Appendix C

Energy and Water Efficiency Compliance Report

To: City of Los Angeles Department of City Planning

From: Green MEP Engineering Consulting, Inc.

Date: August 20, 2018

Subject: CEQA Exemption (8) Energy and Water Efficiency Compliance for **942 N. Broadway** (Case #: EMV-2018-3238-EAF / CPC-2018-3237-DB-MCVP-WDI-SPR)

I. EXECUTIVE SUMMARY

The purpose of this analysis is to describe how the 942 N. Broadway project (the "Project") will meet the Public Resources Code section 21155.1 Sustainable Communities Strategy CEQA exemption for transit priority project subsection (a)(8) requirement for energy and water efficiency.

Public Resources Code Sec. 21155.1 (a)(8) requires that:

> *The buildings in the transit priority project are 15 percent more energy efficient than required by Chapter 6 of Title 24 of the California Code of Regulations and the buildings and landscaping are designed to achieve 25 percent less water usage than the average household use in the region.*

The Project is a mixed-use development in the City of Los Angeles consisting of 178 residential units with 36,814 sf of commercial area (31,777 sf of office, 532 sf of retail and 4,505 sf of restaurant), and below-grade vehicular and bicycle parking in one integrated building. The lot area is 29,012 sf.

This Project complies with both requirements, as follows:

- Energy Use: **15.2%** less than allowed by Title 24, Part 6 2016.
- Water Use: **27.4%** below the average household use in the region.

The energy and water efficiency compliance strategies are separately described below.

II. Energy Efficiency

1. Regulatory Framework

Public Resources Code Sec. 21155.1 (a)(8) requires that a Sustainable Communities Strategy project be 15 percent more energy efficient than required by Title 24, Part 6, the California Energy Code.

Title 24 of the California Code of Regulations, known as the California Building Standards Code or just "Title 24," contains the regulations that govern the construction of buildings in California. Part 6 of the Title 24 of the California Code of Regulations deals with the California Energy Code.

Title 24, Part 6 provides two compliance paths:

1. The *Prescriptive Method*, under which projects must implement individual aspects of the building, one at a time, verifying that each aspect is not below the minimum or above the maximum level prescribed by the Title 24 code.

2. The *Performance Method*, under which projects use California Energy Commission approved energy modeling software to demonstrate that projects meet the required level of energy performance by calculating energy trade-offs. Under the Performance Method, the energy consumption of the entire building is calculated at once and uses this calculation to find the most cost-effective method of satisfying Title 24.

To enable the City of Los Angeles Department of Building and Safety to readily confirm compliance with the Subsection (a) (8) requirement of 15 percent more efficient than Title 24, Part 6, the Project will use the Performance Method.

The following sections provide greater detail into the energy modeling process, the necessary design measures, and the resulting performance.

2. Energy Modeling

Preliminary whole building energy modeling was conducted to determine the anticipated Title 24 energy code performance. The energy modeling was done using a software tool approved by the California Energy Commission to generate a comparison of the Proposed Design to a Baseline Design compliant to Title 24 (2016).

<u>Baseline Design</u>

The software program automatically generates a Baseline Design that is compliant to Title-24. It includes the following parameters:

- The same physical size and shape as the Proposed Design
- The same occupancy schedules and zoning as the Proposed Design
- The prescriptive assembly and glazing U-Factors, and solar heat gain coefficients, based on climate zone
- The prescriptive lighting allotment based on occupancy or task
- The mandatory ventilation rates by occupancy
- The appropriate mechanical system
- A mechanical system size appropriate for heating and cooling loads

The results are measured as Time Dependent Valuation (TDV) Energy, which accounts for the energy used at the building site, consumed in producing, and in delivering energy to a site. TDV is calculated by multiplying the site energy use for each energy type times the applicable TDV multiplier. TDV multipliers vary for each hour of the year and by energy type, by climate zone and by building type

3. Energy Model Input

The energy model considers the following characteristics of the Project:

Site and Climate

The project is located on 942 N Broadway in Los Angeles, California.

- Latitude / Longitude 34.2° N / 118.3° W
- Climate Zone CA 9
- Weather File USA_CA_Burbank-Glendale-LOS-ANGELES-DOWNTOWN_722874_CZ2010.epw
- Summer Design DB/WB 99/69°F (0.1%)
- Winter Median of Extremes 38°F

Architecture and Form

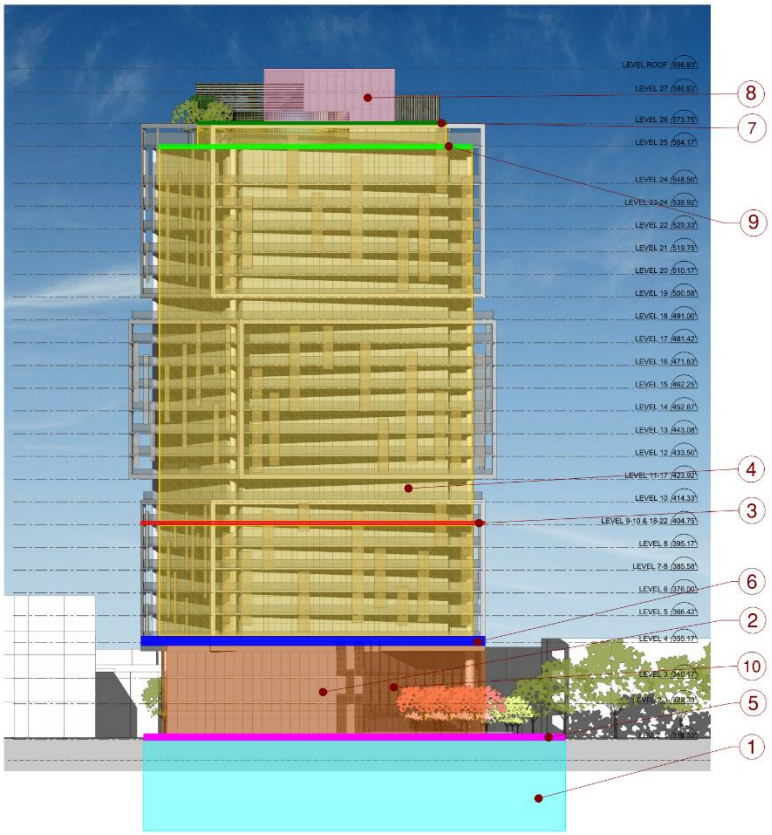
The building is an efficient podium and tower design with a concrete slab and core structure clad in a thermally broken aluminum glazed window system. It consists of 25 floors above ground and five levels of underground parking. The podium part of the building is three levels of retail and office space with approximately 13,341 sf per level. The residential floors from level 4 to 24 are approximately 9,973 sf each.

Opaque Assemblies

The opaque assemblies are the roof, wall and floor assemblies that enclose the conditioned spaces in the Project, protecting them from the outdoor environment. The assemblies used in the simulation model of the Proposed Design are described in Figure 1 below. For the Title 24 Baseline Design, the opaque assemblies follow the prescriptive envelope thermal performance requirements.

Figure 1. Proposed Design

1. Unconditioned Underground Parking
   12" Underground Concrete Walls
2. Retail/Office Storefront Glazing (Levels 1 thru 3)
   30% Spandrel R-20 - U Value 0.141 (R-7.1)
   70% Glazing: U-Value - 0.29
   Solar Heat Gain Coefficient (SHGC) - 0.27
   Visible Transmittance (VT) - 0.61
3. 8" Concrete Slab at building facade modeled as overhang for window shading
4. Tower Vision Glass v. Spandrel (Levels 4 thru 25)
   35% Spandrel R-20 - U Value 0.141 (R-7.1)
   65% Vision Glass: U-Value - 0.29
   Solar Heat Gain Coefficient (SHGC) - 0.39
   Visible Transmittance (VT) - 0.7
5. 48" Concrete Raised Floor Assembly - U-Value 0.215 (R-4.7)
6. Level 3 (Roof above Offices)
   12" Concrete Slab w/ R-20 Insulation - U-Value - 0.045 (R-22.2)
7. Amenity Tower Roof
   12" Concrete Slab w/ R-20 Insulation - U-Value - 0.045 (R-22.2)
8. Unconditioned Mechanical Rooms (Level 26-27)
   8" Concrete Walls
9. Residential Tower Roof
   12" Concrete Slab w/ R-20 Insulation - U-Value - 0.045 (R-22.2)
10. Screens at Office Levels (modeled as "fins")
    Current 4.5' fin depth



Characteristics of the HVAC and DHW Systems

For the Project to be more energy efficient than Title 24 standards, the Proposed Design's total Time Dependent Valuation (TDV) energy use must be equal to or less than the Baseline Design's Total TDV energy budget. The following are the categories of TDV energy end use considered in the energy model:

- **Heating**: Annual TDV energy used for space heating
- **Cooling**: Annual TDV energy used for space cooling
- **Lighting**: Annual TDV energy used for electric lights
- **Process Lighting**: Annual TDV energy used in process lighting input within the program
- **Receptacle**: Annual TDV energy used to meet equipment (receptacle) load. This value is fixed for compliance by occupancy
- **Fans**: Annual TDV energy used for fans moving conditioned air
- **Heat Rejection**: Annual TDV energy used for cooling tower operation
- **Pumps**: Annual TDV energy used pumps for hot water, chilled water, and condenser water piping systems

- **Process**: Annual TDV energy used in process loads input within the program
- **Service Water Heating (DHW)**: Annual TDV energy used for domestic (service) hot water

4. Energy Efficiency Measures

There are key performance measures and features of the Proposed Design that increase the building energy efficiency. These include:

Building Envelope

- **Overhanging balconies for solar shading:** Each level of the tower has an average 6 feet deep balcony slab that provides shading for windows. It reduces solar heat gain and cooling energy use. Another benefit is the reduced glare, which makes the space more comfortable.
- **High-performance window system:** The Project would use a thermally broken, double glazed window system with low-emissivity coatings and insulated spandrel panels. These combined effects reduce cooling energy during the summer and heating during the winter.

Lighting

- **High-efficacy, LED lamp types for amenities, offices, and other common area lighting:** The Project would use high-efficacy LED fixtures. High-efficacy LED fixtures provide more lumens (light output) per watt (electric input) than other lamps like fluorescent or incandescent light fixtures.
- **Daylighting controls for amenities and offices:** The Project would use daylighting controls for all amenities at levels 4, 5, and 25, as well as the offices at floor levels 2 through 3. Daylight harvest controls are controls that sense the amount of natural daylight entering a space and automatically dims the lights. This allows for energy savings while maintaining adequate light levels in the space.
- **Occupancy controls with dimming for amenity, offices, and other common area lighting:** Occupancy controls sense when spaces are vacant for a period of time and automatically turn off lights, saving energy as compared to leaving them on continuously.

HVAC System

- **High-efficiency water source heat pumps ranging from 13.9 to 15.6 Energy Efficiency Rating (EER) for heating, ventilating, and air-conditioning (HVAC):** Water source heat pumps require the use of a chiller system to provide cooling to the residential, commercial, amenity, and office spaces. Using a boiler system, the water source heat pumps provide heating to the various spaces. EER is the ratio of output cooling energy to input electrical energy at a given operating point. EER is normally calculated with a 95°F outside temperature and an inside (return air) temperature of

80°F and 50% relative humidity. The Project would use increased EER values between 13.9 to 15.6 over the 2016 Title-24 code minimum EER of 12, resulting in water source heat pumps that provide the same amount of heating and cooling, while using less electricity to operate it.

Domestic Water Heating

- **Centralized hot water system:** Large centralized hot water systems use more efficient equipment than individual heating systems within the units. The Project would use a centralized hot water system that is 96% more efficient than the standard 82% efficient centralized water heating system. The water heating system has recirculation controls to keep water in the lines hot, reducing hot water wait time and water waste. This hot water system also makes it easier to integrate renewable energy systems like solar hot water.
- **Solar Collectors:** The Project would use a solar hot water factor of 0.2, in that 20% of the hot water heating system will be provided from the solar collectors. Energy usage is reduced in the centralized hot water system.
- **High-efficiency water fixtures:** By specifying fixture flow rates per the more stringent City of Los Angeles Green Building Code versus the standard CalGreen Code, the Project will inherently use less hot water. As a result, there is a lower energy consumption. Table 1 below compares the maximum allowable flow rates between the two building codes.

Table 1. Max Allowable Flow Rates of 2017 Los Angeles Green Building Code vs 2016 CalGreen Code

Fixture Type	Maximum Allowable Flow Rate per 2017 Los Angeles Green Building Code	Maximum Allowable Flow Rate per 2016 CalGreen Code
Showerheads	1.8 gpm @80 psi	2.0 gpm @80 psi
Lavatory Faucets, residential	1.2 gpm @ 60 psi	1.2 gpm @ 60 psi
Lavatory Faucets, nonresidential	0.4 gpm @ 60 psi	0.5 gpm @ 60 psi
Kitchen Faucets	1.5 gpm @ 60 psi	1.8 gpm @ 60 psi
Metering Faucets	0.2 gallons/cycle	0.25 gallons/cycle
Gravity Tank type, Flushometer tank, and Flushometer valve water closets	1.28 gallons/flush	1.28 gallons/flush
Urinals	0.125 gallon/flush	0.125 gallon/flush
Clothes Washers & Dishwashers	ENERGY-STAR certified	ENERGY-STAR certified

Table 2 below gives detailed information of what was specified in the energy model for the Proposed and Baseline Design to achieve the comparative TDV energy values.

Table 2. Values Used in the Energy Model

2016 Code – Title-24		
Program Participation Climate Zone: 9		
Los Angeles, CA		
Building Envelope	**Proposed Design**	**Title-24 2016 Baseline**
Glazing Percentage (Tower L4-25)	65%	40%
Glazing Percentage (Retail & Office L1-3)	70%	40%
Overhang	6'-0" Horizontal Projection	Not required
Insulation Values	**Proposed Design**	**Title-24 2016**
Exterior Wall – all levels Insulated spandrel, thermally broken aluminum framing, low-e glass	R-20 (U-0.141)	U-0.062
Concrete Roof	R-20 (0.045)	0.028
HVAC Efficiencies	**Proposed Design**	**Title-24 2016 Baseline**
EER	13.9 / 14.8 / 15.6	12.0
Duct Insulation	R-4.2	R-4.2
Ventilation Fan (ASHRAE 62.2)	Yes	Yes
Boiler Efficiency	96%	82%
Domestic Hot Water Heating	**Proposed Design**	**Title-24 2016 Baseline**
Fuel Type	Gas	Gas
Input Rating (btu/hr)	1,500,000	-
Type	Central Water Heater	Central Water Heater
Efficiency	96%	82%
Solar Domestic Hot Water	**Proposed Design**	**Title-24 2016 Baseline**
Net Solar Fraction	20%	Not Required
Fenestration NFRC Values (U-Factor / SHGC / VT)	**Proposed Design**	**Title-24 2016 Baseline**
Windows (Tower L4-25)	0.29 / 0.39 / 0.7	0.41 / 0.26 / 0.5
Windows (Retail & Offices L1-3)	0.29 / 0.27 / 0.61	0.41 / 0.26 / 0.5

5. Energy Model Results

Based on the values in the model, the Energy Use Intensity (EUI) of the Proposed Design is calculated and compared to the Baseline in Table 3 below. The results show that the Project has an estimated EUI of 64.34 TDV, compared to the Baseline of 75.92 TDV.

With the incorporation of these performance measures, the Project exceeds Title 24 standards by 15.2%.

These performance estimates are intended to be used for relative comparisons between the Proposed Design and the Title 24 baseline model. There are a range of energy efficiency measures that can achieve the required 15% greater energy efficiency as required by Public Resources Code Sec. 21155.1 (a)(8).

The final combination of energy efficiency measures is best selected during the final design of the project, when other options may be considered.

Table 3. Energy Use Intensity (EUI) for Each Model by End-Use

Energy End-Use	**Notes**	**Proposed (TDV)**	**Baseline (TDV)**	**Margin (TDV)**
Interior Lighting	1	12.16	12.51	0.35
Space Heating	2	0.76	2.15	1.39
Space Cooling	2	34.66	27.30	-7.36
Pumps	2	5.71	3.75	-1.96
Fans - Interior	2	1.76	18.70	16.94
Service Water Heating	3	7.63	10.04	2.41
Heat Rejection	4	1.66	1.47	-0.19
Total	-	64.34	75.92	11.58
Savings	**5**	**15.2%**		

Notes:

1. Corresponds to "lighting" energy category in T24 Energy Efficiency Measures (EEM) section.
2. Corresponds to "building envelope" and "HVAC system" energy categories.
3. Corresponds to "domestic water heating" energy category.
4. Does not correspond with any EEM as it is unregulated energy category.
5. Percent savings determined by dividing total margin by total baseline energy.

III. WATER EFFICIENCY

1. Regulatory Framework

Public Resources Code Sec. 21155.1 (a)(8) requires that each project achieve a 25 percent water use reduction from the *regional average household water use*.

The Project will be required to comply with Ordinance No. 170,978 (Water Management Ordinance), which imposes numerous water conservation measures and Ordinance No. 180,822 (Water Efficiency Requirements for New Development). It will also comply with the 2017 Los Angeles Green Building Standards Code which contains higher standards for water use efficiency than the 2017 California Green Building Standards Code (CalGreen). Table 1 in the previous section shows the comparison of maximum allowable fixture flow rates between the two building codes.

According to the *Metropolitan Water District Water Tomorrow Annual Report to the California State Legislature, Covering Fiscal Year 2015/16 (page 2)*, the average regional Gallons Per Capita Per Day Usage (p. 2) is 131 gallons (http://www.mwdh2o.com/PDF_About_Your_Water/SB60_2017_condensed.pdf) [Accessed 07/19/2018].

Per the *City Planning Demographics Unit - 2016*, the Los Angeles average multifamily unit household size is 2.43. Therefore, the average Los Angeles multi-family residence water use per day is 318.33 gallons (131 gallons x 2.43 people).

2. Water Efficient Features of the Project

The following are some of the water efficient features of the Project. They are based on applicable California Green Building Code and City of Los Angeles Building Code requirements:

- High Efficiency Toilets with flush volume of 1.28 gallons of water per flush or less
- High Efficiency Urinals with 0.125 GPF
- Showerheads with flow rate of 1.8 gallons per minute or less
- High Efficiency Clothes Washers - residential with Energy Star certification
- Lavatory Faucet with flow rate of 0.5 gallons per minute or less for Commercial and 1.5 gallons per minutes for Residential
- Kitchen Faucets with flow rate of 1.5 gallons per minute or less for Retail/Commercial
- Domestic Water Heating System located proximity to point(s) of use
- Water-Saving Pool Filter
- Pool/Spa recirculating filtration equipment
- Pool splash troughs around the perimeter that drain back into the pool

- Meter on the pool make-up line Leak Detection System for swimming pools and spas
- Drip/Subsurface Irrigation (Micro-Irrigation)
- Proper Hydro-zoning/ (groups plants with similar water requirements together)
- Zoned Irrigation
- Landscaping Contouring to minimize precipitation runoff
- Drought Tolerant Plants

3. Water Use Calculation

The following table shows the estimated water usage of the Project taking into consideration detailed project information, including the quantity and type of fixtures, occupant use, irrigation demand and amenities water use.

Residential water use is based on the calculation that 178 dwelling units would result in an estimated 433 occupants, per City Planning Demographics Unit (2016) rate of 2.43 occupants per unit. The occupant use of the Amenity and Common areas are based on Table A, Chapter 4 of the California Plumbing Code. The irrigation demand was calculated by the landscape architect per California Water Efficient Landscape Ordinance. The water use of the pool and water features was calculated by the pool consultant.

Table 4. Title 24 Part 11 CalGreen Whole Building Water Use Calculation

Fixture Type	Flow Rate[1] (gpm/gpf)		Duration (min or # flush)		Daily Uses[2]		Occupants[3]		Proposed Gallons per Day
RESIDENTIAL WATER USE									
Showerheads	1.8	x	8	x	1	x	433	=	6,235.20
Lavatory faucets	1.2	x	0.25	x	5	x	433	=	649.50
Kitchen faucets	1.5	x	4	x	1	x	433	=	2,598.00
Water closets (M)	1.28	x	1	x	5	x	216.5	=	1,385.60
Water closets (F)	1.28	x	1	x	5	x	216.5	=	1,385.60
Clothes washers (gal/person-day)[5]					5.08	x	433	=	2,199.64
Dishwashers (gal/person-day)[6]					0.43	x	433	=	186.19
Residential Total									**14,639.73**
RETAIL WATER USE									
Lavatory faucets	0.4	x	0.25	x	3	x	26	=	7.8
Water closets (M)	1.28	x	1	x	3	x	13	=	49.92
Water closets (F)	1.28	x	1	x	3	x	13	=	49.92
Urinal	0.125	x	1	x	2	x	13	=	3.25
Retail Total									**110.89**
RESTAURANT WATER USE									
Lavatory faucets	0.4	x	0.25	x	3	x	260	=	78
Kitchen sinks	1.8	x	4	x	3	x	260	=	5,616

Water closets (M)	1.28	x	1	x	3	x	130	=	499.2
Water closets (F)	1.28	x	1	x	3	x	130	=	499.2
Urinal	0.125	x	1	x	2	x	130	=	32.5
Comm. Dishwasher	1.67	x	60	x	4	x		=	400.8
Restaurant Total									**7,125.70**
AMENITY / COMMON AREA WATER USE									
Room	**Area**		**Occupant Load Factor[4]**		**Occupants**				**Gallons per Day**
Fitness[7]	2,773		30		92				2008.73
Plaza/Roof Terrace[7]	15,674		200		78				1,697.02
Community Rooms[7]	3,693		30		123				528.86
Pool[8,8a]									433
Spa[9,9a]									83
Water Feature[10]									125
Irrigation[11]									421.53
Cooling Tower[12]									8,112
Parking Structure[13]	117,589 sq. ft.								2,351.78
Amenity / Common Area Total									**15,760.92**
OFFICE WATER USE									
Office[7]	31,508		200		158				3,517.87
Office Total									**3,517.87**
Proposed Design – Total Water Demand (GPD)									**41,155.11**
Proposed Design - Water Use / Household (GPD)									**231.21**
Baseline – Total Water Demand (GPD)[14]									**56,662.74**
Baseline - Water Use / Household (GPD) [14]									**318.33**
PERCENT REDUCTION FROM BASELINE									**27.4%**

Notes

1. Flow rates are the maximum allowed under City of Los Angeles Green Building Code (Form GRN 17).
2. Daily uses per CalGreen Building Standards Code, Chapter 8 - Compliance Forms, Worksheets and Reference Material.
3. For Residential Water Use occupancy based on 178 dwelling units x 2.43 occupants per household. For Retail and Restaurant Water Use occupancy based on load factor per CPC Section 422.0, Table A.
4. Occupancy load factor per CPC Section 422.0, Table A.
5. Clothes Washer in each unit. Los Angeles Green Building Code requires Energy Star certified units. Typical Energy Star unit = 3.2 WF (Water Factor) = 5.08 gal per person per day.
6. Dishwasher assumed in each unit. Los Angeles Green Building Code requires Energy Star certified units. Typical Energy Star unit = 4 GPC (Gallons per Cycle) = 0.43 gal per person per day.
7. Amenity / Common Area square footage based on architectural plans.
8. Per pool consultant, pool surface 908.25 SF. Approx. ¾" loss per day (splash and evaporation), or 425 gallons to be made up per day.

    a. Based on the draining half of the pool every five (5) years. Pool capacity of 25,544 gallons. (25,544 gallons / 0.5) / 5 years = 2,555 gallons per year or 7 gallons per day.
9. Per pool consultant, spa surface 130 SF. Approx. 1" loss per day (splash and evaporation), or 82 gallons to be made up per day.
    a. Based on the draining half of the spa every five (5) years. Spa capacity of 130 gallons. (130 gallons / 0.5) / 5 years = 220 gallons per year or 0.6 gallons per day.
10. Water feature estimate surface 200 SF. Approx. 1" loss per day, or 125 gallons to be made up per day.
11. Irrigation usage is based on the Maximum Applied Water Allowance from the California Water Model Efficiency Landscape Ordinance. 153,859 gallons per year (421.53 gallons per day.)
12. Based on 26 gpm evaporation for the two (2) cooling towers with operation at 8 hours per day, 7 days per week and 65% load capacity.
13. Based on the City of Los Angeles Department of Public Works - Bureau of Sanitation Sewer Generation Rates (0.02 gallons per sq. ft.)
14. Based on the regional average for Los Angeles multi-family residence water demand per day of 318.33 gallons (131 gallons x 2.43 people). The Project has 178 residential units.

4. Water Usage

It is estimated that the Project will use an average of 41,155.11 gallons per day of water. With 178 residential units, the household water use is approximately 231.21 gallons per day, compared to the baseline calculation of 318.33 gallons per day.

In conclusion, the Project is designed to achieve approximately 27.4% less water usage than the average household in the region.

These calculations are used to show a relative comparison between the Project and the regional average household water use. There are a range of water efficiency measures that can achieve the required reduction. The final combination of water efficient features is best selected during the final design of the Project, when other options may be considered.