In packet 6/19/98

UNDERGROUND
ENGINEERING &
ENVIRONMENTAL
SOLUTIONS

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HALEY & ALDRICH

1 May 1998
File No. 12258-000

Neville Community Partners, Inc.
c/o Cambridge Housing Authority
675 Massachusetts Avenue
Cambridge, Massachusetts 02139

Attention: Mr. Michael Feloney
Assistant Director, Office of Planning & Development

Subject: Redevelopment of Neville Manor Nursing Home
Water Quality Impact on Fresh Pond
Cambridge, Massachusetts

Gentlemen:

In accordance with our proposal to you dated 14 April 1998 and your subsequent authorization, we have reviewed available information relative to the proposed renovations to Neville Manor and the construction of the new Skilled Nursing Home and the impact they may have on the water quality in Fresh Pond. For the purposes of this letter, the term "Neville Manor Site" is used to define the geologic feature currently occupied by Neville Manor, the associated buildings, the CWD storage yard and nearby topography generally between Fresh Pond and Concord Avenue.

SUMMARY OF CONCLUSIONS

We have concluded the following:

1. The water quality in Fresh Pond could theoretically be impacted by changes in the Neville Manor Site area in two ways:

   a. flow into the pond from surface water runoff, and

   b. flow into the pond by groundwater coming from soils under the Neville Manor Site (groundwater discharge).

2. With respect to runoff into Fresh Pond (Item 1a above), the proposed activities on the Neville Manor Site will have virtually no impact on Fresh Pond because the project activities are entirely outside the Fresh Pond Watershed area. Overland flows from

the Neville Manor Site go north toward Concord Avenue where they are collected in a storm drain that eventually discharges to Alewife Brook.

3. With respect to groundwater flow into Fresh Pond (Item 1b above) under normal operating conditions of the reservoir (pond level El. 15 or above), the proposed activities on the Neville Manor site will have virtually no impact on Fresh Pond because groundwater flows from the pond into the soil under the Neville Manor Site northward toward Concord Avenue. Under these conditions any contamination introduced to the ground at the Neville Manor Site would be carried north and would have no impact on Fresh Pond.

4. The CWD periodically operates the Fresh Pond Reservoir below the operating level recommended by Camp Dresser & McKee (CDM) (El. 15) in order to capture water which would otherwise have to be wasted due to lack of storage capacity. When this happens, groundwater will begin to flow into the reservoir from the soils under the Neville Manor Site. Initially (for at least a few months), the flow will be Fresh Pond water that has seeped into the ground and has reversed its flow as a result of the pond level being depressed. After several months, water in the ground under the Neville Manor Site will move toward the reservoir. The quality of that water is now good.

5. The planned work at the Neville Manor Site does not include any threat to the existing groundwater quality in the area. In fact, the amount of impervious ground cover (paving and building) will be decreased, the number of spaces for cars will be reduced, the peak staff will be reduced and the number of patients and residents will be reduced.

6. The landform currently occupied by Neville Manor, the associated buildings, and the Cambridge Water Development (CWD) storage yard, provides a valuable groundwater buffer zone between the Pond and the commercial area north of Concord Avenue. Due to the very slow rate at which water flows through soil, this area stores months of water that will flow toward Fresh Pond if the pond is depressed below normal operating levels for a lengthy period of time. Protection of this buffer is important due to the likely contamination of groundwater in the commercial area north of Concord Avenue.

7. The renovations to Neville Manor and the construction of the new Skilled Nursing Home nearby includes no element which is a threat to groundwater quality and it provides an opportunity to improve existing conditions to a level which are appropriate for a groundwater buffer zone adjacent to a public water supply. Specific recommendations are provided herein.

SCOPE

Our conclusions are based on a review of the following:

- Final Report - Groundwater Quality Impacts to Fresh Pond Reservoir (CDM, May 1997), (Reference No. 1).
- Cambridge Water Treatment Plant Environmental Notification Form (CDM, March 1996), (Reference No. 2).
- Partial Set of Schematic Design Drawings for Neville Manor by Steffian, Bradley and Associates, Inc. (provided 4/08/98).
- Engineering Reports by Haley & Aldrich, Inc. prepared for approximately 20 private projects located just north of Concord Avenue from Neville Manor.
- Site visit conducted 20 April 1998.

SURFACE WATER RUNOFF

The watershed boundary for Fresh Pond is shown on Figure 5 "Fresh Pond Watershed" in Reference No. 2. The drawing is attached to this letter for your ease in reference. It can be noted that the Actual Watershed Area of Fresh Pond is defined by a line which includes very little more area than the pond itself. This means that most precipitation that falls on land around the pond flows away from the pond. From Figure 5, it should be noted that the Neville Manor Site lies entirely outside the Fresh Pond watershed limits.

GROUNDWATER FLOW INTO THE POND

Groundwater flow into Fresh Pond varies depending upon the elevation of the water in the Pond. "The pond is maintained at El. 15 to 16 at most times, (although) it is occasionally drawn down below this level for short periods." (Reference No. 1, pp. ES-2, para. 3).

Groundwater flow when the pond is at normal operating levels (El. 15 or above) is shown on Figure 4-6 "Zone of Contribution with Pond Level Greater than 15 feet" in Reference No. 1. The drawing is attached to this letter for your ease in reference. It should be noted that when the pond is at normal operating levels groundwater flow is to the north, from the pond north under the Neville Manor Site toward Concord Avenue. Therefore, under normal operating conditions the groundwater under the Neville Manor Site has no impact whatsoever on Fresh Pond.

Groundwater flow when the pond is below normal operating levels (below El. 14) is shown on Figure 4-7 "Zone of Contribution with Pond Level less than 14 feet" in Reference No. 1. The drawing is attached to this letter for your ease in reference. This drawing indicates that when the pond level falls below El. 14, water under the Neville Manor Site begins to flow toward Fresh Pond. This water is mostly Fresh Pond water that seeped into the soil when the pond was full. Because of the very slow rate that water flows through soils of the type north

of Fresh Pond, it would take months for water on the north side of the Neville Manor Site to reach the pond. This provides a nice buffer to protect water quality in Fresh Pond if it is necessary to lower the pond level briefly.

GROUNDWATER BUFFER ZONE

As described above, the groundwater under the Neville Manor Site is mostly pond water that has seeped into the ground and moved north through the soil while the pond was full. If the pond is drawn down below El. 14, this water begins to move back toward the pond. It will take months for the groundwater reservoir under the Neville Manor Site to drain back into the pond. Unfortunately, if the pond is lowered for an extensive period (years), water from north of Concord Avenue could begin to move toward the pond. This groundwater is likely to contain contaminants. However, to reach the pond it must flow south for months or years. In the process, contaminates will tend to adhere to soil particles along the way.

Therefore, the soil under the Neville Manor Site may be viewed as a very slow draining reservoir storing Fresh Pond water, a buffer zone between the pond and the contaminated water north of Concord Avenue, and a filter through which southward groundwater flow must move.

GROUNDWATER BUFFER ZONE PROTECTION

Considering the role that this property plays in the hydrogeology of Fresh Pond, it is important to minimize the risk of introducing contaminants into the groundwater in the area. Many of the planned improvements related to the project will accomplish this. Specifically:

1. Run-off from paved parking areas (subject to exposure to oil, grease, gasoline) should be captured and drained to catch basins and storm drains leading away from the pond. Runoff from paved areas now drains into the soil.

2. The CWD storage yard contains an assortment of transient materials that are collected and disposed as part of the maintenance system for the water supply system. The yard should be graded and paved to provide drainage to catch basins and storm drains leading away from the pond. Runoff from the yard currently drains into the soil.

3. One of the existing buildings appears to have an above-the-ground fuel storage tank adjacent. The area under the tank should be protected in the event of a spill. If the tank is not in service, it should be removed.

4. Underground fuel oil storage tanks should not be used on the project. It is understood that none are planned.

5. It is understood that roof drains will be lead to a storm drain system. This is probably reasonable considering the low permeability of the soil might make groundwater recharge difficult for 100% of the water. The feasibility of a partial recharge option might be studied since the quality of water from roof drains is generally good.

6. The maximum capture of clean rainwater using best management practices, and the recharge of this water into the ground whenever practical should be encouraged in the design.

CONSTRUCTION ACTIVITIES

During the period of active construction, the principal risk to water quality is degradation of surface water runoff, specifically with silt. Since all of the prepared construction activities are outside the Fresh Pond Watershed area, there should be no risk to Fresh Pond. Nevertheless, appropriate precautions should be taken to avoid excess siltation and runoff to Concord Avenue.

CLOSURE

In summary, it is our opinion that the proposed project will have no negative impact on the quality of water in Fresh Pond, and that the project brings with it an opportunity to improve the value of the site as a groundwater buffer zone through engineered enhancements of existing site usage which will minimize or eliminate potential risks to groundwater quality which already exist.

If you have any questions or require further elaboration on this letter, please call.

Sincerely yours,
HALEY & ALDRICH, INC.

David E. Thompson
Chairman/CEO

Attachments:
Reference No. 1 - Figures 4-6 and 4-7
Reference No. 2 - Figure 5

c: Steffian Bradley Associates, Inc.; Attn.: Mr. Peter Steffian

F:\12258\WATERIMP.WPF

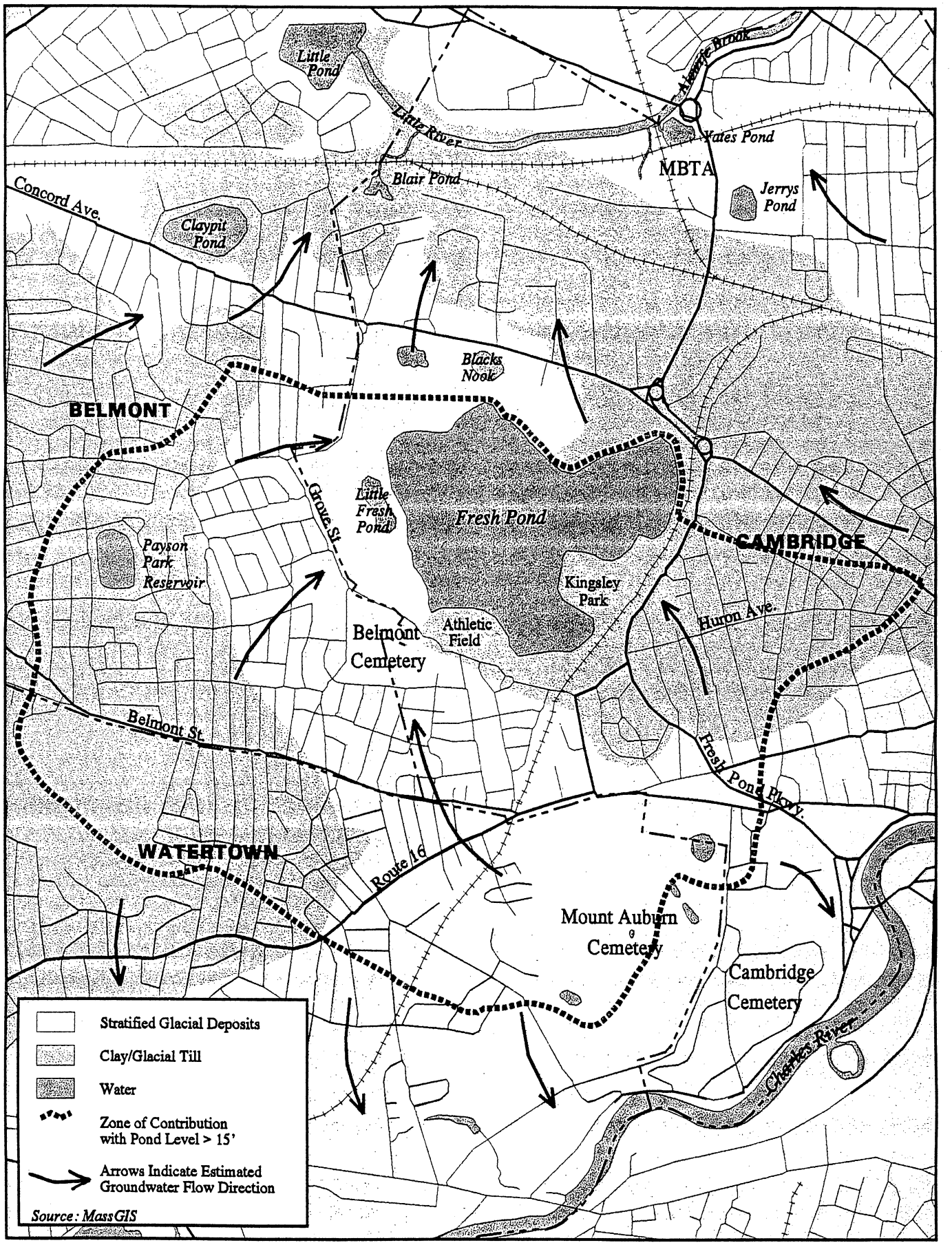

Figure 4-6

Zone of Contribution With Pond Level Greater Than 15 Feet Cambridge, MA

0 500 1000 2000 3000 Feet

N

Scale 1 inch = 1600 feet

April, 1997

CDM Camp Dresser & McKee Inc.

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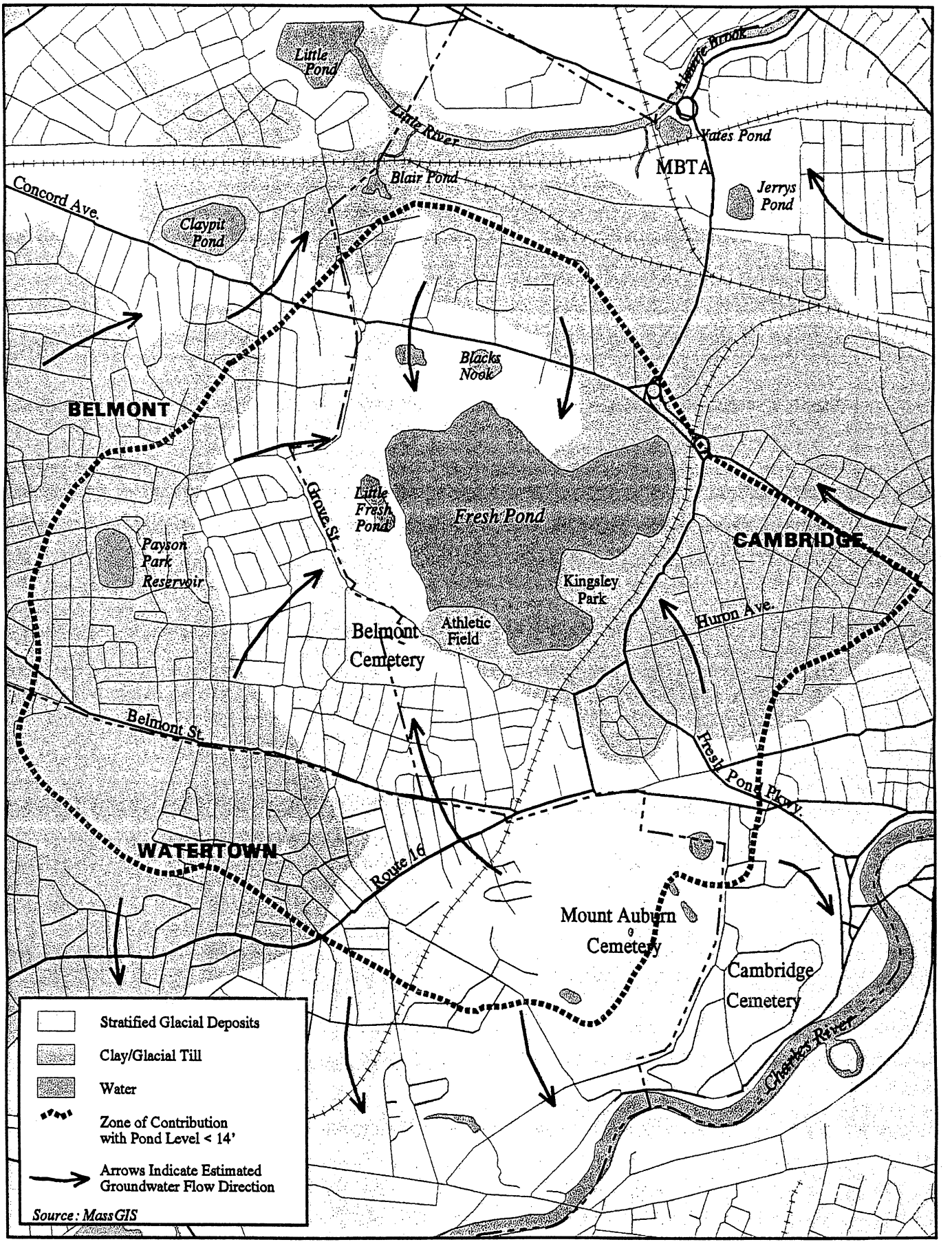


Figure 4-7

Zone of Contribution With Pond Level Less Than 14 Feet Cambridge, MA

0 500 1000 2000 3000 Feet

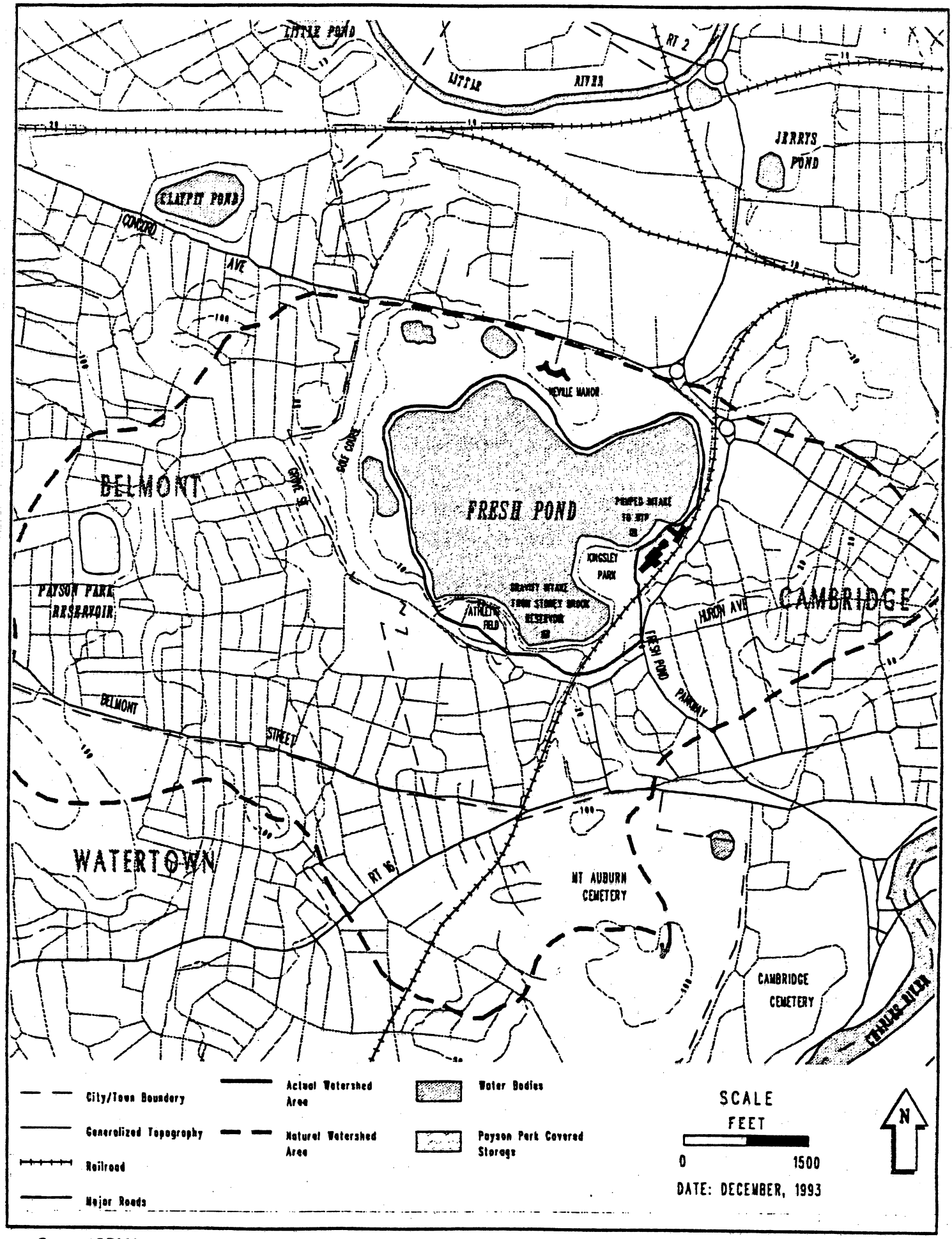
N

Scale 1 inch = 1600 feet

April, 1997

CDM Camp Dresser & McKee Inc.

/data2/projects/cambridge/geol.aml



Source: CDM base map data from MassGIS. Watershed boundaries delineated and digitized by CDM. Topography digitized by CDM from USGS topographic quadrangles.

Cambridge Water Department
Water Treatment Plant Project

Figure 5
Fresh Pond Watershed

CDM Camp Dresser & McKee

4765

Information on the redevelopment of Neville Manor Nursing Home Water Quality Impact on Fresh Pond.