Supplement to Application for Environmental Leadership Development Project

April 2013

To supplement its April 18, 2012, Application for Environmental Leadership Development Project (the "Application") for the Apple Campus 2 Project (the "Project"), Apple Inc. (Apple) submits this updated greenhouse gas (GHG) emissions analysis prepared by ENVIRON International Corporation.

A GHG emissions analysis was initially submitted with the Application to demonstrate that the Project does not result in any net additional GHG emissions, as required for approval under Assembly Bill 900 (AB 900). In June 2012, the California Air Resources Board (ARB) issued a Determination that the Project satisfied the GHG emissions requirement, and Governor Edmund G. Brown, Jr. approved the Application.

At the time of the Application, Phase 1 of the Project was fully defined; however, Phase 2 was defined only at the program level and was not included in the GHG emissions analysis. This Supplement to the Application describes the further defined Phase 2 and updates the GHG analysis to include emissions from both Phases. Moreover, project construction has been enhanced to reduce offhaul, in addition to other environmental benefits, resulting in further emissions reductions. With this Supplement, the Project information and analysis are fully up-to-date. Based on the methods used by ARB in its initial Determination, the Project's GHG emissions remain below the baseline emissions for the Project site. Therefore, Apple submits that the Project should retain its AB 900 Leadership Project status.

Updated Project Description[1]

In Phase 1, 13,000 employees are expected to occupy the following new buildings, totaling 3,340 thousand square feet (kSF):

- Main Building (2,820 kSF) located in the block bounded by Homestead Road, North Tantau Avenue, Pruneridge Avenue, and North Wolfe Road.
- Corporate Auditorium (120 kSF) located in the same block as the Main Building.
- Corporate Fitness Center (100 kSF) located in the same block as the Main Building.
- East of Tantau Research Facilities (300 kSF) located in the block bounded by Pruneridge Avenue, Interstate 280, and North Tantau Avenue.

Phase 2 will add an additional 1,200 employees and 300kSF of building space. The Phase 2 buildings will be located in the area bounded by Calabazas Creek, North Tantau Avenue, and Interstate 280.

The Project totals 14,200 employees and 3,640 kSF of building space.

Updated GHG Emissions Analysis

Below, the Project's GHG emissions are calculated using the updated Project parameters. For the purpose of this update, the first year of Project operation is still assumed to be 2016. The construction of the Main Building will be complete by the end of 2016.

Baseline Emissions

No changes to the baseline emissions conditions are submitted with this Supplement. The baseline conditions include full occupancy of the existing Apple buildings and the square footage of the buildings east of North Tantau Avenue. It should be noted that the baseline estimates are conservative—for example, the employees in buildings east of

[1] To the extent this supplement describes Phase 1 and Phase 2 of the project, those descriptions are simply intended to reflect the initially submitted project application and the updates provided here—they are not necessarily indicative of any particular construction timelines or logistics.

North Tantau are excluded from the baseline, resulting in artificially low baseline emissions. Similarly, a potential adjustment discussed in the Solid Waste section that could have raised baseline emissions has not been applied. As a result, the corresponding acceptable ceiling for Project GHG emissions is artificially low, ensuring a conservative analysis.

Project Construction Emissions

The construction emissions analysis has been modified to account for Phase 2 construction as well as other refinements in the construction plan:

- Two models of large cranes (MANITOWOC 160000 and LR 1600) have been replaced by cranes of lower horsepower.
- Other modifications to equipment type and count have been made to accommodate Phase 2 and changes to earth movement quantities.
- Construction is now assumed to take place over four years, with the majority of the Phase 2 work occurring in the third and fourth years.
- The number of haul truck trips has been reduced, because the site is now balanced with regard to the amount of fill required.
- Double-counting of haul truck trips as both on- and off-road emissions has been eliminated. Haul truck trips are now treated solely as on-road sources of emissions.
- The estimate of worker trips has been revised based on more refined manpower projections. Of the construction workers, 16.8% are now assumed to carpool based on data from the United States Census Bureau 2011 American Community Survey.[2] The carpool density is assumed to be two people per vehicle.

With these changes, the construction GHG emissions are now estimated at 47,884 metric tonnes (MT) of carbon dioxide equivalent (CO_2e) over four years of construction, approximately 0.1 percent higher than the original estimate of 47,189 MT CO_2e. Table 1 shows estimated construction emissions by year.

Table 1. GHG Emissions from Construction

Construction Year	GHG Emissions (MT CO_2e)
1	17,864
2	15,683
3	13,127
4	1,209
Total	**47,884**

Project Operational Emissions

The Project's operational emissions have been estimated using the same methods and categories (energy, mobile sources, solid waste, and water) used by ARB in its Determination. Estimates are summarized below and detailed in Attachment A.

[2] United States Census Bureau. 2011. American Community Survey, Table S0804 for California. Available online at http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_1YR_S0804&prodType=table.

Energy:

There is no change to estimated emissions from energy use, which remains at 0 MT CO_2e/year due to Apple's commitment to power the Project using only renewable and clean energy sources. The Project will generate electricity on-site using approximately 640 kSF of photovoltaic solar panels, as well as fuel cells with directed biogas. When necessary during periods of peak demand, renewable energy will be purchased from the grid through the Direct Access Program, as committed to by Apple. Energy efficiency measures will decrease energy demand relative to baseline conditions.

Mobile Sources:

On-road vehicle emissions were estimated for commute trips, non-commute trips, visitor trips, and vendor trips, as described in Attachment A.

Daily trip counts for commute, visitor, vendor, and Apple Transit are the same as those used by ARB. Non-commute trip counts have been increased to match the daily trip count projected by TIA. Apple assumes a trip generation of 3.59 trips per day per employee, as in its AB900 application. With 14,200 employees, the total Project trip count is 50,978 trips per day. The derivation of non-commute trip counts is included as Attachment B.

Apple Transit coach and shuttle trip frequencies, which currently serve 12,750 employees in Cupertino under the baseline scenario, were scaled up to reflect the increase in employee counts associated with a total employee count of 14,200 for the Project scenario. A GHG emissions credit for biodiesel combustion, which was not included in ARB's initial determination, has been incorporated for Apple Transit shuttles. The use of biodiesel is described in Apple's Sustainability Report,[3] and will continue for the duration of the Project.

Apple will also be providing a shuttle service to transport employees between the parking garages and the office buildings. This shuttle, which is similar in vehicle type to the existing Apple Transit shuttles, will travel up to 700 miles per day total on business days (assumed to be 260 days per year, although operations may vary).

Project emissions for Phases 1 and 2 are estimated at 36,888 MT CO_2e in 2016. Project emissions for Phase 1 only are estimated at 33,716 MT CO_2e per year. ARB's Determination, which did not account for the use of biodiesel in Apple Transit coaches and shuttles, estimated Phase I mobile source emissions at 33,661 MT CO_2e per year.

Solid Waste:

An emissions factor used by ARB has been increased, resulting in slightly higher emissions. With the inclusion of Phase 2 and the slightly higher emission factor, Project emissions are estimated at 972 MT CO_2e per year. Phase 1 only emissions are estimated at 890 MT CO_2e per year, as compared to 729 MT CO_2e per year in ARB's determination.

Water:

Water usage scales with both the project building square footage and landscaped acreage. Building square footage was increased from 3,340 kSF to 3,640 kSF to reflect the inclusion of Phase 2, but the landscaped acreage has not changed. Emissions from water usage are now estimated at 398 MT CO_2e per year, an increase of about 6.7% over the ARB's Phase 1 estimate of 373 MT CO_2e per year.

[3] Apple. 2012. Facilities Report, 2012 Environmental Update. Available online at http://images.apple.com/environment/reports/docs/Apple_Facilities_Report_2013.pdf .

Other:
The Project will not use perfluorinated gases or high-global warming potential refrigerants beyond those used in rooftop building comfort ventilation systems.

Conclusions

Table 2 shows total Project operational emissions under the baseline scenario, the Phase I scenario as presented in the initial AB900 Application for 2016 (the first year of Project operation), and the updated scenario including Phase 2 for 2016.

Table 2. GHG Emissions from Project Operation, Phases 1 and 2 as compared to 2011 Full-Occupancy Baseline

Emissions Source	GHG Emissions (MT CO_2e/Year)		
	2011 Full-Occupancy Baseline	**2016 Project Operation, Phase 1 Only (Rounded)**	**2016 Project Operation, Phases 1 & 2**
Energy	23,839	0	0
Mobile Sources	29,744	33,716	36,888
Solid Waste	533	890	972
Water	366	373	398
Total	**54,482**	**34,979**	**38,258**

The inclusion of Phase 2 does not raise Project GHG emissions above the baseline level, and thus does not generate net additional GHG emissions. As a result, Apple submits that the Project's qualification for the benefits of AB900 should be unaffected.

The additional items submitted with Apple's original AB 900 application remain valid and are unaffected by this supplement.

Name of Applicant Representative: James C. Fowler, Asst. Sec'y.

Signature of Applicant Representative: James C. Fowler, Asst. Secty.

Date: 4/3/2013

Attachments:

Exhibit A: Emissions Calculations

Exhibit B: Transportation Impact Analysis

Exhibit A: Emissions Calculations

Apple Campus 2
AB900 Application Updates: Total Operational Emissions

Summary of Project 2016 GHG Emissions

Emissions Source	2011 Full-Occupancy Baseline, ARB Determination	2016 Project Emissions, ENVIRON
Energy	23,839 MT CO_2e/year	0 MT CO_2e/year
Mobile	29,744 MT CO_2e/year	36,888 MT CO_2e/year
Solid Waste	533 MT CO_2e/year	972 MT CO_2e/year
Water	366 MT CO_2e/year	398 MT CO_2e/year
Total	**54,482 MT CO_2e/year**	**38,258 MT CO_2e/year**

Mobile Source Emissions Calculations

Apple Campus 2
AB900 Application Updates: Mobile Source Emissions

Summary of Mobile Source Emissions

Mode	2016 Project CO_2e Emissions
Commute Trips	21,796 MT/year
Non-Commute Trips	6,333 MT/year
Visitor Trips	1,857 MT/year
Vendor Trips	2,466 MT/year
Transit Trips - with biodiesel	4,437 MT/year
Total	**36,888 MT/year**

Commute Trips

Total Vehicle Trips Calculation

Scenario	Total Employees[1]	% SOV[2]	% Carpool[2]	Carpool Density (people/ vehicle)[2]	Trips/ Roundtrip	Electric Vehicle Count[3]	Electric Vehicle Trips/ Roundtrip	Total Vehicle Trips per Day
Project 2016	14,200	72%	10%	2.22	2	300	2	21,127

Notes:

1. Employee counts are from the AB900 Application (page 38 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
2. Single-Occupancy Vehicle (SOV) rate, Carpool rate, and Carpool Density are from the AB900 Application (page 100 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
3. Count of 300 electric vehicles during Project operation is from the AB900 Application (page 28 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)

CO_2 Emissions Calculations

Scenario	Total Vehicle Trips per Day	Trip Length (mi)[1]	Average working days per year[1]	CO_2 Emission Factor (g/mi)[2]	MT/g	CO_2 Emissions
Project 2016	21,127	11.98	250	344	0.000001	21,796 MT/year

Notes:

1. From ARB Staff Assessment (2012, pages 11 and 19 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf).
2. From EMFAC2011 for vehicle classes LDA, LDT1, LDT2, MDV, and MCY, calendar year 2016, Santa Clara County. Emission factors are weighted by vehicle miles traveled (VMT).

Non-Commute Trips

Total Vehicle Trips Calculation

Scenario	Total Vehicle Trips per Day, All Vehicles[1]	Electric Vehicle Count[3]	EV Trips/ Roundtrip	Total Vehicle Trips per Day, Combustion Engines
Project 2016	25,114	300	2	24,514

Notes:

1. Derived from count of Project vehicle trips per day using 3.59 trips per day per employee and 14,200 employees, as described in Attachment B.
2. Count of 300 electric vehicles during Project operation is from the AB900 Application (page 28 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)

CO_2 Emissions Calculations

Scenario	Total Vehicle Trips per Day, Combustion Engines	Trip Length (mi)[1]	Average working days per year[2]	CO_2 Emission Factor (g/mi)[3]	MT/g	CO_2 Emissions
Project 2016	24,514	3	250	344	0.000001	6,333 MT/year

Notes:

1. Trip length is from the AB900 Application (page 104 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
2. From ARB Staff Assessment (2012, page of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf).
3. From EMFAC2011 for vehicle classes LDA, LDT1, LDT2, MDV, and MCY, calendar year 2016, Santa Clara County. Emission factors are weighted by vehicle miles traveled (VMT).

Visitor Trips

CO_2 Emissions Calculations

Scenario	Total Vehicle Trips per Day[1]	Trip Length (mi)[2]	Average working days per year[3]	CO_2 Emission Factor (g/mi)[4]	MT/g	CO_2 Emissions
Project 2016	2,840	7.3	260	344	0.000001	1,857 MT/year

Notes:

1. Visitor trip count per day is 10% of the employee count per day, from the AB900 Application (page 100 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf), times 2 trips per round trip.

2. Trip length is from the AB900 Application (page 104 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
3. From ARB Staff Assessment (2012, page 20 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
4. From EMFAC2011 for vehicle classes LDA, LDT1, LDT2, MDV, and MCY, calendar year 2016, Santa Clara County. Emission factors are weighted by vehicle miles traveled (VMT).

Vendor Trips

CO_2 Emissions Calculations

Scenario	Total Vehicle Trips per Day[1]	Trip Length (mi)[2]	Average working days per year[3]	CO_2 Emission Factor (g/mi)[4]	MT/g	CO_2 Emissions
Project 2016	1,114	7.3	260	1,167	0.000001	2,466 MT/year

Notes:

1. Vendor trip rate of 190 round trips per day per 4,844 employees, times 2 trips per round trip, is from the AB900 Application (page 100 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf). The 2011 baseline ratio of 190 vendor trips per 4,844 Apple employees, approximately 4%, is applied to the total employee count to calculate the vendor trip count.

2. Trip length is from the AB900 Application (page 104 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
3. From ARB Staff Assessment (2012, page 20 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
4. From EMFAC2011 for vehicle classes LHD1, LHD2, T6, and T7, calendar year 2016, Santa Clara County. Emission factors are weighted by vehicle miles traveled (VMT).

Apple Transit Trips

Coach biodiesel fuel content[1]	15%
Shuttle biodiesel fuel content[1]	3%
Garage shuttle biodiesel fuel content[1]	3%

CO_2 Emissions Calculations

Scenario	Total Vehicle Miles per Day[1]	Average working days per year[2]	CO_2 Emission Factor (g/mi)[3]	MT/g	CO_2 Emissions
Project 2016					
Coaches	7,997	260	2,007	0.000001	4,173 MT/year
Shuttles	803	260	675	0.000001	141 MT/year
Garage shuttles	700	260	675	0.000001	123 MT/year
				Project 2016 Sum:	**4,437 MT/year**

Notes:

1. Apple Transit fuel biodiesel content, trip count per day, and length per route are from the AB900 Application (page 106 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf). For the Project, ENVIRON assumes trip frequencies scale with employee population based on the ratio of employee population to the 2011 all-Cupertino Apple employee population of 12,750 used to calculate the 2011 baseline vehicle miles per day (also on page 106 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf).
2. From ARB Staff Assessment (2012, page 21 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
3. From EMFAC2011 for vehicle classes UBUS for coaches and OBUS for shuttles, calendar year 2016, Santa Clara County. Emission factors are weighted by vehicle miles traveled (VMT). Includes a 15% credit for biodiesel in coaches and a 3% credit for biodiesel in shuttles.

Abbreviations

AB900: (California) Assembly Bill 900
ARB: (California) Air Resources Board
CO_2: carbon dioxide
EMFAC2011: EMission FACtors model, 2011 release
g: gram
LDA: Light-Duty Automobiles (Passenger Cars)
LDT1: Light-Duty Trucks (0-3,750 lbs)
LDT2: Light-Duty Trucks (3,751-5,750 lbs)
LHD1: Light-Heavy-Duty Trucks (8,501-10,000 lbs)
LHD2: Light-Heavy-Duty Trucks (10,001-14,000 lbs)
MCY: Motorcycles
MDV: Medium-Duty Trucks (5,751-8,500 lbs)
mi: mile
MT: metric ton
OBUS: Other Buses
SOV: Single-Occupancy Vehicle
T6: Medium-Heavy-Duty-Trucks (14,001-33,000 lbs)
T7: Heavy-Heavy-Duty-Trucks (33,001-60,000 lbs)
UBUS: Urban Buses
VMT: vehicle miles traveled

References

California Air Resources Board. 2012. Air Resources Board Staff Assessment of the Apple Campus 2 Application for Environmental Leadership Development Project. June. Available online at: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf

California Air Resources Board. 2011. EMission FACtors Model, 2011 (EMFAC2011). Available online at: http://www.arb.ca.gov/msei/modeling.htm#emfac2011_web_based_data

Mobile Source Emissions Supporting Materials

Apple Campus 2
Cupertino, California

EMFAC2011 CO_2 Emission Factor Calculations for Calendar Year 2016

EMFAC2011 Query Inputs

Area	Santa Clara County
Calendar Year	2016
Season	Annual average
Model Year	All model years
Speed	All speeds

Conversions

1 pound =	453.592	grams
1 ton =	2,000	pounds

Vehicle Class	Fuel	Vehicle Miles Traveled (miles/day)	Running Exhaust CO_2 Emissions[1] (tons CO_2/day)	Idling Exhaust CO_2 Emissions[1] (tons CO_2/day)	Starting Exhaust CO_2 Emissions[1] (tons CO_2/day)	Total Exhaust CO_2 Emissions[1] (tons CO_2/day)	Exhaust CO_2 Emission Factor[1] (grams CO_2/mile)
Commute, Non-Commute and Visitor Trips							
LDA	GAS	24,855,472	7,421	0	327	7,748	344
LDA	DSL	82,784	26	0	0	26	
LDT1	GAS	2,619,041	941	0	39	981	
LDT1	DSL	3,892	1	0	0	1	
LDT2	GAS	8,364,506	3,624	0	148	3,772	
LDT2	DSL	3,841	1	0	0	1	
MCY	GAS	271,449	44	0	3	47	
MDV	GAS	5,585,219	3,164	0	126	3,291	
MDV	DSL	7,023	2	0	0	2	

Vehicle Class	Fuel	Vehicle Miles Traveled (miles/day)	Running Exhaust CO_2 Emissions[1] (tons CO_2/day)	Idling Exhaust CO_2 Emissions[1] (tons CO_2/day)	Starting Exhaust CO_2 Emissions[1] (tons CO_2/day)	Total Exhaust CO_2 Emissions[1] (tons CO_2/day)	Exhaust CO_2 Emission Factor[1] (grams CO_2/mile)
Vendor Trips							
LHD1	GAS	995,751	1,030	3	24	1,057	1,167
LHD1	DSL	342,278	191	1	0	192	
LHD2	GAS	89,291	92	0	2	95	
LHD2	DSL	112,061	63	0	0	63	
T6 Ag	DSL	3,848	5	0	0	5	
T6 CAIRP heavy	DSL	279	0	0	0	0	
T6 CAIRP small	DSL	919	1	0	0	1	
T6 instate construction heavy	DSL	17,051	22	0	0	22	
T6 instate construction small	DSL	44,031	55	1	0	56	
T6 instate heavy	DSL	110,830	140	2	0	142	
T6 instate small	DSL	299,317	375	4	0	379	
T6 OOS heavy	DSL	160	0	0	0	0	
T6 OOS small	DSL	527	1	0	0	1	
T6 Public	DSL	12,645	16	1	0	17	
T6 utility	DSL	2,086	3	0	0	3	
T6TS	GAS	78,334	56	0	2	59	
T7 Ag	DSL	11,196	21	0	0	21	
T7 CAIRP	DSL	154,561	285	18	0	303	
T7 CAIRP construction	DSL	13,477	25	2	0	26	
T7 NNOOS	DSL	173,875	319	24	0	343	
T7 NOOS	DSL	56,287	104	8	0	112	
T7 other port	DSL	15,572	29	1	0	30	
T7 POAK	DSL	73,948	139	5	0	144	
T7 POLA	DSL	0	0	0	0	0	
T7 Public	DSL	8,824	17	3	0	20	
T7 Single	DSL	93,740	174	5	0	179	
T7 single construction	DSL	34,862	65	2	0	67	
T7 SWCV	DSL	24,016	45	4	0	49	
T7 tractor	DSL	282,367	524	7	0	531	
T7 tractor construction	DSL	25,992	48	1	0	50	
T7 utility	DSL	1,430	3	1	0	3	
T7IS	GAS	15,563	10	0	0	10	

Vehicle Class	Fuel	Vehicle Miles Traveled (miles/day)	Running Exhaust CO_2 Emissions[1] (tons CO_2/day)	Idling Exhaust CO_2 Emissions[1] (tons CO_2/day)	Starting Exhaust CO_2 Emissions[1] (tons CO_2/day)	Total Exhaust CO_2 Emissions[1] (tons CO_2/day)	Exhaust CO_2 Emission Factor[1] (grams CO_2/mile)
Transit Trips							
Coach Trips							
UBUS	GAS	5,693	5	0	0	5	2,361
UBUS	DSL	51,758	145	0	0	145	
Shuttle Bus Trips							
OBUS	GAS	31,716	23	0	1	24	696

Notes

1. CO_2 emission factors include adoption of the Pavley I and Low Carbon Fuel Standards (LCFS) emissions standards in future years.

Abbreviations

CO_2: carbon dioxide
DSL: diesel
EMFAC2011: EMission FACtors model, 2011 release
GAS: gasoline
LCFS: Low-Carbon Fuel Standard
LDA: Light-Duty Automobiles (Passenger Cars)
LDT1: Light-Duty Trucks (0-3,750 lbs)
LDT2: Light-Duty Trucks (3,751-5,750 lbs)
LHD1: Light-Heavy-Duty Trucks (8,501-10,000 lbs)
LHD2: Light-Heavy-Duty Trucks (10,001-14,000 lbs)
MCY: Motorcycles
MDV: Medium-Duty Trucks (5,751-8,500 lbs)
OBUS: Other Buses
T6 Ag: Medium-Heavy Duty Diesel Agriculture Truck
T6 CAIRP heavy: Medium-Heavy Duty Diesel CA International Registration Plan Truck with GVWR>26000 lbs
T6 CAIRP small: Medium-Heavy Duty Diesel CA International Registration Plan Truck with GVWR<=26000 lbs
T6 instate construction heavy: Medium-Heavy Duty Diesel instate construction Truck with GVWR>26000 lbs
T6 instate construction small: Medium-Heavy Duty Diesel instate construction Truck with GVWR<=26000 lbs
T6 instate heavy: Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs
T6 instate small: Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs
T6 OOS heavy: Medium-Heavy Duty Diesel Out-of-state Truck with GVWR>26000 lbs
T6 OOS small: Medium-Heavy Duty Diesel Out-of-state Truck with GVWR<=26000 lbs
T6 Public: Medium-Heavy Duty Diesel Public Fleet Truck
T6 utility: Medium-Heavy Duty Diesel Utility Fleet Truck
T6TS: Medium-Heavy Duty Gasoline Truck
T7 Ag: Heavy-Heavy Duty Diesel Agriculture Truck
T7 CAIRP construction: Heavy-Heavy Duty Diesel CA International Registration Plan Construction Truck
T7 CAIRP: Heavy-Heavy Duty Diesel CA International Registration Plan Truck
T7 NNOOS: Heavy-Heavy Duty Diesel Non-Neighboring Out-of-state Truck
T7 NOOS: Heavy-Heavy Duty Diesel Neighboring Out-of-state Truck
T7 other port: Heavy-Heavy Duty Diesel Drayage Truck at Other Facilities
T7 POAK: Heavy-Heavy Duty Diesel Drayage Truck in Bay Area
T7 POLA: Heavy-Heavy Duty Diesel Drayage Truck near South Coast

T7 Public: Heavy-Heavy Duty Diesel Public Fleet Truck
T7 single construction: Heavy-Heavy Duty Diesel Single Unit Construction Truck
T7 Single: Heavy-Heavy Duty Diesel Single Unit Truck
T7 SWCV: Heavy-Heavy Duty Diesel Solid Waste Collection Truck
T7 tractor construction: Heavy-Heavy Duty Diesel Tractor Construction Truck
T7 tractor: Heavy-Heavy Duty Diesel Tractor Truck
T7 utility: Heavy-Heavy Duty Diesel Utility Fleet Truck
T7IS: Heavy-Heavy Duty Gasoline Truck
UBUS: Urban Buses

References

California Air Resources Board. 2011. EMission FACtors Model, 2011 (EMFAC2011). Available online at: http://www.arb.ca.gov/msei/modeling.htm#emfac2011_web_based_data

Apple Campus 2
Cupertino, California

Apple Transit Trip Routes, Frequencies, and Lengths

Transit Type	Route[1]	Time of Day	Frequency[2]	Trip Length[3] (miles)		Total Vehicle Miles per Day
COACH RUNS (50 passenger capacity)	San Francisco - Van Ness	AM	9.67	49.9	74.85	724
	San Francisco - Divisadero		9.67	48.5	72.75	703
	San Francisco - 19th Ave		9.67	47.7	71.55	692
	San Francisco - Van Ness	PM	9.67	49.9	74.85	724
	San Francisco - Divisadero		9.67	48.5	72.75	703
	San Francisco - 19th Ave		9.67	47.7	71.55	692
	San Francisco - Colma Express		1	38.1	57.15	57
	Oakland/Berkeley/Alameda	AM	3	54.1	81.15	243
	Oakland/Berkeley/Alameda	PM	4	54.1	81.15	325
	Fremont	AM	3	45.6	68.4	205
	Fremont	PM	4	45.6	68.4	274
	Union City	AM	1	45.6	68.4	68
	Union City	PM	1	45.6	68.4	68
	Pleasanton	AM	4	38	57	228
	Pleasanton	PM	4	38	57	228
	Gilroy/Morgan Hill/Blossom Hill	AM	4	51	76.5	306
	Gilroy/Morgan Hill/Blossom Hill	PM	4	51	76.5	306
	Santa Cruz	AM	3	36.9	55.35	166
	Santa Cruz	PM	3	36.9	55.35	166
	Belmont/San Carlos/Redwood City	AM	2	22.8	34.2	68
	Belmont/San Carlos/Redwood City	PM	2	22.8	34.2	68
	Santa Clara/Milpitas	AM	3	18.4	27.6	83
	Santa Clara/Milpitas	PM	3	18.4	27.6	83
SHUTTLE RUNS - connecting to transit but accomodates Walk-ons as well (16 passenger capacity)	Mt View Caltrain	AM	13	6.5	9.75	127
	Mt View Caltrain	PM	14	6.5	9.75	137
	Sunnyvale Caltrain	AM	3	5.3	7.95	24
	Sunnyvale Caltrain	PM	3	5.3	7.95	24
	San Jose Caltrain	AM	3	9	13.5	41
	San Jose Caltrain	PM	3	9	13.5	41
	Los Altos	AM	3	12.9	19.35	58
	Los Altos	PM	3	12.9	19.35	58
	Los Gatos	AM	3	13.8	20.7	62
	Los Gatos	PM	3	13.8	20.7	62

Transit Type	Route[1]	Time of Day	Frequency[2]	Trip Length[3] (miles)		Total Vehicle Miles per Day
	Campbell	AM	3	9.9	14.85	45
	Campbell	PM	3	9.9	14.85	45
TOTAL (Cupertino population 12,750)			**164**			

Notes

1. Routes and frequencies provided by Apple.
2. Frequency of San Francisco routes distributed evenly for the 3 sub-routes for calculation purposes.
3. Trip lengths estimated from route maps using Google Earth and a conservative 50% is added to each route to account for miles traveled when the vehicle is not occupied.

Solid Waste Emissions Calculations

Apple Campus 2
AB900 Application Updates: Solid Waste Emissions

Determination of Solid Waste Generation Rate

Commercial waste generation rate (City of Los Angeles 2006):

10.53 lb waste/employee-day

Convert this value to kg/employee-year for use in subsequent calculations:

Input	Value		Data Source
Waste Generation Rate	10.53	lb waste/employee-day	City of Los Angeles 2006
Average working days per year	250	days/year	ARB 2012a (page 25 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
1 lb =	453.592	g	-
1 kg =	1000	g	-

Commercial waste generation rate (City of Los Angeles 2006):

1,194 kg waste/employee-year

Determination of Diversion Rate

From CalRecycle (2012):

> "The 2011 per employee disposal rate dropped to 11.3 pounds/employee/day resulting in a slight bump in the per employee "diversion rate equivalent" to 64% compared to 63% in 2010."

Diversion rate: 63% for 2010

Determination of Emission Factor

Method: mass balance on carbon entering in municipal solid waste

Calculate the amount of Anaerobically Degradable Carbon (ANDOC) in 1 ton of solid waste

Input	Value	Data Source
ANDOC	7.7%	ARB 2012b
1 ton =	2,000 lb	-
1 lb =	453.592 g	-
1 MT =	1,000,000 g	-

Total ANDOC in 1 ton waste:

0.070 MT ANDOC/1 ton waste

Calculate the amount of uncaptured ANDOC in 1 ton waste

Input	Value	Data Source
Total ANDOC in 1 ton waste	0.070 MT ANDOC/1 ton waste	Calculated
Captured portion of Landfill Gas	85%	ARB 2012b
Uncaptured portion of Landfill Gas	15%	ARB 2012b
Oxidized portion of carbon in the landfill cap	10%	ARB 2012b
Unoxidized portion of carbon in the landfill cap	90%	ARB 2012b

Uncaptured ANDOC in 1 ton waste:

9.43E-03 MT uncaptured ANDOC/1 ton waste

Calculate the amount of captured and uncontrolled ANDOC in 1 ton waste

Input	Value	Data Source
Total ANDOC in 1 ton waste	0.070 MT ANDOC/1 ton waste	Calculated
Captured portion of Landfill Gas	85%	ARB 2012b
Controlled portion of captured Landfull Gas	99%	ARB 2012b
Uncontrolled portion of captured Landfull Gas	1%	ARB 2012b

Captured and Uncontrolled ANDOC in 1 ton waste:

5.94E-04 MT captured and uncontrolled ANDOC/1 ton waste

Calculate the amount of uncaptured and captured and uncontrolled ANDOC in 1 ton waste

Total ANDOC available for release in 1 ton waste:

1.00E-02 MT ANDOC/1 ton waste

Calculate methane (CH_4) emissions from uncaptured and captured and uncontrolled ANDOC in carbon dioxide equivalents (CO_2e)

Input	Value	Data Source
Total ANDOC available for release in 1 ton waste	0.010 MT ANDOC/1 ton waste	Calculated
Portion of Landfill Gas releasted as CH_4	50%	ARB 2012b
Portion of Landfill Gas releasted as CO_2	50%	ARB 2012b. Emissions of carbon dioxide (CO_2) are not attributed to solid waste.
100-year Global Warming Potential of CH_4	21 g CO_2e/g CH_4	IPCC 1996
Molecular weight of CH_4	16.04 g/mol	-
Molecular weight of C	12.01 g/mol	-

CO_2e emitted from 1 ton waste:

0.141 MT CO_2e/1 ton waste

Calculate the CO_2e emission factor for solid waste

Input	Value	Data Source
CH_4 emitted from 1 ton waste	0.141 MT CO_2e/1 ton waste	Calculated
1 ton =	2,000 lb	-
1 lb =	453.592 g	-
1 MT =	1,000,000 g	-

CO_2e emission factor for solid waste:

0.155 MT CO_2e/tonne waste

Calculations for Commercial Sector

Calculate CO_2e emissions from Project solid waste disposal

Input	Value	Data Source
Total Employees	14,200 employees	ARB 2012a (page 41 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
Waste Generation Rate	1,194 kg waste/employee-year	City of Los Angeles 2006
Days per Year	250 days/year	ARB 2012a (page 25 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
Diversion Rate	63%	CalRecycle 2012
CO_2e Emission Factor	0.155 MT CO_2e/tonne	Calculated

Project 2016 Total Indirect Emissions from Solid Waste: 972 MT CO_2e/year

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California Air Resources Board. 2012a. Air Resources Board Staff Assessment of the Apple Campus 2 Application for Environmental Leadership Development Project. June. Available online at: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf

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Water Emissions Calculations

Apple Campus 2
AB900 Application Updates: Water Emissions

Determination of Emission Factor

Excerpt of Table A4-6 of CPUC and WetCat 2010:

Stage	State Average (ton CO_2/AF)
Supply	0.6
Treatment	0.01
Distribution	0.1
Wastewater	0.1
End Use	1.7
Total	**2.51**

AF = acre foot

Based on ARB 2012, exclude End Use to get the following emission factor for indirect emissions from water:

CO_2 emission factor 0.81 ton CO_2/AF

Convert this value to MT CO_2e/Mgal for use in subsequent calculations:

Input	Value	Data Source
CO_2 emission factor	0.81 ton CO_2/AF	Calculated
1 AF =	325,851 gal	-
1 Mgal =	1,000,000 gal	-
1 ton =	2,000 lb	-
1 lb =	453.592 g	-
1 MT =	1,000,000 g	-

CO_2e emission factor for water:

2.255 MT CO_2e/Mgal

Calculations for Office Space

Inputs to the calculation:

Input	Value	Data Source
Area	3,640 1,000 sq ft	AB900 Application (page 41 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
Water Use Rate	146.5 gal/1,000 sq ft-day	City of Milpitas 2009
Days per Year	365 days/year	-
Efficiency	30%	AB900 Application (page 29 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
1 Mgal =	1,000,000 gal	-
CO_2e EF	2.255 MT CO_2e/MGal	Implementing a Public Goods Charge for Water, Table A4-6. Includes Supply, Treatment, Distribution, and Wastewater. Excludes End Use.

Project 2016 Office Space Indirect Emissions from Water:

307 MT CO_2e/year

Calculations for Landscaping

Inputs to the calculation:

Input	Value	Data Source
Permeable Landscape	5,275,000 sq ft	AB900 Application (page 41 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
1 acre =	43,560 sq ft	-
Area	121 acres	ENVIRON calculation
Water Use Rate	1,300 gal/acre-day	City of Milpitas 2009
Days per Year	365 days/year	-
Efficiency	30%	AB900 Application (page 29 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf)
1 Mgal =	1,000,000 gal	-
CO_2e EF	2.255 MT CO_2e/MGal	ing a Public Goods

Project 2016 Landscaping Indirect Emissions from Water:

91 MT CO_2e/year

Project 2016 Total Indirect Emissions from Water: 398 MT CO_2e/year

References

California Air Resources Board. 2012. Air Resources Board Staff Assessment of the Apple Campus 2 Application for Environmental Leadership Development Project. June. Available online at: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf

City of Milpitas. 2009. Water Master Plan Update. December. Available online at: http://www.ci.milpitas.ca.gov/_pdfs/eng_mp_water.pdf

California Public Utilities Commission (CPUC) and the Water Energy Team of the Climate Action Team (WetCat). 2010. Implementing a Public Goods Charge for Water. July. Available online at: http://www.waterplan.water.ca.gov/docs/cwpu2009/0310final/v4c02a19_cwp2009.pdf

Exhibit B: Transportation Impact Analysis

Apple Campus 2 Trip Generation Rates

The proposed trip generation rate per employee has not changed from that submitted in the initial AB900 application, 3.59 trips per day per employee. With 14,200 employees total at the Project, the total trip generation rate is 50,978 trips per day. Table 1, below, shows the trip rate per employee and the total daily trips for the proposed Apple Campus 2, based on trip rates derived from surveys at the existing Infinite Loop campus.

As discussed in its AB900 application, Apple Campus 2 trip rates on a daily basis are similar to the industry-standard Institute of Transportation Engineers (ITE) trip generation rates for land uses with similar characteristics—single tenant office building, and research and development center. Apple Campus 2 AM peak hour and PM peak hour trip rates are lower than the ITE rates, however, indicating that travel will be more spread out over the day.

Table 1.
Trip Generation - Apple Campus 2

Land Use	Employee Count	Daily Trip Rate (trips/employee-day)	Daily Trip Rate (trips/day)
Apple Campus 2	14,200	3.59	50,978

ENVIRON has used the total trip count of 50,978 trips per day to adjust the daily trip counts for the categories used by ARB in its AB900 Determination.[1] Trips were first divided into home-based work (i.e., commute) and non-home-based trips. Non-home-based trips were further divided into vendor, visitor, and Apple Transit trips, with the difference being non-commute trips. The trip rates developed in this way were used with the emission factors and methodology of ARB in its AB900 Determination to calculate Project greenhouse gas emissions.

1. California Air Resources Board. 2012. Air Resources Board Staff Assessment of the Apple Campus 2 Application for Environmental Leadership Development Project. June. Available online at: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf

Development of Home-Based Work and Non-Home-Based Trip Counts

Trip type	Proposed Apple Campus 2 Total Trips per Day	Data Source
Total Trips	50,978	Assumes 3.59 trips per employee per day with 14,200 total employees for the Project scenario
Home-Based Work Trips	21,727	Calculated by ENVIRON assuming employees who drive to work make one round-trip commute trip per day; this includes a 72% SOV rate and a 10% carpool rate with 2.22 people per carpool on average. Includes electric vehicle trips.
Non-Home-Based Trips	29,251	Calculated by ENVIRON by difference between total trips and commute trips. Non-home-based trips are assumed to include non-commute, visitor, vendor, and Apple Transit trips as used in the ARB Determination.

Development of Visitor, Vendor, Apple Transit, and Non-Commute Trip Counts

Trip type	Total Vehicle Trips per Day	Data Source
Total Non-Home-Based Trips	29,251	Calculated by ENVIRON by difference between total trips and commute trips
Visitor Trips[1]	2,840	10% of employee population times two trips per round trip
Vendor Trips[1]	1,114	Vendor trip rate of 190 round trips per day per 4,844 employees, times 2 trips per round trip, is from the AB900 Application (page 100 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf). The 2011 baseline ratio of 190 vendor trips per 4,844 Apple employees, approximately 4%, is applied to the total employee count of 14,200 to calculate the vendor trip count.
Apple Transit Trips[1]	183	Apple Transit trip count per day is from the AB900 Application (page 106 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf). For the Project, ENVIRON assumes trip frequencies scale with employee population based on the ratio of employee population to the 2011 all-Cupertino Apple employee population of 12,750 used to calculate the 2011 baseline vehicle miles per day (also on page 106 of 304 of this pdf: http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf).
Non-Commute Trips	25,114	Calculated by ENVIRON by difference between total non-home-based trips and visitor, vendor, and Apple Transit trips. Includes electric vehicle trips.

1. These trip rates are determined using the methods ARB used in its Determination (available online at http://opr.ca.gov/docs/ARBDeterminationAppleCampus2.pdf).