



**TATA & HOWARD**

October 7, 2016

Ms. Susan Gittelman, Executive Director  
Covenant Commonwealth Corporation  
34 Washington Street  
Brighton, MA 02135

Subject: Letter of Transmittal for Water System Impact Report  
Coolidge at Sudbury Phase 2

Dear Susan:

As requested, Tata & Howard, Inc. is pleased to provide the Water System Impact Report for The Coolidge at Sudbury Phase 2 in accordance with the regulations for the Sudbury Water District.

Should you have any questions or require additional information, please do not hesitate to contact our office.

Sincerely,

TATA & HOWARD, INC.

Karen L. Gracey, P.E.  
Vice President

Enclosures

# TABLE OF CONTENTS

Letter of Transmittal

Section - Description	Page
SECTION 1 – Project Description.....	1
SECTION 2 – Water Demand .....	2
Estimated Demands .....	2
SECTION 3 – Impacts on Water System .....	4
Existing Water Supply System .....	4
Proposed Water Supply System.....	4
Permit Compliance .....	5
Proposed Conservation Measures .....	5

## SECTION 1 – Project Description

On behalf of Covenant Commonwealth Corporation, Tata & Howard Inc. has prepared this Water Impact Report for the Coolidge at Sudbury Phase 2 (Project) proposed development at 189 Boston Post Road in Sudbury Massachusetts. This report was prepared based on requirements outlined in the Sudbury Water District System Rules and Regulations. The Report includes:

- Estimated impact of the project on the District’s water demand,
- Impact of the project to the District’s existing supply system including the effect on water flow, speed and direction through the water mains proximate to the new service line, and on maintenance of adequate fire flow,
- Impact of the project on the District’s Water Management Act Withdrawal Permit compliance,
- Conditions and water conservation measures that will mitigate the effect of the project’s impact.

**Project Name:** Coolidge at Sudbury Phase 2

**Applicant:**

Ms. Susan Gittelman, Executive Director  
Covenant Commonwealth Corporation  
34 Washington Street  
Brighton, MA 02135

**Proposed Use:** 56 one-bedroom housing units for seniors and older adults

The sections below provide a detailed analysis of the Project’s water demand and impact on the District’s system.

## SECTION 2 – Water Demand

### Estimated Demands

The estimated demands are based on actual water use for The Coolidge at Sudbury Phase 1 between May, 2015 and May, 2016. Phase 1 includes 64 housing units for seniors and older adults (61 of the units contain one bedroom and 3 of the units contain two bedrooms). The water use for Phase 1 was approximately 50 gallons per day (gpd) per unit. Phase 1 water usage does not include outdoor water use as an onsite well is used for irrigation. Currently, there is not an irrigation well proposed for Phase 2. The applicant is still considering the possibility of installing an irrigation well onsite. A typical irrigation system uses between 12 and 20 gallons per minute (gpm) and can increase usage by approximately 900 gallons per day. Assuming the irrigation system is used for four months each year, the total demand will increase approximately ten percent. A multiplier of 1.1 has been used to account for outdoor water use in Phase 2. Based on the usage per unit in Phase 1 and using 56 planned units in Phase 2, the projected average day demand (ADD) for Phase 2, including the multiplier for irrigation, is approximately 3,050 gpd. This demand equates to an average flow of 2.1 gpm based on a 24-hour day. A flow rate for a 16 hour usage period is 3.2 gpm.

The Sudbury Water District has reported a maximum day demand (MDD) to ADD peaking factor of 2.0. For the proposed development, the peaking factor could be lower due to the use of water conserving plumbing fixtures. The maximum day peaking factor was not available for Phase 1, however, based on demands from the summer months, the peaking factor for the summer demand is approximately 1.3. The maximum day peaking factor of 2.0 is being assumed for this development to be conservative. Using this value, the maximum day demand (MDD) for the development is estimated at 6,100 gallons. This equates to a flow rate of 6.4 gpm over a 16 hour period.

According to Section 15 of 310 CMR (Title 5), 110 gpd per bedroom should be used for wastewater flow design of one bedroom units for elderly housing. This value equates to a daily wastewater flow of 6,160 gpd. Water usage is typically higher than wastewater usage, however, Title 5 estimates have often been proven to be greater than actual flows. Because of this, no additional multiplier was added to the wastewater demands to develop an estimated water usage based on Title 5 flows. Using the MDD/ADD peaking factor of 2.0, the estimated MDD is approximately 12,320 gpd, based on Title 5.

Because Title 5 flows are often an over estimate of actual water flows and we anticipate the demands to be similar to the Phase 1 demands, the estimated ADD of 3,200 gpd was used in this report.

#### Estimated Water Demand for Coolidge at Sudbury Phase 2:

##### Based on Actual Use at Coolidge at Sudbury Phase 1

Average Day 3,050 gpd

Maximum Day 6,100 gpd (2.0 x Average Day Demand)

Based on Title 5

Average Day 6,160 gpd

Maximum Day 12,320 gpd (2.0 x Average Day Demand)

## **SECTION 3 – Impacts on Water System**

### **Existing Water Supply System**

The Town of Sudbury is served by the Sudbury Water District, an independent municipal entity. The proposed project will be tapping into the existing 8-inch water main on Boston Post Road.

### **Proposed Water Supply System**

The developer proposes to install a 6-inch diameter water main to serve the development. The new main will connect to the existing 8-inch diameter water main along Boston Post Road.

The Sudbury Water District issued a mandatory outdoor water restriction on August 11, 2016. Because of the ban, no fire flow testing was completed for this report. The District provided the results of a previous flow test completed in November 2014 on Old Country Road and Goodman's Road. This test was located approximately 1,500 feet east of the proposed site.

The flowing hydrant was located off the 10-inch diameter main at along Old Country Road, east of Boston Post Road and the residual hydrant was located on Goodman's Road at the intersection with Boston Post Road. Both hydrants are located off 10-inch diameter mains, however, the mains are separated by an 8-inch diameter main. The flow measured during the test was 1,400 gpm. The static pressure at the residual hydrant was 155 pounds per square inch (psi) and the residual pressure during the flow test was 124 psi. Fire flow testing at this location indicates an available fire flow of approximately 3,000 gpm at a 20 psi residual pressure.

Based on the fire flow test provided by the District, the existing water distribution system is capable of providing adequate supply to the proposed development for both fire flow and domestic demands.

A representative fire flow of 1,000 gpm at the entrance to the proposed development was used to estimate the impacts to the system. Using the Hardy Cross Methodology and headloss flow tables based on the Darcy Weisbach flow formula, it was estimated that a demand of 1,000 gpm would increase flows from Green Hill Road and Goodman's Hill Road to the proposed development on Boston Post Road by 400 and 600 gpm, respectively. It was assumed the mains along Green Hill Road, Goodman's Hill Road, and Boston Post Road have C-factors of 100.

A velocity increase of approximately 3.8 feet per second occurs in the 8-inch diameter main along Boston Post Road between the proposed site and Goodman's Hill Road. The velocity increases approximately 2.4 feet per second in the 10-inch diameter main along Goodman's Hill Road and approximately 2.6 feet per second in the 8-inch diameter main along Green Hill Road and the 8-inch diameter main along Boston Post Road, from Green Hill Road to the proposed development. The increased velocity would only be due to an emergency situation and would not cause increases to velocity under normal flow conditions.

No calculation was performed for the increase in velocity during ADD and MDD because the increase in demand is minimal and any increase in velocity will be negligible.

### **Permit Compliance**

The Sudbury Water District's WMA authorized withdrawal volume is 2.08 millions gallons per day (mgd), however, the baseline, as defined by the District's 2010 WMA permit, is 2.06 mgd.

The ADD for 2014 and 2015 was 1.68 and 1.89 mgd, respectively. The 2015 demand is 0.17 mgd below the baseline value and 0.19 mgd below the authorized volume. The Project has a demand estimated at 3,050 gallons per day (0.003 mgd). This volume would have minimal effect on the District's overall demand. The District would remain approximately 0.17 mgd below the baseline volume and 0.19 below the authorized volume to meet demand growth.

### **Proposed Conservation Measures**

The project takes steps to reduce demand on the Sudbury Water District. Watersense low-flow toilets and aerators are being implemented throughout the building. Concept plans to-date have not yet assessed a location for an outdoor irrigation well. An irrigation well would reduce demand on the Sudbury Water District.