NORTH SAGAMORE WATER DISTRICT
14 SQUANTO ROAD, P.O. BOX 133
SAGAMORE BEACH, MA 02562

www.northsagamorewaterdistrict.com

Tel. 508-888-1085
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April 14, 2021

Mr. James Beyer, Chair
Zoning Board of Appeals
Bourne Town Hall
24 Perry Ave., Room 203
Buzzards Bay, MA 02532

RE: Cape View Way 40B, Application for Comprehensive Permit (#2021-CP06)

Dear Mr. Beyer,

I am writing you today in regards to the proposed Cape View Way 40B housing development located off of Meetinghouse Lane in Sagamore Beach. The North Sagamore Water District (NSWD) has received a completed application for water from the Preservation of Affordable Housing, Inc. for this project

At this time, the NSWD Board of Water Commissioners has not voted to approve the water connection for this project. The review of the application and utility plans is included in this correspondence. Staff comments and minimum requirements to connect to the water system have previously been sent to the Horsley Witten Group, the engineering firm representing the developer.

A hydraulic analysis for this project was completed by the NSWD's engineer, Kristen Berger of Resilient Civil Engineering on March 9, 2021. The hydraulic modeling showed a fire flow event at this location would negatively impact other areas of the water district. Under certain situations, a drop in water pressure below 20 PSI was observed in other locations of the water system. The minimum pressure requirement established by the MA Department of Environmental Protection during emergency situations is 20 PSI. In order to mitigate this condition, the applicant will be required to replace and increase the size of the water main from 8" to 12" on Williston Road from the Hoxie School to Scusset Beach Road, on Scusset Beach Road from Williston Road to Old Plymouth Road and on Meetinghouse Lane from Old Plymouth Road to Cape View Way.

The Board of Water Commissioners has set precedent to require this type of mitigation. In 2019, as a condition to approve the water connection for Canal Street Crossing, the developers

were required to replace and increase the size of the existing water mains on Canal Street and Hunters Brook Road. This mitigation was essential after similar findings during the hydraulic model analysis for their project.

In 2019, the Board of Water Commissioners adopted a policy in regards to the available capacity of the NSWD's groundwater wells and storage tanks to supply the water needed for future development. As of the date of this letter, the District has 18,940 gallons of water per day (gpd) available for new construction. The applicant's projected water usage is 8,610 gpd. This proposal represents a substantial increase from the estimated 1,650 gpd of the existing five lot subdivision. If approved, this project will leave 10,330 gpd available for all future construction under our current infrastructure. As a reference point, this is enough available water for thirty-two, three-bedroom homes to be constructed within the boundaries of the NSWD. Although our firm capacity is the immediate concern, all future growth will also bring our groundwater withdrawals closer to our MassDEP Water Management Act Permit limits.

All applicants are required to abide by the policies set forth in the NSWD's Regulations for Subdivisions and Large Commercial Buildings as well as our Rates and Regulations for Supplying Water. NSWD policies are available at www.northsagamorewaterdistrict.com/about-us .

Following the Board of Water Commissioner's completion of the application review process, we will notify the Zoning Board of Appeals of the availability of water for this project. If you have additional questions you may contact me by telephone at (508) 888-1085 ext.102 or email at matt-nswd@comcast.net.

Sincerely,

Matt Sawicki

Matthew Sawicki
Superintendent

Enc: North Sagamore Water District Requirements of Subdivision - 3/30/2021

CC: Mark Bergeron, Chair, North Sagamore Water District Board of Water Commissioners

Tel. 508-888-1085
Fax 508-888-8951

NORTH SAGAMORE WATER DISTRICT
14 SQUANTO ROAD, P.O. BOX 133
SAGAMORE BEACH, MA 02562

www.northsagamorewaterdistrict.com

Date: March 30, 2021

To: North Sagamore Water District Board of Water Commissioners

From: Matt Sawicki, Superintendent

RE: Cape View Way Application for Water for a Subdivision

Commissioners,

Enclosed you will find the North Sagamore Water District's staff review of the proposed 40B development on Cape View Way in Sagamore Beach. Included is also the letter from Kristen Berger, PE of ResilientCE in regards to the water model simulations for the Cape View Drive 40B development dated March 9, 2021.

Sincerely,

Matt Sawicki

North Sagamore Water District
Requirements of Subdivision

Project: **Cape View Way (40B)**
Preservation of Affordable Housing, Inc.
Meena Jacob, Senior Project Manager
(617) 449-0895 mjacob@poah.org

Date Completed Application Submitted: March 5, 2021

Requirements Prior to installation / Approval

North Sagamore Water District Board of Water Commissioners favorable vote

Mitigation per hydraulic analysis: Developer must agree to design and replace the existing 8" AC water main with a new 12" PVC water main on Williston Rd from the Hoxie School to Scusset Beach Road, on Scusset Beach Road from Williston Road to Old Plymouth Road and on Meetinghouse Lane from Old Plymouth Road to Cape View Way.

Satisfy plan review comments (March 26, 2021) and resubmit proposed water main design

NSWD water will not be permitted for irrigation

A copy of the recorded deed and plan for the easement shall be submitted to the water district

Performance Bond, 10% of water system expense for 2 years

Fees:

System Development Fee	$ 10,000.00
Engineering Reimbursement	$ 3,592.50
Legal Reimbursement	*TBD*
Connection fee for Building (1 1/2 Meter)	$ 11,500.00
Fire Service Connection Fee	$ 300.00
Payments as of March 26, 2021	*$ 1,000.00*
Total Fees Due as of March 26, 2021	**$ 24,392.50**

Requirements Prior to Acceptance / Water Turned On

As-built drawings submitted per regulations

Inspector paid in full

Backflow Prevention Device Design Data Sheets for building submitted and approved

Service Installation Fee to be finalized once the domestic service size is determined by the project engineer. (See plan review)

North Sagamore Water District
Subdivision Plan Review

Project: Cape View Way – Preservation of Affordable Housing

Engineer: Horsley Witten Group, Inc., Joseph Henderson, PE

Plan Date: March 5, 2021

Reviewed by: Matt Sawicki

Review Date: March 26, 2021

Description: Proposed 40B subdivision connecting to water mains on Meetinghouse Lane and looping to Homestead Road. Project includes one building containing 51 units and 90 bedrooms. It will be supplied by an 8" water main with one domestic and one fire service. A utility easement is needed to tie the water system into Homestead Road.

Sheet	Modification
C11, C12	Engineer shall clarify if the developer intends to use the existing 8" PVC water main or if the water main will be replaced. Proposed 8" DI water mains may be constructed of PVC.
C11, C12	Utility plan shall show all street names.
C11, C12	A hydrant shall be added between the proposed hydrant and TSG on Meetinghouse Lane. Hydrants should be located no less than 500' apart. Proposed hydrant is approximately 650' from the TSG. Engineer shall confirm hydrant locations with the Bourne Fire Department prior to construction.
C11	Plan shall show the size of the proposed domestic and fire service lines. Plan shall also show location of shut off valves for these lines. The Wonzy/Barbar and Associates, Inc. Domestic Water Service Calculation calls for a 3" minimum water service. 3" is not a standard size pipe in the NSWD water system and shall not be used.
C11	Plan states "insulate water line within 10' of wall and chambers". Does this pipe require insulation due to depth or just a sleeve for separation from the wastewater system?
C11	Light post located 10' from match line shall be minimum 3' from proposed water main.
C11	An 8" main line gate shall be installed between the domestic/fire service lines and the Homestead Road tie in to isolate the cross county main and still supply the building with water.
C12	The existing TSG on Meetinghouse Lane shall be located on the plan. If a new water main is being installed, the plan shall specify if the existing TSG will be utilized. If a new TSG will be installed,

	plan shall call for the existing TSG to be plugged. Plan shall show existing water main size and type on Meetinghouse Lane (8" AC).
C11, C12	Water Line Easement shall be 20' wide with water main located in center. The easement as drawn is only 15' with the water main off center.
C12	Once ownership of the water main is established, a copy of the recorded deed and plan for the easement shall be submitted to the water district.
C12	Homestead Road Tie in – Connection should be a cut in connection. A main line valve and a hydrant must be installed on Homestead Road northwest of the gate supplying Cape View Way. Valve and hydrant configuration shall be shown on the plan. Plan shall show existing water main size and type on Homestead Road (8" PVC).
C11, C12	Chlorination taps are not shown on the plan and may be located during construction with District approval.
Inspection	All work done and materials used are to be inspected by the District representative whose decision to accept or reject either work or materials shall be in accordance with district regulations. The developer shall be responsible for the cost of the inspector.
As-built Drawings	Developer must also supply 4 copies of accurate as-built Mylar drawings as well as an electronic copy before acceptance of the system.

March 9, 2021

Matthew Sawicki, Superintendent
North Sagamore Water District
14 Squanto Road
Sagamore Beach, MA 02562

RE: Water Model Simulations for Cape View Drive 40B Development

Dear Mr. Sawicki:

The North Sagamore Water District (District) retained Resilient Civil Engineering, P.C. (ResilientCE) to utilize the District's existing water system hydraulic computer model to simulate the potential hydraulic impacts imposed by the proposed 40B development at Cape View Drive. Water system hydraulics are stressed when emergency flow events, such as fire flows, occur. The minimum pressure requirement for water distribution systems has been established in the Massachusetts Department of Environmental Protection (MassDEP) "Guidelines and Policies for Public Water Systems", as 35 pounds per square inch (psi) for all non-emergency conditions and 20 psi for emergency conditions. Fire flows are considered emergency conditions, so 20 psi must be maintained throughout the system under these conditions. For example, a flow test may indicate a certain amount of water is available at 20 psi at a specific location, however, consideration must also be given to other areas to provide at least 20 psi throughout the system during emergencies. These minimum pressure requirements are established to protect public health.

The proposed Cape View Drive 40B development is located off of Meetinghouse Lane behind the post office and next to the North Sagamore Fire Station within the Main Zone of the District. The pressures within the Main Zone are a factor of the water levels in the Bournedale Tank and the Clark Road Tank. Distribution storage is provided to meet peak demand of short duration (hourly fluctuations), minimize pressure fluctuations during periods of demand changes, and to provide the required water for fire flow requirements and short-term emergencies. The total volume of the storage facilities is not usable. In order for the water in the storage tank to be usable it must be stored above an elevation that corresponds to a minimum pressure requirement at ground elevation at all points in the distribution system.

The area within the Main Zone at the highest elevation, and corresponding lowest pressures, is along the Scenic Highway. When evaluating the impacts on potential fire flow events at the proposed development, pressures along the Scenic Highway must be considered. According to information provided to the District dated 2/11/2021, the developer has estimated average day demand use of 8,613 gallons per day (gpd) and maximum day demand use of 17,225 gpd based on a maximum day to average day demand ratio of 2. Note that the District's 10-year average maximum day to average day demand ratio is 2.9 so the estimate for the maximum day for the proposed development may be low and could be closer to 25,000 gpd.

The developer's fire protection engineer, Wozny/Barbar & Associates, Inc. memorandum dated February 2, 2021 summarizes the estimated domestic and fire protection needs of the proposed development. They estimate the domestic water demand will be approximately 75 gallons per minute (gpm) based on the number and type of plumbing fixtures. This estimate does not appear to account for irrigation and it is unknown if the development will have an irrigation system. This should be investigated further before approving the requested 1-½ - inch meter size. The fire protection engineer also estimate that the minimum required fire flow will be 1,125 gpm based on the National Fire Protection Association (NFPA).

A fire flow test was completed by Horsley Witten Group on September 5, 2019. Based on this the developer's fire protection engineer, Wozny/Barbar & Associates, Inc. estimated that water flow availability to the site would be 1,507 gpm at 20 psi. However, this is based on a test that was conducted over a period of minutes while actual fire flow events last for hours. It also does not account for potential impacts to residual pressure on other areas of the system.

The Massachusetts Department of Environmental Protection (MassDEP) Guidelines for Public Water Systems requires "when fire protection is to be provided, the system should be designed so that fire flows to the facilities meet the requirements of the National Fire Protection Association (NFPA), Insurance Services Office (ISO) or other similar agency on fire flows required or recommended in the service area involved."

At the fire flow targeted for this development, the NFPA and ISO recommend maintaining this fire flow for 2 hours during the maximum day demand. This means that a minimum of 20 psi must be maintained at the proposed development and throughout the rest of the water system, including along the Scenic Highway, for the entire 2 hour fire flow event.

The hydraulic computer model was utilized to simulate several scenarios with the 2 hour fire flow occurring at the proposed development during maximum day demand. The model was used to simulate fire flow events of 1,125 gpm (estimated minimum needed fire flow) and 1,500 gpm (flow close to the estimated flow at 20 psi at the site based on flow test). For each scenario, the model included the proposed water main loop to connect Cape View Drive to Homestead Road. Scenarios also include (a) normal operating conditions with all wells and storage tanks on-line and no water main breaks and (b) emergency conditions with water main breaks or tank off-line. Findings are summarized as follows:

1. Model Run 1 – All Infrastructure Operational
    a. Current infrastructure conditions and adding water main loop to connect Cape View Drive to Homestead Road.
    b. All water storage tanks and wells on-line and no water main breaks or other emergency conditions.
    c. Fire flow of 1,125 gpm for two hours on maximum day demand at Cape View Drive.

d. The residual pressure at the end of the 2 hours at Cape View Drive was about 40 psi and residual pressures along the Scenic Highway were greater than 20 psi.

2. Model Run 2 – Water Main Breaks with Current Infrastructure
   a. Current infrastructure conditions and adding water main loop to connect Cape View Drive to Homestead Road.
   b. All water storage tanks and wells on-line with water main break on either the 8-inch diameter main crossing at Route 3 OR the 12-inch diameter water main crossing at Route 6.
   c. Fire flow of 1,125 gpm for two hours on maximum day demand at Cape View Drive.
   d. The residual pressure at the end of the 2 hours at Cape View Drive was about 30-35 psi however residual pressure along the Scenic Highway decrease to less than 20 psi which is unacceptable.

3. Model Run 3 – Water Main Breaks with Water Main Improvements
   a. Adding water main loop to connect Cape View Drive to Homestead Road AND replace 8-in AC with 12-in PVC on Williston Rd and Scusset Beach from Williston to Old Plymouth and Meetinghouse from Old Plymouth to Cape View Dr.
   b. All water storage tanks and wells on-line with water main break on either the 8-inch diameter main crossing at Route 3 OR the 12-inch diameter water main crossing at Route 6.
   c. Fire flow of 1,125 gpm for two hours on maximum day demand at Cape View Drive.
   d. The residual pressure at the end of the 2 hours at Cape View Drive was about 35-40 psi and residual pressures along the Scenic Highway were greater than 20 psi.

4. Model Run 4 – Bournedale Tank off-line
   a. Current infrastructure conditions and adding water main loop to connect Cape View Drive to Homestead Road.
   b. Bournedale Tank off-line, Clark Road Tank and wells on-line with no water main breaks.
   c. Fire flow of 1,125 gpm for two hours on maximum day demand at Cape View Drive.
   d. The residual pressure at the end of the 2 hours at Cape View Drive was about 40 psi and residual pressures along the Scenic Highway were less than 20 psi.

5. Model Run 5 – Bournedale Tank off-line with Water Main Improvements
   a. Adding water main loop to connect Cape View Drive to Homestead Road AND replace 8-in AC with 12-in PVC on Williston Rd and Scusset Beach from Williston to Old Plymouth and Meetinghouse from Old Plymouth to Cape View Dr.
   b. Bournedale Tank off-line, Clark Road Tank and wells on-line with no water main breaks.
   c. Fire flow of 1,125 gpm for two hours on maximum day demand at Cape View Drive.

d. The residual pressure at the end of the 2 hours at Cape View Drive was about 43 psi and residual pressures along the Scenic Highway were greater than 20 psi.

6. Model Run 6 – Tanks Only with no Wells and Fire Flow of 1,500 gpm (simulates estimated fire flow available at 20 psi at site per flow test calculation)
    a. Current infrastructure conditions and adding water main loop to connect Cape View Drive to Homestead Road.
    b. All water storage tanks on-line and wells off-line with no water main breaks.
    c. Fire flow of 1,500 gpm for two hours on maximum day demand at Cape View Drive.
    d. The residual pressure at the end of the 2 hours at Cape View Drive was about 20 psi and residual pressures along the Scenic Highway were less than 20 psi. This highlights the importance of considering the impacts of estimated fire flows at 20 psi throughout the system in addition to the fire flow site.

7. Model Run 7 – Tanks and Wells Operating and Fire Flow of 1,500 gpm
    a. Current infrastructure conditions and adding water main loop to connect Cape View Drive to Homestead Road.
    b. All water storage tanks and wells on-line with no water main breaks.
    c. Fire flow of 1,500 gpm for two hours on maximum day demand at Cape View Drive.
    d. The residual pressure at the end of the 2 hours at Cape View Drive was about 40 psi and residual pressures along the Scenic Highway were greater than 20 psi.

8. Model Run 8 – Water Main Breaks and Fire Flow of 1,500 gpm with Water Main Improvements
    a. Adding water main loop to connect Cape View Drive to Homestead Road AND replace 8-in AC with 12-in PVC on Williston Rd and Scusset Beach from Williston to Old Plymouth and Meetinghouse from Old Plymouth to Cape View Dr.
    b. All water storage tanks and wells on-line with water main break on either the 8-inch diameter main crossing at Route 3 OR the 12-inch diameter water main crossing at Route 6.
    c. Fire flow of 1,500 gpm for two hours on maximum day demand at Cape View Drive.
    d. The residual pressure at the end of the 2 hours at Cape View Drive was about 43 psi and residual pressures along the Scenic Highway were greater than 20 psi.

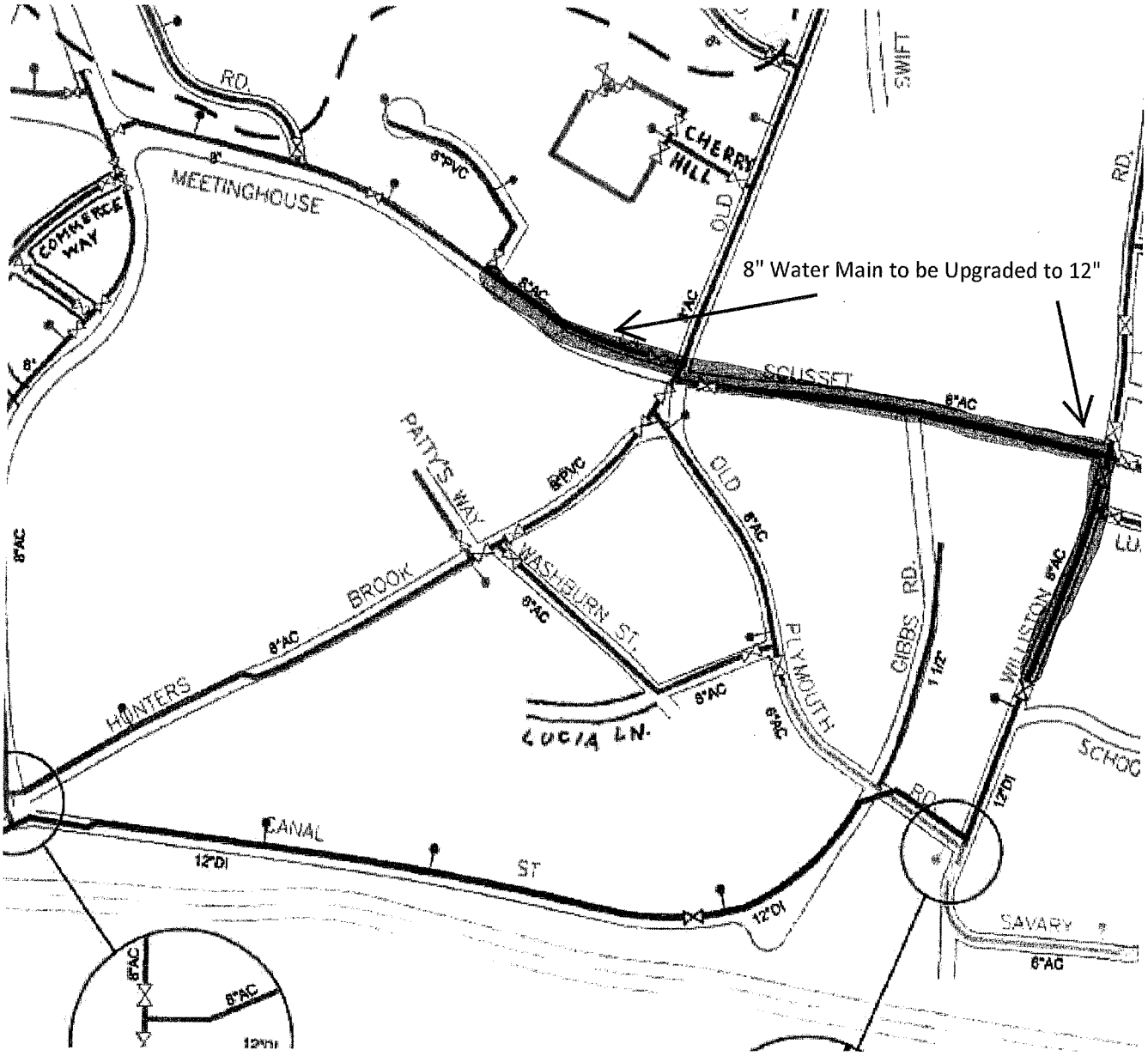
In summary, to provide the targeted fire flow of 1,125 gpm for the recommended duration of 2 hours to the proposed development while maintaining sufficient residual pressures throughout the water system during emergency conditions, the water main improvements identified above are required. Based on the hydraulic modeling analysis, pressure can be maintained along the Scenic Highway with fire flows of 1,125 or 1,500 gpm at the proposed development provided the tanks and wells are on-line and no other emergencies are occurring. However, it is necessary to be prepared for emergency conditions such as a water main break at one of the Route 3 or Route 6 crossings or having the Bournedale Tank off-line for maintenance.

It is critical for the District to maintain pressures along Scenic Highway to protect public health therefore in addition to adding the water main loop to connect Cape View Drive to Homestead Road, improvements must include replacing the 8-in AC water main with 12-in PVC water main on Williston Rd and Scusset Beach from Williston to Old Plymouth and Meetinghouse from Old Plymouth to Cape View Dr.

Please contact me with any questions at 508-726-2458 or kberger@resilientce.com.

Sincerely,
Resilient Civil Engineering, P.C.

Kristen M. Berger, P.E.
President


8" Water Main to be Upgraded to 12"
MEETINGHOUSE
COMMERCE WAY
CHERRY HILL
OLD
SWIFT
RD.
SCUSSET
8"AC
8"PVC
PATTY'S WAY
WASHBURN ST.
BROOK
HUNTERS
LUCIA LN.
PLYMOUTH
GIBBS RD.
WILLISTON
CANAL
ST
12"DI
SAVARY
SCHOO