



**Memorandum** To: Mr. Stephen Buchbinder Date: September 26, 2013

Project 10865.02  
No.:

From: Richard S. Hollworth, P.E. Re: Water Conservation Measures  
Inflow and Infiltration

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This memorandum has been prepared to describe the distinction between the design average daily sewer flow generation rates as established under MassDEP 314 CMR 7.15 and anticipated actual sewer flow rates.

The MassDEP design flow rates are intentionally conservative to account for daily fluctuations. However, the MassDEP design flow rates do not account for the reductions in sewer flow accomplished through the implementation of water conservation measures including low flow and ultra-low flow plumbing fixtures (showerheads, urinals, toilets and faucets) and high efficiency appliances (washing machines and dishwashers).

The following excerpts from our Special Permit Application identify the specific goals of the Water Conservation Measures to be implemented on the Station at Riverside project:

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**“ Improvements to Wet Infrastructure**

*Water, sewer, and storm water infrastructure improvements which increase capacity and lower impacts on the surroundings.*

The following sections provide a summary of water, sewer and storm water infrastructure availability and improvements necessary to increase capacity and lower impacts on the surroundings.

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**Water Supply**

The projected water consumption rates provided below assumes that water use is roughly equivalent to wastewater flows calculated in accordance with the DEP Wastewater Design Flow Guidelines at 314 CMR 7.15, generally as follows:

Office Space: 75 gallons per day per 1,000 square feet  
Apartments: 110 gallons per day per bedroom

Retail: 50 gallons per day per 1,000 square feet  
 Restaurant: 35 gallons/seat

Because the DEP wastewater design flow volumes are considered to be very conservative in relation to actual flow volumes, no increase in water consumptive rates have been applied to these figures.

**Unadjusted Maximum Projected Daily Water Use**

| <b>Land Use</b> | <b>Unit Wastewater Rate (gpd)</b> | <b>Total Size of Building Program</b> | <b>Water Use 100% of Wastewater Rate (gpd)</b> |
|-----------------|-----------------------------------|---------------------------------------|--|
| Office          | 75/1000/sf                        | 225,000 sf                            | 16,875   |
| Residential     | 110/bedroom                       | 18 studio                             | 1,980  |
|                 |                                   | 157 one bedroom                       | 17,270   |
|                 |                                   | 104 two bedrooms                      | 22,880   |
|                 |                                   | 12 three bedrooms                     | 3,960  |
|                 |                                   | 419 bedrooms                          | 46,090   |
| Retail          | 50/1,000 sf                       | 15,000 sf                             | 750  |
| Comm. Space *   | 75/1000 sf                        | 8,000 sf                              | 600  |
| Restaurant      | 35/ seat                          | 200 seats                             | 7,000  |
| <b>Total</b>    |                                   |                                       | <b>71,315</b>                                  |

sf = square feet; \*Use of this space currently undefined.

Water Conservation

The Applicant has taken an “integrated planning” approach to water conservation for the Project with a goal of minimizing the impact on the local water distribution system and the MWRA water supply system. Maximizing water efficiency within buildings will reduce the burden on the municipal water supply and wastewater systems. Due to significant differences in the design, construction and on-going operation of each of the various land uses, it is imperative to evaluate the appropriateness and effectiveness of the water conservation measures per land use. For example, each rental unit will be equipped with sub-metering of utilities to promote conservation. Like homeowners, when renters know that their dry and wet utilities are individually metered it improves greatly upon their conservation efforts.

Office Space Water Conservation

Within the 225,000 sf of office space, the Applicant will install low flow, high-efficiency faucets (0.5 gallons per minute (gpm)) as well as low-flow water closets and urinals resulting in an estimated 30% reduction in water use and subsequent wastewater generation based on LEED® guidelines (WE Credit 3.2). This 30%

reduction in water usage and wastewater generation equates to a reduction of 5,062 gpd and 1,847,810 gallons per year (gpy) from the office land use.

#### Residential

All residential units will be individually metered and equipped with low flow, high efficiency faucets (0.5 gpm). Based on industry standards, this improvement is expected to reduce water usage and subsequent wastewater generation by approximately 10%. This 10% overall reduction in water usage and wastewater generation equates to a reduction of 4,600 gpd and 1,679,000 gpy from the residential units alone.

#### Retail

The retail space will be outfitted with low flow, high efficiency faucets (0.5 gpm). Based on industry standards, this improvement is expected to reduce water usage and subsequent wastewater generation by approximately 10%. This 10% overall reduction in water usage and wastewater generation equates to a reduction of approximately 100 gpd and 36,500 gpy from the retail land use.

#### Restaurants

The program potentially includes one or more café style restaurants totaling up 5,000 gsf, (200-seats) which will be outfitted with low flow, high efficiency faucets (0.5 gpm). Based on industry standards, this improvement is expected to reduce water usage and subsequent wastewater generation by approximately 10%. This 10% overall reduction in water usage and wastewater generation equates to a reduction of approximately 700 gpd and 255,500 gpy from the restaurant land use.

#### Water Conservation Summary

The projected water demand adjusted to account for water conservation commitments are presented in the following table of Adjusted Project Water Demand with Water Conservation below.

#### **Adjusted Project Water Demand with Water Conservation**

| <b><u>Land Use</u></b> | <b><u>Water Use<br/>100% of<br/>Wastewater Rate</u></b> | <b><u>Water Conservation<br/>Reduction Factor<br/>(% of total)</u></b> | <b><u>Projected<br/>Water Use</u></b> |
|------------------------|---|--|---------------------------------------|
| Office                 | 16,875  | 30   | 11,800                                |
| Residential            | 46,090  | 10   | 41,480                                |
| Retail                 | 750   | 10   | 625                                   |
| Community              | 600   | 10   | 540                                   |
| <u>Restaurant</u>      | <u>7,000</u>  | <u>10</u>  | <u>6,300</u>                          |
| <b>Totals</b>          | <b>71,315 gpd</b>                                       |  | <b>60,745 gpd</b>                     |

Overall, water conservation measures are expected to reduce water consumption by approximately 3,860,000 gallons of water per year compared to typical design standards.”

Thus if we were to use the projected Water Use the corresponding Inflow and Infiltration Mitigation Fee would be calculated as follows:

$$60,745 \text{ gpd} \times 8:1 \times \$8.40 = \$4,082,064$$

As noted above, implementation of water conservation measures will result in an overall reduction of approximate 10-30% in water use and subsequent wastewater generation. The effectiveness of water conservation measures are further documented in the 1992 Water Resources Commission Water Conservation Standards for the Commonwealth of Massachusetts, the 1992 US Energy Policy Act as amended (EPAct) standards, US Green Building Council LEED and Stretch Building Code which establish specific reduction goals for the aforementioned fixtures. MWRA also acknowledges the effectiveness of water conservation measures to serve as sewer mitigation offsets by allowing local sewer authorities, subject to MassDEP approval to propose specific water conservation projects. Residential units will be sub-metered to promote conservation. Therefore, actual average daily sewer flow rates are expected to be considerably less than projected design flows.