subphase.

Prior to the issuance of a building permit for the first vertical building in the final phase of the Project, a calculation of total Project emissions from all sources (residential and non-residential, horizontal and vertical construction) including projected emissions from the proposed final phase shall be provided. In addition, a calculation of all Local Offset Measures and all offsets purchased to date for the total Project (excluding the proposed final phase) shall be provided. If the purchase of offsets would exceed 50% of the projected total Project emissions, then the Local Offset Measures identified for implementation in the final phase must be sufficient to reduce the total offset purchases to 50% or less of the total Project emissions. Any Required Local Reduction Measures identified in the calculations shall be implemented no later than the temporary certificate of occupancy of the final vertical building of the final phase of the Project unless: (i) calculations demonstrate that the obligations set forth in AB 734 pertaining to non-residential emissions have been achieved for the Project; or (ii) equivalent Local Reduction Measures have been provided; or (iii) equivalent monies have been escrowed by the issuance of the temporary certificate of occupancy of the final vertical building in the final phase of the Project to fund a Local Reduction Measure project.

In calculating the construction and operational emissions, the Oakland A's will provide to the City or the Port calculations and related evidence demonstrating compliance with AB 734, including at the time the calculations are required as set forth above, identifying the Local Reduction Measures that have been or will be implemented by the completion of the Project, as well as contracts for the purchase of offsets from projects. As provided in AB 734, the A's shall, to the extent feasible, place the highest priority on the purchase of offsets that produce emission reductions within the City of Oakland or the boundaries of the Bay Area Air Quality Management District. Any offset credits shall be verified by a third party accredited by the ARB and in no event shall offset credits be used from a project located outside the United States.

3. UPDATES TO EMISSION INVENTORY INPUTS

As stated above, the emissions inventory was updated in this memorandum in response to ARB's recent feedback regarding construction emissions, as well as to show that the Project would meet the 50% local reduction measure and ARB's interpretation of the 50% offset cap if the OPP variant is not

implemented. The following updates were made:

- **Construction Assumptions**: In this update, it is assumed that emissions from the construction of non-residential land uses would be included in the calculation of non-residential emissions that need to be 50% reduced locally. The emissions calculations have not been changed since the previous submittal, but the inclusion of those emissions in the local reduction calculation is new.
- **EV Charging Assumptions**: This analysis reverts back to a prior submission dated August 26, 2019 which assumes that 10% of parking spaces across all land uses on the Project site would have EV chargers.

These updates have been incorporated in the revised **Tables 12** and **13**. The revised tables show two potential paths to the 50% local reduction target/50% offset cap assuming no Additional Events occur at the Coliseum: **Table 12** shows a path assuming implementation of the OPP Variant and **Table 13** shows a path assuming the OPP Variant is not implemented.

The Project would result in 977,521 MT CO_2e of net new non-residential project emissions over a 30-year lifetime. The Project has committed to a TDM/TMP plan and installation of EV chargers at 10% of Project parking spaces, which reduces emissions over 30 years by 395,717 MT CO_2e. The potential path to the 50% local reduction presented in **Table 12** incorporates the OPP Variant, which accounts for a reduction of 520,655 MT CO_2e. The potential path to the 50% local reduction presented in **Table 13** incorporates electrification of 50% of residential units and the installation of 751 off-site residential EV chargers in the local community. These local reductions account for 18,582 and 265,565 MT CO_2e, respectively.

4. POTENTIAL TO REDUCE EMISSIONS LOCALLY

Table 14 and the text below shows the estimated emissions per attendee per Additional Event and summarizes the local, direct reductions that the A's could implement, as needed, to meet the AB734 requirements. Emissions are provided in relative units; all emissions reductions shown here can be scaled linearly based on the units in the table, except for reduced on-site parking. Each emissions reduction is categorized as either on-site or off-site based on its location. Below is a brief description of each potential reduction.

Potential On-Site Reductions

Depending on the status of the OPP variant and Coliseum stadium backfill, the A's could choose to do any number of potential on-site reductions. Each of these reductions is shown in **Table 14**. Consistent with the Project emissions inventory, each on-site reduction is assumed to have a 30-year lifetime.

- **On-site Solar Panels:** this estimates the emissions reduction associated with on-site generation of renewable electricity, as shown in Table OP-19 that was included in the October 2019 submittal. This reduction assumes a 30-year lifetime for the solar panels beginning in 2023.
- **No Natural Gas for Residential Units:** this estimates the reduction in emissions from natural gas consumption by assuming that natural gas usage from a single Project residential unit is replaced by grid electricity, as shown in Table OP-20 that was included in the October 2019 submittal. It is assumed that the all-electric residences have a 40% higher kilowatt-hour usage compared to buildings with natural gas domestic hot water, space heating and appliances, as estimated by Meyers+ Engineers. The cost of this on-site reduction would be due to the additional electricity charges for the residential units. However, since tenants are responsible for costs associated with their own electricity usage, there is no cost associated with this reduction for the A's.

- **On-site Waste Diversion**: this estimates the reduction associated with each ton of waste diverted, using the CO_2e emission factor estimated in Table OP-5 that was included in the October 2019 submittal.
- **Reduced On-site Parking**: this estimates the reduction in emissions associated with fewer mobile trips to the Project site due to reduced parking spaces on-site. The methodology is consistent with that shown in Table OP-2, with trips and mileage-based estimates provided by Fehr & Peers.[4]

Potential Off-Site Reductions

In addition to the various on-site reductions that the A's could do, the A's could install off-site neighborhood EV chargers to reduce emissions locally. Unlike on-site EV chargers, off-site EV chargers are assumed to have a lifetime of 10 years. Details are shown in **Table 14**.

- **Off-site Neighborhood EV Chargers**: this estimates the reduction in GHG emissions associated with the installation of an EV charger in a local off-site residential community. This reduction is quantified in new Table OP-22. The lifetime emissions reduction associated with off-site EV chargers is 127 MT CO_2e per charger. The average cost for a Level 2 EV charger is ~$3,000, with a range from $400 to $6,500 per charger.[5,6] Installation costs are roughly $4,000 - $4,500 in the California markets studied (San Francisco, Los Angeles and San Diego), as compared to the average cost throughout the United States of ~$3,100.[7] Assuming the total cost of a charger for equipment and installation in California are in the $7,000 (California average) to $11,000 (California high-end) range, the resulting in a cost per metric ton between $55.12 to $86.61 per MT CO_2e.

This assumption is reasonable, as 43 Additional Events with 35,000 attendees could reasonably be offset by the installation of 22 local community EV chargers. To be conservative, the $86.61/MT CO_2e high-end estimate for EV chargers was increased in case any of the higher cost off-site reductions are implemented instead.

[4] Based on communication with Fehr & Peers on February 12, 2020, for every 500 on-site parking spaces removed from the project design, there would be 540 fewer trips for large events and concerts, 10,320 fewer miles travelled for weekday games, 10,920 fewer miles traveled for weekend games, and 8,890 fewer miles traveled for concerts. This reduction is capped at 2,000 spaces.

[5] National Renewable Energy Laboratory. 2019. Best Practices for Electric Vehicle Supply Equipment Installations in the National Parks. Golden, CO:. NREL/TP-5400-74806. Available at: www.nrel.gov/docs/fy20osti/74806.pdf.

[6] New West Technologies, LLC. 2015. Costs Associated with Non-Residential Electric Vehicle Supply Equipment. Prepared for the U.S. Department of Energy Vehicle Technologies Office. DOE/EE-1289. Available at: afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf.

[7] Idaho National Laboratory. 2015. How do Publicly Accessible Charging Infrastructure Installation Costs Vary by Geographic Location? INL/MIS-15-35319. Available at: avt.inl.gov/sites/default/files/pdf/EVProj/HowDoPubliclyAccessibleInfrastructureInstallationCostsVaryByGeographicLocation.pdf.

Table 12. Year-by-Year Comparison of GHG Emissions with Oakland Power Plant
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2,6]	Project 2.0 Operational Emissions[2,6]	Construction Emissions	Non-Residential Construction Emissions	Net New Emissions			Direct Local Reductions			
						Non-Residential Emissions[4]	Residential Emissions[4]	Total Emissions to Reduce or Offset[3,6]	Required Direct Local Offsets (50% of Non-Residential)	TMP + TDM + Onsite EV Charging[5]	Peaker Power Plant	Total Direct Local Reductions
	MT CO_2e/year											
2020	0	0	0	333	245	245	87	333	123	0	0	0
2021	0	0	0	5,580	4,359	4,359	1,220	5,580	2,180	0	0	0
2022	0	0	0	5,939	4,645	4,645	1,294	5,939	2,322	0	-185	-185
2023	-10,600	12,889	10,504	3,543	2,686	4,738	1,094	5,833	2,369	2,385	-34	2,351
2024	**-10,600**	**24,490**	**19,740**	**3,572**	**2,103**	**13,121**	**4,341**	**17,462**	**6,561**	**4,750**	**16,775**	**21,525**
2025	-10,600	23,786	19,186	3,793	2,228	12,615	4,365	16,980	6,307	4,600	16,819	21,419
2026	-10,600	23,149	18,681	4,760	2,794	12,608	4,700	17,308	6,304	4,468	16,864	21,331
2027	-10,600	36,832	30,098	3,056	1,793	21,353	7,935	29,288	10,677	6,734	16,908	23,642
2028	**-10,600**	**64,390**	**49,614**	**0**	**0**	**39,260**	**14,530**	**53,790**	**19,630**	**14,776**	**16,953**	**31,729**
2029	-10,600	62,853	48,415	0	0	38,046	14,207	52,253	19,023	14,438	16,997	31,435
2030	-10,600	61,485	47,337	0	0	36,966	13,920	50,886	18,483	14,148	17,042	31,190
2031	-10,600	60,233	46,340	0	0	35,977	13,656	49,633	17,988	13,893	17,086	30,979
2032	-10,600	59,099	45,425	0	0	35,082	13,417	48,499	17,541	13,674	17,130	30,804
2033	-10,600	58,066	44,581	0	0	34,267	13,199	47,467	17,134	13,485	17,174	30,659
2034	-10,600	57,120	43,796	0	0	33,522	12,998	46,520	16,761	13,324	17,218	30,541
2035	-10,600	56,256	43,069	0	0	32,842	12,814	45,656	16,421	13,187	17,262	30,449
2036	-10,600	55,466	42,393	0	0	32,221	12,645	44,867	16,111	13,074	17,306	30,380
2037	-10,600	54,741	41,760	0	0	31,651	12,489	44,141	15,826	12,980	17,350	30,330
2038	-10,600	54,077	41,171	0	0	31,131	12,346	43,477	15,566	12,906	17,394	30,300
2039	-10,600	53,469	40,621	0	0	30,655	12,214	42,869	15,327	12,848	17,438	30,286
2040	-10,600	52,909	40,104	0	0	30,216	12,093	42,309	15,108	12,805	17,482	30,286
2041	-10,600	52,387	39,614	0	0	29,809	11,978	41,787	14,904	12,773	17,526	30,298
2042	-10,600	51,909	39,155	0	0	29,435	11,874	41,309	14,717	12,754	17,569	30,323
2043	-10,600	51,461	38,718	0	0	29,085	11,776	40,861	14,543	12,743	17,613	30,357
2044	-10,600	51,035	38,296	0	0	28,754	11,682	40,436	14,377	12,740	17,657	30,397
2045	-10,600	50,631	37,888	0	0	28,438	11,593	40,031	14,219	12,743	17,701	30,444
2046	-10,600	50,567	37,845	0	0	28,387	11,580	39,967	14,194	12,722	17,701	30,424
2047	-10,600	50,516	37,810	0	0	28,347	11,570	39,916	14,173	12,706	17,701	30,407
2048	-10,600	50,477	37,783	0	0	28,315	11,562	39,877	14,157	12,693	17,701	30,395
2049	-10,600	50,450	37,766	0	0	28,293	11,557	39,850	14,146	12,684	17,701	30,385

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Table 12. Year-by-Year Comparison of GHG Emissions with Oakland Power Plant
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2,6]	Project 2.0 Operational Emissions[2,6]	Construction Emissions	Non-Residential Construction Emissions	Net New Emissions			Direct Local Reductions			
						Non-Residential Emissions[4]	Residential Emissions[4]	Total Emissions to Reduce or Offset[3,6]	Required Direct Local Offsets (50% of Non-Residential)	TMP + TDM + Onsite EV Charging[5]	Peaker Power Plant	Total Direct Local Reductions
	MT CO_2e/year											
2050	-10,600	50,468	37,784	0	0	28,305	11,563	39,868	14,152	12,684	17,701	30,385
2051	-10,600	50,468	37,784	0	0	28,305	11,563	39,868	14,152	12,684	17,701	30,385
2052	-10,600	50,468	37,784	0	0	28,305	11,563	39,868	14,152	12,684	17,701	30,385
2053	0	42,462	31,370	0	0	30,872	11,590	42,462	15,436	11,091	17,701	28,793
2054	0	39,040	28,336	0	0	27,468	11,572	39,040	13,734	10,704	0	10,704
2055	0	39,037	28,333	0	0	27,465	11,572	39,037	13,733	10,704	0	10,704
2056	0	38,992	28,300	0	0	27,465	11,527	38,992	13,733	10,692	0	10,692
2057	0	4,971	3,530	0	0	4,951	20	4,971	2,476	1,441	0	1,441
Total	**-317,998**	**1,646,649**	**1,250,933**	**30,576**	**20,854**	**977,521**	**381,707**	**1,359,227**	**488,760**	**395,717**	**520,655**	**916,372**
Maximum Allowable Offset Credits[7] (50% of Total Emissions)								**679,614**	**% Local Reduction Measures**			**94%**

Notes:

1. Emissions decrease over time due to transportation and electricity (for both building energy use and water treatment and distribution) becoming cleaner. A linear interpolation is used to take into account decrease in electricity intensity factor due to Renewable Portfolio Standards. The decrease in vehicle emission factors over time is based on Alameda County fleet-average emission factors from 2020-2050. The estimate assumes no change after 2050, since EMFAC2017 does not project past 2050.
2. Emissions assume all buildings become operational as soon as Phase is constructed, based on percent of operational land uses by Phase and percent of operation per year. The first calendar year is adjusted for partial operation based on start date and the last calendar year is adjusted for partial operation such that total lifetime for each land use sums to 30 years.
3. Net new emissions to reduce or offset include Existing Conditions Emissions, Project 1.0 Operational Emissions, Construction Emissions, and Backfill.
4. Net new non-residential emissions include Existing Conditions Emissions, Project 1.0 Non-Residential Operational Emissions, and Backfill. A portion of the construction emissions corresponding to the percent of building square footage that is non-residential was included. The remainder of emissions are considered residential.
5. This analysis assumes that 10% of onsite parking spaces will be equipped with an EV charger.
6. The analysis presented here does not include anticipated additional reductions from Project features associated with LEED Gold design or from local air quality mitigation measures with GHG co-benefits. The Project is committed to achieving LEED Gold Standard, which requires projects to obtain points in the areas of Location & Transportation, Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation, and Regional Priority. Many of these measures, such as optimizing energy performance, demand response, and renewable energy production, would allow the Project to achieve further GHG reductions locally that are not captured in this analysis.
7. Per CARB's interpretation of AB734, up to 50% of the total net new emissions for the Project can be reduced with offset credits on the carbon market.

Abbreviations:

CO_2e - carbon dioxide equivalents
MT - metric ton
NPV - net present value
yr - year

Table 13. Year-by-Year Comparison of GHG Emissions without Oakland Power Plant
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2,7]	Project 2.0 Operational Emissions[2,7]	Construction Emissions	Non-Residential Construction Emissions	Net New Emissions			Direct Local Reductions[6]				
						Non-Residential Emissions[4]	Residential Emissions[4]	Total Emissions to Reduce or Offset[3,7]	Required Direct Local Offsets (50% of Non-Residential)	TMP + TDM + Onsite EV Charging[5]	Electrification of 50% of Residential Units	751 Offsite Neighborhood EVCS	Total Direct Local Reductions
	MT CO_2e/year												
2020	0	0	0	333	245	245	87	333	123	0	0	0	0
2021	0	0	0	5,580	4,359	4,359	1,220	5,580	2,180	0	0	0	0
2022	0	0	0	5,939	4,645	4,645	1,294	5,939	2,322	0	0	0	0
2023	-10,600	12,889	10,504	3,543	2,686	4,738	1,094	5,833	2,369	2,385	5.9	10,626	13,017
2024	**-10,600**	**24,490**	**19,740**	**3,572**	**2,103**	**13,121**	**4,341**	**17,462**	**6,561**	**4,750**	**75**	**10,318**	**15,143**
2025	-10,600	23,786	19,186	3,793	2,228	12,615	4,365	16,980	6,307	4,600	77	10,014	14,691
2026	-10,600	23,149	18,681	4,760	2,794	12,608	4,700	17,308	6,304	4,468	80	9,744	14,291
2027	-10,600	36,832	30,098	3,056	1,793	21,353	7,935	29,288	10,677	6,734	206	9,504	16,445
2028	**-10,600**	**64,390**	**49,614**	**0**	**0**	**39,260**	**14,530**	**53,790**	**19,630**	**14,776**	**471**	**9,295**	**24,542**
2029	-10,600	62,853	48,415	0	0	38,046	14,207	52,253	19,023	14,438	484	9,115	24,036
2030	-10,600	61,485	47,337	0	0	36,966	13,920	50,886	18,483	14,148	497	8,960	23,606
2031	-10,600	60,233	46,340	0	0	35,977	13,656	49,633	17,988	13,893	510	8,829	23,233
2032	-10,600	59,099	45,425	0	0	35,082	13,417	48,499	17,541	13,674	524	8,721	22,918
2033	-10,600	58,066	44,581	0	0	34,267	13,199	47,467	17,134	13,485	537	8,633	22,655
2034	-10,600	57,120	43,796	0	0	33,522	12,998	46,520	16,761	13,324	550	8,563	22,437
2035	-10,600	56,256	43,069	0	0	32,842	12,814	45,656	16,421	13,187	563	8,511	22,261
2036	-10,600	55,466	42,393	0	0	32,221	12,645	44,867	16,111	13,074	576	8,473	22,124
2037	-10,600	54,741	41,760	0	0	31,651	12,489	44,141	15,826	12,980	590	8,450	22,020
2038	-10,600	54,077	41,171	0	0	31,131	12,346	43,477	15,566	12,906	603	8,439	21,948
2039	-10,600	53,469	40,621	0	0	30,655	12,214	42,869	15,327	12,848	616	8,439	21,903
2040	-10,600	52,909	40,104	0	0	30,216	12,093	42,309	15,108	12,805	629	8,448	21,882
2041	-10,600	52,387	39,614	0	0	29,809	11,978	41,787	14,904	12,773	642	8,466	21,881
2042	-10,600	51,909	39,155	0	0	29,435	11,874	41,309	14,717	12,754	656	8,490	21,899
2043	-10,600	51,461	38,718	0	0	29,085	11,776	40,861	14,543	12,743	669	8,519	21,931
2044	-10,600	51,035	38,296	0	0	28,754	11,682	40,436	14,377	12,740	682	8,553	21,975
2045	-10,600	50,631	37,888	0	0	28,438	11,593	40,031	14,219	12,743	695	8,591	22,029
2046	-10,600	50,567	37,845	0	0	28,387	11,580	39,967	14,194	12,722	695	8,576	21,994
2047	-10,600	50,516	37,810	0	0	28,347	11,570	39,916	14,173	12,706	695	8,565	21,966
2048	-10,600	50,477	37,783	0	0	28,315	11,562	39,877	14,157	12,693	695	8,555	21,943
2049	-10,600	50,450	37,766	0	0	28,293	11,557	39,850	14,146	12,684	695	8,546	21,925
2050	-10,600	50,468	37,784	0	0	28,305	11,563	39,868	14,152	12,684	695	8,540	21,919
2051	-10,600	50,468	37,784	0	0	28,305	11,563	39,868	14,152	12,684	695	8,540	21,919
2052	-10,600	50,468	37,784	0	0	28,305	11,563	39,868	14,152	12,684	695	8,540	21,919

Table 13. Year-by-Year Comparison of GHG Emissions without Oakland Power Plant
Oakland Waterfront Ballpark District Project
Oakland, California

Year[1]	Existing Conditions Emissions	Project 1.0 Operational Emissions[2,7]	Project 2.0 Operational Emissions[2,7]	Construction Emissions	Non-Residential Construction Emissions	Net New Emissions			Direct Local Reductions[6]				
						Non-Residential Emissions[4]	Residential Emissions[4]	Total Emissions to Reduce or Offset[3,7]	Required Direct Local Offsets (50% of Non-Residential)	TMP + TDM + Onsite EV Charging[5]	Electrification of 50% of Residential Units	751 Offsite Neighborhood EVCS	Total Direct Local Reductions
	MT CO_2e/year												
2053	0	42,462	31,370	0	0	30,872	11,590	42,462	15,436	11,091	685	0	11,777
2054	0	39,040	28,336	0	0	27,468	11,572	39,040	13,734	10,704	570	0	11,274
2055	0	39,037	28,333	0	0	27,465	11,572	39,037	13,733	10,704	570	0	11,274
2056	0	38,992	28,300	0	0	27,465	11,527	38,992	13,733	10,692	570	0	11,262
2057	0	4,971	3,530	0	0	4,951	20	4,971	2,476	1,441	382	0	1,823
Total	**-317,998**	**1,646,649**	**1,250,933**	**30,576**	**20,854**	**977,521**	**381,707**	**1,359,227**	**488,760**	**395,717**	**18,582**	**265,565**	**679,863**
Maximum Allowable Offset Credits[8] (50% of Total Emissions)								**679,614**	**% Local Reduction Measures**				**70%**

Notes:

1. Emissions decrease over time due to transportation and electricity (for both building energy use and water treatment and distribution) becoming cleaner. A linear interpolation is used to take into account decrease in electricity intensity factor due to Renewable Portfolio Standards. The decrease in vehicle emission factors over time is based on Alameda County fleet-average emission factors from 2020-2050. The estimate assumes no change after 2050, since EMFAC2017 does not project past 2050.
2. Emissions assume all buildings become operational as soon as Phase is constructed, based on percent of operational land uses by Phase and percent of operation per year. The first calendar year is adjusted for partial operation based on start date and the last calendar year is adjusted for partial operation such that total lifetime for each land use sums to 30 years.
3. Net new emissions to reduce or offset include Existing Conditions Emissions, Project 1.0 Operational Emissions, Construction Emissions, and Backfill.
4. Net new non-residential emissions include Existing Conditions Emissions, Project 1.0 Non-Residential Operational Emissions, and Backfill. A portion of the construction emissions corresponding to the percent of building square footage that is non-residential was included. The remainder of emissions are considered residential.
5. This analysis assumes that 10% of onsite parking spaces will be equipped with an EV charger.
6. The avoided GHG emissions quantified under Additional Local Reductions show a potential path to the required 50% local reduction under AB734 should the OPP Variant not be implemented.
7. The analysis presented here does not include anticipated additional reductions from Project features associated with LEED Gold design or from local air quality mitigation measures with GHG co-benefits. The Project is committed to achieving LEED Gold Standard, which requires projects to obtain points in the areas of Location & Transportation, Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation, and Regional Priority. Many of these measures, such as optimizing energy performance, demand response, and renewable energy production, would allow the Project to achieve further GHG reductions locally that are not captured in this analysis.
8. Per AB734, up to 50% of the total net new emissions for the Project can be reduced with offset credits on the carbon market.

Abbreviations:

CO_2e - carbon dioxide equivalents
EVCS - electric vehicle charging stations
MT - metric ton
NPV - net present value
yr - year

Table 14. GHG Emissions Reductions from Local, Direct Measures
Oakland Waterfront Ballpark District Project
Oakland, California

Potential Additional Emissions	Emissions	Units
Backfill Emissions per Attendee[1]	0.0037	MT CO_2e/backfill event/attendee

Location	Measure	Lifetime[2] (Years)	Lifetime Emissions (MT CO_2e/Unit)	Unit
On-site	Solar Panels[3]	30	1.4	MWh
On-site	Residences without NG[4]	30	12	DU
On-site	Waste Diversion[5]	30	15	ton diverted
On-site	Reduced On-Site Parking[6]	30	1,024	100 spaces reduced
Off-site	Neighborhood EVCS[7]	10	127	EVCS

Notes:

1. Backfill emissions per attendee were estimated by dividing the total annual emissions at the Coliseum stadium by 82 games per year with 35,000 attendees at each game.
2. On-site emissions reductions are assumed over a 30-year operational life. Off-site emissions reductions are assumed over a 10-year operational life, with the exception of Trees Planted, which assumes a 20-year growing period.
3. Methodology is consistent with Table OP-19. CO_2e emissions reductions were calculated for the lifetime starting with 2023. Since electricity emission factors decrease each year (see Table OP-12), the sum of the CO_2e emissions reductions over the lifetime and dividing by the electricity generation to obtain a relationship between MT CO_2e and MWh.
4. Methodology is consistent with Table OP-20. CO_2e emissions reductions were calculated by multiplying residential natural gas usage rate by the natural gas emission factor. CO_2e emissions associated with the electricity that will replace natural gas (40% increase) have been added back into the reduction.
5. Methodology is consistent with Table OP-5. The value for CO_2e emissions per unit is equal to the CO_2e emission factor for solid waste disposal.

Table 14. GHG Emissions Reductions from Local, Direct Measures
Oakland Waterfront Ballpark District Project
Oakland, California

Notes, Continued:

6. Reduced on-site parking reductions are based on communication with Fehr & Peers on February 12, 2020, for every 500 on-site parking spaces removed from the project design, there would be 540 fewer trips for large events and concerts, 10,320 fewer miles travelled for weekday games, 10,920 fewer miles traveled for weekend games, and 8,890 fewer miles traveled for concerts. This reduction is capped at 2,000 spaces. Due to the complex nature of this analysis, Ramboll has evaluated these reductions for 100 spaces, which may not scale linearly when changing the number of spaces.

7. Methodology is consistent with Table OP-22.

Abbreviations

CO_2e - carbon dioxide equivalent

EVCS - electric vehicle charging station

DU - dwelling unit

EV - electric vehicle

MT - metric tons

MWh - megawatt-hour

NG - natural gas

ZEV - zero emission vehicle

Table OP-22. Potential GHG Emissions Reductions from Installing Offsite Neighborhood EV Charging Station (EVCS)
Oakland Waterfront Ballpark District Project
Oakland, California

Input parameters

Description	Assumption	Units
Years of emissions reductions included (assumed operating life of EVCS)	10	years
Annual Gasoline-Fueled Vehicle VMT Reduction per EVCS (PHEV)[1]	36,500	mi/yr/EVCS
Annual Gasoline-Fueled Vehicle VMT Reduction per EVCS (BEV)[1]	73,000	mi/yr/EVCS
Calculated Annual Gasoline-Fueled VMT Reduction per EVCS (mi/yr/charger)[2]	54,750	mi/yr/EVCS
Fuel Economy of an EV (kWh/mile)[3]	0.25	kWh/mi
Fuel Economy of an EV (MWh/mile)	0.00025	MWh/mi
Calculated MWh used per EVCS per year	13.69	MWh/yr/EVCS

Emissions Reductions from Offsite Neighborhood EVCS

Year	Emission Factors		Emissions per EVCS (MT CO_2e/yr/charger)		
	Non-Electric Passenger Vehicle[4] (g CO_2e/mi)	EVSC Emission Factor[5] (lb CO_2e/MWh)	Non-Electric Passenger Vehicle Emissions Reduced	Indirect EVCS Emissions	Net Reductions
2023	288	264	16	1.6	14
2024	280	252	15	1.6	14
2025	271	240	15	1.5	13
2026	263	228	14	1.4	13
2027	256	216	14	1.3	13
2028	249	204	14	1.3	12
2029	243	192	13	1.2	12
2030	238	180	13	1.1	12
2031	234	168	13	1.0	12
2032	230	156	13	1.0	12

Table OP-22. Potential GHG Emissions Reductions from Installing Offsite Neighborhood EV Charging Station (EVCS)
Oakland Waterfront Ballpark District Project
Oakland, California

Notes:

1. The annual VMT reduction per EVCS is based on Based on Table H1 of ARB's Electric Vehicle Charging Infrastructure: Multifamily Building Standards from 2019. Available at: https://ww3.arb.ca.gov/cc/greenbuildings/pdf/tcac2018.pdf
2. The estimated VMT reduction per EVCS is the average of the PHEV and BEV VMT reductions.
3. This is representative of a typical charge rate for an EV of 6.25 kWh per hour and a fuel economy of 0.25 kWh per mile. The charge rate is based on capability of existing battery-electric vehicles and Level 2 charging stations. Reference: Chargepoint. 2017. Level Up Your EV Charging Knowledge. Available at: https://www.chargepoint.com/blog/level-your-ev-charging-knowledge/. The fuel economy is based on National Renewable Energy Laboratory (NREL). 2018. California Plug-In Electric Vehicle Infrastructure Projections: 2017-2025 (Table C.1). Available at: https://www.nrel.gov/docs/fy18osti/70893.pdf.
4. The non-electric passenger vehicle emission factor was estimated using EMFAC2017 for Alameda county. Only gasoline light-duty passenger vehicles were included.
5. The EVSC emission factor is equivalent to the grid averaged electricity emission factor in Table OP-12.

Abbreviations:

BEV - battery electric vehicle
CO_2e - carbon dioxide equivalents
EVCS - electric vehicle charging station
kWh - kilowatt-hour
MMBTU - million British Thermal Units
MT - metric ton(s)
MWh - megawatt-hour
NOx - nitrogen oxides
PGE - Pacific Gas & Electric
PHEV - plug-in hybrid electric vehicle
PM - particulate matter
ROG - reactive organic gases
VMT - vehicle miles traveled
yr - year

CITY OF OAKLAND

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February 28, 2020

Richard Corey
California Air Resources Board
1001 I Street
Sacramento, CA 95814
Dear Mr. Corey,

I write concerning the potential future of the Oakland Coliseum site, which includes the stadium and associated parking lots (the "Coliseum"). Today the Coliseum is the home field of the Oakland Athletics (the "A's") and the Oakland Raiders (the "Raiders"). The Raiders franchise is moving to Las Vegas next season, leaving the A's as the only remaining tenant. As you know, the Coliseum was built in the early 1960s, with its first game held in 1966. As indicated in prior correspondence to you from us, the City of Oakland (the "City") prepared a Specific Plan for the Coliseum City area in which it noted that the Coliseum was "obsolete" and would be demolished in the circumstance where neither the A's nor the Raiders were anchor tenants. Once the Coliseum loses its anchor tenants, there may not be a steady revenue stream to support the ongoing maintenance and repair of this facility.

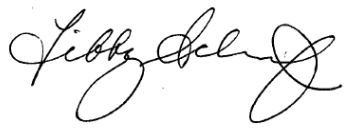
We understand that in association with the Howard Terminal Project ("Project"), in the event the Coliseum is not demolished immediately following the A's departure, the California Air Resources Board ("CARB") wishes to have a commitment regarding the potential use of the newly available dates in excess of the historical average of four non-sporting events per year at the Coliseum. By this letter, I confirm that the A's have agreed and the City will enforce the following: if (1) the Project is approved and constructed, (2) the A's leave the Coliseum, and (3) the Coliseum is not demolished, then for each year the Coliseum is not demolished and events exceed four per year, the A's are required to fully reduce and offset, consistent with AB 734 requirements, all greenhouse gas emissions associated with events that are in excess of four per year. I understand that the Application provided by the A's to CARB must identify a menu of reduction measures and their associated greenhouse gas reductions that the A's may then select to reduce emission from these excess events in accordance with a process and methodology included in the Application and approved by CARB.

As you know, the City, as the lead agency charged with enforcing the obligations of the A's under AB 734, has agreed to monitor and enforce all obligations if the Project is certified by the Governor, approved, and constructed.

Please note that the City has no obligation to approve, and the A's have no obligation to develop, the Project unless and until the parties have negotiated, executed and delivered mutually acceptable agreements based upon information produced from the CEQA environmental review process and any other public review and hearing processes, subject to all applicable regulatory approvals. The City retains the absolute, sole discretion to (1) modify the Project as the City in its sole discretion deems necessary to comply with CEQA; (2) select other feasible alternatives and/or impose mitigation measures to avoid or reduce significant environmental impacts; (3) balance the benefits of the Project against any significant environmental impacts prior to taking final actions, if such significant impacts cannot otherwise be avoided; and/or (4) determine not to grant the requisite approvals for the Project.

Thank you for your consideration of this letter. Please do not hesitate to call if you have questions.

Sincerely,



Mayor Libby Schaaf

Cc:
Jared Blumenfeld, Secretary for Environmental Protection, State of California
Vice Mayor Reid, City of Oakland
Councilmember Taylor, City of Oakland
Supervisor Miley, County of Alameda
Supervisor Haggerty, County of Alameda
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