

NOTICE OF INTENT

Noncontact Cooling Water General Permit

133 Boston Post Road
Weston, Massachusetts

Weston Corporate Center



June 17, 2024

ERW/nps/019355NI001



Prepared by
Beals and Thomas, Inc.
144 Turnpike Road
Southborough, MA 01772

In association with:
BXP - Boston Properties
800 Boylston Street
Boston, MA, 02199



June 17, 2024

US EPA, Region 1
NCCW GP Processing
Mail Code: OEP 06-4
5 Post Office Square, Suite 100
Boston, MA 02109-3912

Via: EPA CDX Submission Portal and Email: NCCW.GeneralPermit@epa.gov.

Reference: Application for Coverage under Noncontact Cooling Water General Permit
Notice of Intent
Weston Corporate Center
[Weston, Massachusetts](#)
B+T Project No. 0193.55

Dear U.S. Environmental Protection Agency:

On behalf of the Applicant, BXP, Beals and Thomas, Inc. (B+T) respectfully submits this Notice of Intent (NOI) for Noncontact Cooling Water (NCCW) General Permit for the Weston Corporate Center (the facility) in Weston, Massachusetts. The facility was previously covered under a NCCW General Permit which expired on November 4, 2019, (MAG250979). The Applicant now seeks coverage under the 2024 General Permit.

The Applicant seasonally withdraws water from the south quarry pond on the property to be used in cooling the facility located at 133 Boston Post Road in Weston, Massachusetts during the warmer months between May and September. Whenever outdoor ambient conditions are cool enough, the system operates in the air economizer mode and demand for cooling water is reduced or eliminated. This occurs primarily near the beginning and end of the cooling season.

The Applicant currently implements a noncontact deep water source cooling system with intake and outtake piping installed in the south quarry pond. A small pump house structure (approximately 12 feet by 18 feet) is located adjacent to the south quarry pond. Cold water (40°F) is pumped from near the bottom of the quarry (below 200 feet deep) to heat exchangers in the building and returned to the quarry ponds at 50-58°F closer to the surface (25 to 35 feet deep). This results in a discharge temperature that is generally consistent and approximately 12°F higher than the intake water temperature. During off-season months, the change in water temperature is almost negligible.

The cooling water is historically drawn from the hypolimnion, where the colder and denser water resides in the quarry. Since the cooling water is drawn from the hypolimnion and returned near the surface, the effect over the summer cooling season is that the hypolimnion level goes down and the depth of the warmer water near the top increases.

Corporate Office

144 Turnpike Road
Southborough, MA 01772

bealsandthomas.com T 508.366.0560 F 508.366.4391

Regional Office

32 Court Street
Plymouth, MA 02360

The temperature of the return water after being used for building cooling is about 55°F, which is generally cooler and/or approximately the same as the temperature of the surface water. Therefore, there is effectively no increase in the temperature of the quarry pond as a result of the system, only a change in the level of the thermocline depth.

There are no chemical additives introduced to the water in the quarry recirculation; therefore, there is no change in pH from system activities.

Best Technology Available (BTA)

The design capacity of the cooling water intake structure is 1.0 million gallons per day (GPD). The maximum intake velocity is 1.0 feet per second (fps) and the maximum velocity of the outlet structure is 1.11 fps. No system modifications have been made since the original NOI was filed and the NCCW system for coverage under this general permit is the original system installation. There has not been a need to implement new technology since the system has worked as intended and without known impingement of aquatic organisms. The water flow circulates from the quarry pond into the non-contact heat exchanger and back into the quarry in a closed-loop system (seen in the attached flow diagram).

The intake structure is below 200 feet in depth. B+T prepared an Invertebrate Study in March of 2008 (see attached) to provide a qualitative assessment of the estimated macroinvertebrate habitat conditions within the quarry and potential implications of the cooling water withdrawal and discharge. Since the initial study was conducted, the conditions of the quarry pond and the NCCW system itself have remained the same. A diving team inspects, as a routine sequence, the intake and discharge inlets and outlets for deficiencies such as excessive corrosion or obstructions. Considering the lack of suitable habitat features and nutrient food sources within the littoral zone of the pond, as well as potential predation by common vertebrate species, the quarry does not support robust macroinvertebrate populations. There is no direct inlet or outlet allowing deep-water fish species access to the quarry. In the last five years, there has been no known occurrence of impinged aquatic organisms within the NCCWS. The pump suction and discharge piping and pump systems have in-line pressure reading devices that are monitored by building engineers daily are in the building's alarmed BMS system. Any significant increase in pressure readings (delta) between suction and discharge would indicate an obstruction in the system. There have been no changes in pressure indicative of an obstruction to date. If an obstruction were to occur, it would be addressed immediately by the building engineers.

National Historic Preservation Act

A portion of the Subject Property is located within the Boston Post Road Historic District listed on the National and State Registers of Historic Places (NRIND, 2/11/1983). This district includes approximately 170 properties on both sides of Boston Post Road from Stony Brook to Plain Road (National and State Register of Historic Places updated through December 2009). Based upon information provided in the Final Environmental Impact Report (FEIR) document filed under the Massachusetts Environmental Policy Act (MEPA), "when the District was formed, the line was drawn to exclude several intrusive elements including the Route 128 interchange and the Mass Broken Stone quarry operation." The site of the water removal

from the South Quarry Pond, formerly used in the Mass Broken Stone quarry operation, is not on the National or State Register of Historic Places.

As required, a copy of this filing has been sent to the Massachusetts Department of Environmental Protection (MassDEP) through the eDEP filing system. The filing fee of \$500 (fee schedule BRP WM 15) will be paid for through the filing system website.

Should you have any questions regarding this matter or require additional information, please contact us at (508) 366-0560. We thank you for your consideration of this Notice of Intent.

Sincerely,

BEALS AND THOMAS, INC.



Eric J. Las, PE, LEED AP
Vice President

Attachments:

1. Form of Notice of Intent for Noncontact Cooling Water General Permit (Appendix 5)
2. Topographic map indicating discharge information including outfall location
3. Line/flow diagram showing water flow through the facility
4. Map showing the location of each cooling water intake structure (CWIS) and CWIS features referred to in BTA description
5. Invertebrate Study - Weston Corporate Center, 2008

cc: MassDEP ePLACE Online Filing System
BXP

**APPENDIX 5
Suggested Notice of Intent (NOI) Form**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY - REGION 1

**Request for General Permit Authorization to Discharge Noncontact Cooling Water
to be covered by the Noncontact Cooling Water General Permit (NCCWGP)
NPDES General Permits No. MAG250000 and NHG250000**

A. Facility Information

1. Indicate applicable General Permit: MAG250000
NHG250000

2. Facility Information/Location:

Facility Name Weston Corporate Center
 Street/PO Box 133 Boston Post Road City Weston
 State Massachusetts Zip Code _____
 Latitude 71d 16' 31.09" W Longitude 42d 22' 20.29" N

Type of Business Office
 SIC Code(s) 73

3. Facility Mailing address (if different from Location Address):

Facility Name c/o Boston Properties
 Street/PO Box 800 Boylston Street, Suite 1900 City Boston
 State Massachusetts Zip Code _____

4. Facility Owner:

Name BP Weston Quarry LLC
 E-mail msexton@bxp.com
 Street/PO Box 800 Boylston Street City Boston
 State MA Zip Code 02199

Contact Person Matthew Sexton, Director, Engineering Tel _____
 Owner is (check one): Federal _____ State _____ Tribal _____ Private x
 Other (describe) _____

5. Facility Operator (if different from above):

Legal Name Same as Above
 E-mail bdilworth@bxp.com
 Street/PO Box 1601 Trapelo Road City Waltham Zip Code 02451
 State MA Contact Brian Dilworth Telephone 781-259-6357

6. Current permit coverage: yes no

- a) Has a prior NPDES permit (individual or general permit coverage) been granted for the discharge that is listed on the NOI? yes no If Yes, permit number MAG250979
- b) Is the facility covered by an individual NPDES permit for other discharges? yes no
If yes, Permit Number: _____
- c) Is there a pending NPDES application on file with EPA for this discharge? yes no
If yes, date of submittal: _____ and permit number, if available _____

7. Attach a topographic map indicating the location of the facility and the outfall(s) to the receiving water.

B. Map attached? Discharge Information (attach additional sheets as needed):

1. Name of receiving water into which discharge will occur: Unnamed Quarry Pond
 Freshwater Marine Water ; State Water Quality Classification Class None
 Type of Receiving Water Body (e.g., stream, river, lake, reservoir, estuary, etc.) Quarry Pond

2. Attach a line drawing or flow schematic showing water flow through the facility including sources of intake water, operations contributing to flow, treatment units, outfalls, and receiving water(s).

Line drawing or flow diagram attached?

3. Describe the discharge activities for which the owner/applicant is seeking coverage (e.g., building cooling, process line cooling, etc.) Building cooling

4. Number of Outfalls 1 Latitude and Longitude to the nearest second for each Outfall. See EPA's siting tool at <https://www.epa.gov/toxics-release-inventory-tri-program/tri-data-and-tools>. Attach additional pages if necessary.

Outfall #	Latitude <u>42d 22' 15" W</u>	Longitude <u>71d 16' 15" N</u>
Outfall #	Latitude _____	Longitude _____
Outfall #	Latitude _____	Longitude _____

5. For each Outfall provide the following discharge information:

Outfall # 1

- a) Maximum Daily Flow 1.0 MGD Average Monthly Flow 0.331 MGD
NOTE: EPA will use the flow reported here as the facility's permitted effluent flow limit.
- b) Maximum Daily Temperature 70.8 °F Average Monthly Temperature 52 °F
- c) Maximum Monthly pH 9.5 s.u. Minimum Monthly pH 5.2 s.u.
- d) Outfall's discharge is: continuous intermittent seasonal

Outfall # _____

- a) Maximum Daily Flow _____ MGD Average Monthly Flow _____ MGD
NOTE: EPA will use the flow reported here as the facility's permitted effluent flow limit.
- b) Maximum Daily Temperature _____ °F Average Monthly Temperature _____ °F
- c) Maximum Monthly pH _____ s.u. Minimum Monthly pH _____ s.u.
- d) Outfall's discharge is: continuous intermittent seasonal

Outfall # _____

a) Maximum Daily Flow _____ MGD Average Monthly Flow _____ MGD

NOTE: EPA will use the flow reported here as the facility's permitted effluent flow limit.

b) Maximum Daily Temperature _____ °F Average Monthly Temperature _____ °F

c) Maximum Monthly pH _____ s.u. Minimum Monthly pH _____ s.u.

d) Outfall's discharge is: continuous intermittent seasonal

6. Is the source of the NCCW potable water? yes no

If yes, EPA will calculate a Total Residual Chlorine effluent limit for your facility.

7. Provide the reported or calculated seven day-ten year low flow (7Q10) of the receiving water N/A MGD

Attach any calculation sheets used to support stream flow and/or dilution calculations.

8. For facilities that discharge to Massachusetts surface waters:

a) Submit the completed engineering calculation of the surface water temperature rise as shown in Attachment B of the General Permit. Calculation attached?

b) Does the discharge occur in an Area of Critical Environmental Concern (ACEC)? yes no

If yes, provide the name of ACEC _____

c) Does the discharge occur to an Outstanding Resource Water (ORW)? yes no

If yes, enclose antidegradation waiver approval provided by MassDEP.

Note: See Appendix 1 of the General Permit for more information on ACEC.

C. Chemical Additives

1. Are any non-toxic neutralization and/or dechlorination chemicals used in the discharge(s)? yes no

2. If yes, attach a list of each chemical used and include the chemical name and manufacturer; maximum and average daily quantity used on a monthly basis, as well as the maximum and average daily expected concentrations (mg/L) in the discharge, and the vendor's reported aquatic toxicity (NOAEL and/or LC₅₀ in percent for typically acceptable aquatic organism).

3. Was this list submitted with the facility's 2014 NCCWGP NOI? yes no

D. NCCW Source Water Information

1. State the source of the NCCW (e.g., municipal water supply, private well, surface water withdrawal, etc.).

Source Surface Water Withdrawal Name of Source Water Unnamed Quarry Pond

2. Is the source water registered/permitted under MA Water Management Act or NHDES User Registration Rule (ENV WQ 2202)? yes no If yes, registration number _____

3. If the source water is groundwater (non-municipal well water), see Appendix 9 of the General Permit and submit effluent (and receiving water hardness) test results, as required in Part 5.4 of the General Permit.

Test results attached?

4. Does the facility use both a primary and backup source of NCCW? yes no If yes, **attach information** that identifies and describes the primary and backup sources of NCCW and how often any backup supply was used in the past five years.

E. Best Technology Available for Cooling Water Intake Structures (CWISs)

If the facility's non-contact cooling water discharge is covered by this General Permit and the facility **withdraws water from a surface water**, it is subject to the BTA requirements at Part 4.2 of the General Permit.

1. Are you subject to the BTA requirements of the General Permit? yes no
- a) If no, explain _____ and skip to F.
- b) If yes, submit a facility-specific BTA description that accurately describes the facility's operations and practices, including, but not limited to, the measures described in Part 5.5 of the General Permit. For additional information and guidance, see Section IV of the Fact Sheet.

Include in your description:

- a) Measures to meet the General Permit Part 4.2.1 general BTA requirements, including documentation that describes the facility's monitoring program for impinged fish and/or invertebrates; or the required alternative monitoring plan frequency and/or protocol.
- b) The attributes of the current CWIS.
- c) The design measures of the CWIS.
- d) The operational measures of the CWIS.
- e) The historical occurrence of impinged fish for the past five years.
- f) If applicable, a demonstration that the facility's intake rate is commensurate with a closed-cycle recirculation system.
- g) Other components to reduce impingement and/or entrainment of aquatic life.

2. Provide the following information for each CWIS to support your attached facility-specific BTA description:

- a) The design capacity of the of the CWIS 1.0 MGD
- b) Maximum monthly average intake of the CWIS during the previous five years 0.734 MGD
- c) The month and year in which this flow reported in 2.b. occurred August 2023
- d) The maximum through-screen design intake velocity 1.11 feet/second (fps)

3. For facilities where the CWIS is located on a freshwater river or stream, provide the following information:

- a) The source water's annual mean flow in MGD as available from USGS or other appropriate source
N/A MGD
- b) The design intake flow as a % of the source water's annual mean flow N/A %
Attach calculations if equal to or less than 5% of annual mean flow.
- c) The source water's 7Q10 N/A MGD
- d) The design intake flow as a percent of the source water's 7Q10 N/A %

4. Provide a map showing the location of each cooling water intake structure; NCCW Outfall(s) and CWIS features referred to in the BTA description. **Map attached?**

F. Endangered Species Act Eligibility Information

If your facility is listed in Table A as one of the 37 facilities covered under the 2014 NCCW GP, check this box.
Your ESA consultation responsibilities have been satisfied by EPA. Proceed to Part G.

If your facility is not included as one of the 37 facilities covered under the 2014 NCCW GP, complete this Part.

Using the instructions in Appendix 2, Parts B(1) and B(2) of the NCCW GP, which of the following criteria apply to your facility?

United States Fish and Wildlife Service (USFWS) Criteria: A B C

National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) Criteria: A B C

1. If you selected USFWS criterion B, has consultation with the USFWS been completed? yes no
If you selected NOAA Fisheries criterion B, has consultation with NOAA Fisheries been completed?
yes no
2. If consultation with USFWS and/or NOAA Fisheries Service was completed, was a written concurrence finding that the discharge is "not likely to adversely affect" listed species or critical habitat received?
USFWS yes no N/A NOAA Fisheries yes no N/A
3. Attach documentation of ESA eligibility for USFWS and NOAA Fisheries as required at Appendix 2, Part C. of the General Permit. **Documentation attached?** USFWS NOAA Fisheries
4. Please indicate if your facility **directly intakes water for non-contact cooling from, or discharges any NCCW effluent to**, any of the following waterbodies:

- Merrimack River
- Connecticut River
- Westfield River
- Deerfield River
- Piscataqua River
- Salmon Falls River
- Cocheco River
- Taunton River

EPA will consult with NOAA Fisheries on any cooling water intakes or discharges covered under this permit in areas (in the above waterbodies) that overlap with the presence of shortnose sturgeon (endangered) and Atlantic sturgeon (threatened/endangered).

Please indicate if your facility **directly intakes water for non-contact cooling from, or discharges non-contact cooling water effluent to**, the Connecticut River Watershed. EPA will consult with the U.S Fish and Wildlife Service on cooling water intakes and discharges covered under this permit in areas of the Connecticut River Watershed that overlap with the presence of the dwarf wedgemussel (endangered).

yes no

G. National Historic Properties Act Eligibility

1. Are any historic properties listed or eligible for listing on the National Register of Historic Places located on the facility site or in proximity to the discharge? yes no
2. Have any State or Tribal Historic Preservation Officers been consulted in this determination? yes no
If yes, attach the results of the consultation(s).
3. Which of the three National Historic Preservation Act scenarios listed in Appendix 3, Section C has the facility met?
 1 2 3

H. Supplemental Information

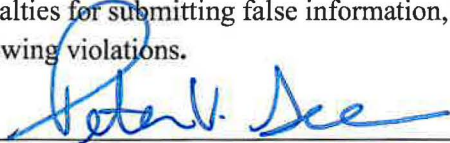
Please provide any supplemental information, including antidegradation review information applicable to new or increased discharges. Attach any analytical data used to support the application. Attach any certification(s) required by the General Permit.

I. Signature Requirements

The NOI must be signed by the operator in accordance with the signatory requirements of 40 CFR§ 122.22 (see below) including the following certification:

I certify under penalty of law that (1) no biocides or other chemical additives except for those used for pH adjustment and/or dechlorination are used in the noncontact cooling water (NCCW) system; (2) the discharge consists solely of NCCW (to reduce temperature) and authorized pH adjustment and/or dechlorination chemicals; (3) the discharge does not come in contact with any raw materials, intermediate product, water product (other than heat) or finished product; (4) if the discharge of noncontact cooling water subsequently mixes with other wastewater (i.e. stormwater) prior to discharging to the receiving water, any monitoring provided under this permit will be only for noncontact cooling water; (5) where applicable, the facility has complied with the requirements of this permit specific to the Endangered Species Act and National Historic Preservation Act; and (6) this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

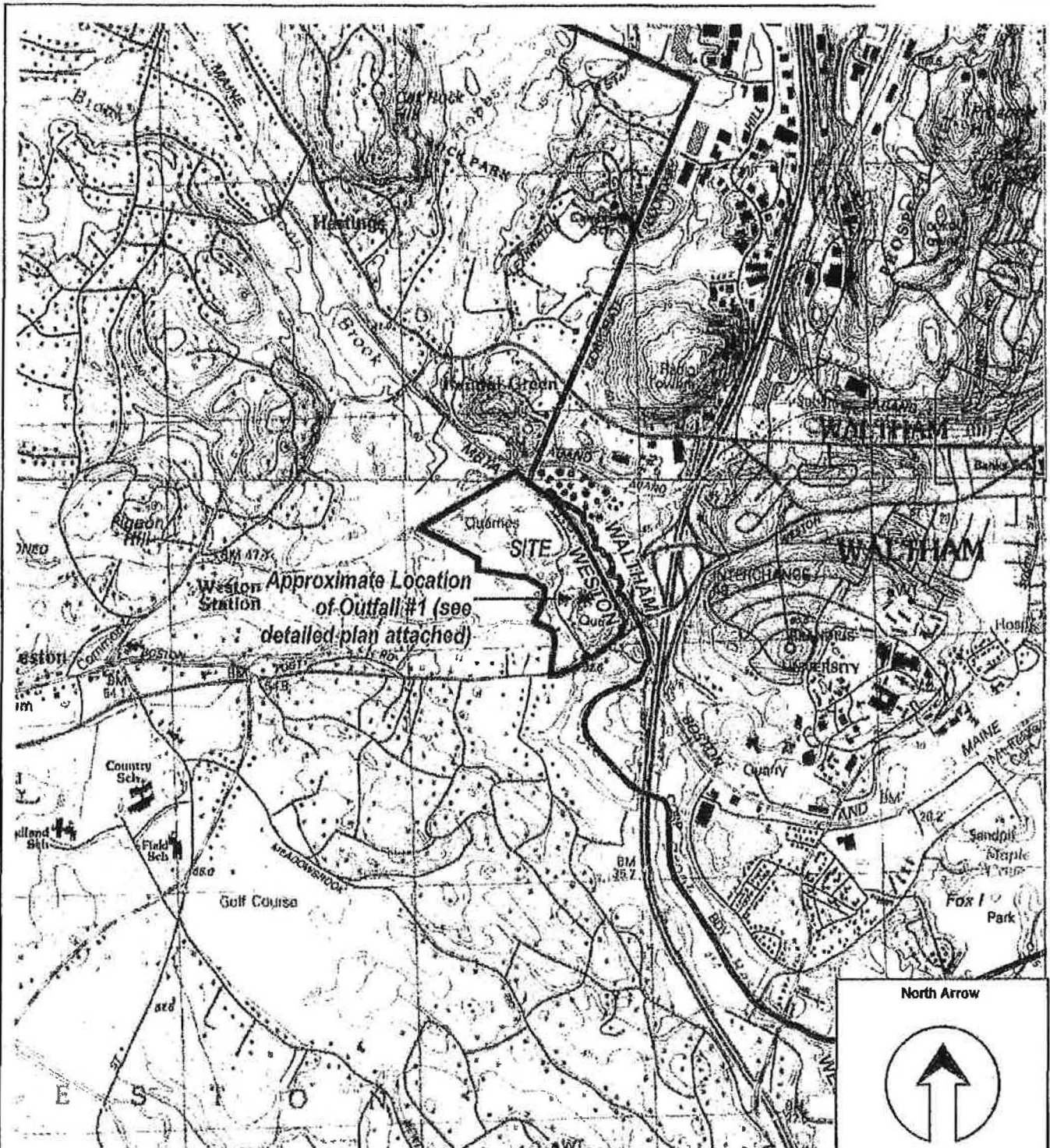
Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I certify that I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature  Date 6/17/2024

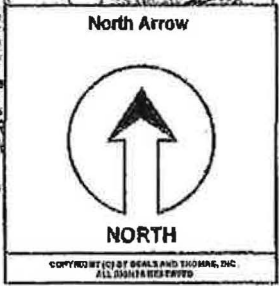
Printed Name and Title **Peter V. See**
Sr. Vice President, Property Management

Federal regulations require this application to be signed as follows:

- 1. For a corporation, by a principal executive officer of at least the level of vice president;
- 2. For a partnership or sole proprietorship, by a general partner or the proprietor, respectively, or,
- 3. For a municipality, State, Federal or other public facility, by either a principal executive officer or ranking elected official.



Digital USGS Maps of Concord and Natick, MA, dated 1987, provided by the Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs.



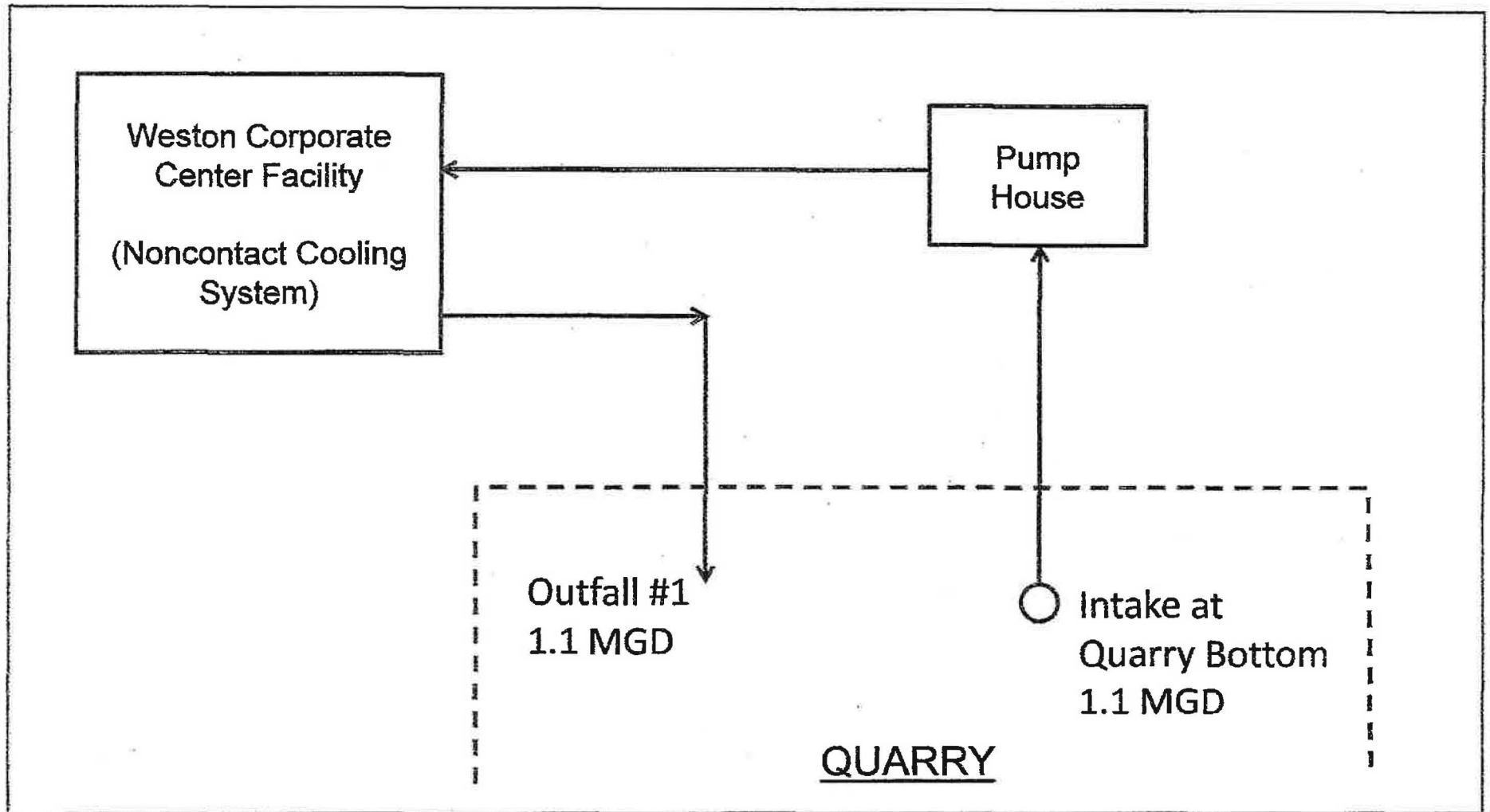
**Noncontact Cooling
Water General Permit**
Weston, Massachusetts

Weston Corporate Center
33 Boston Post Road
Weston, Massachusetts

**Facility and Outfall
Locus Map**

Scale: 1" = 2,000' Date: 01/22/2015

Source File M491433P001A.mxd
BTI Project No. M4914.33

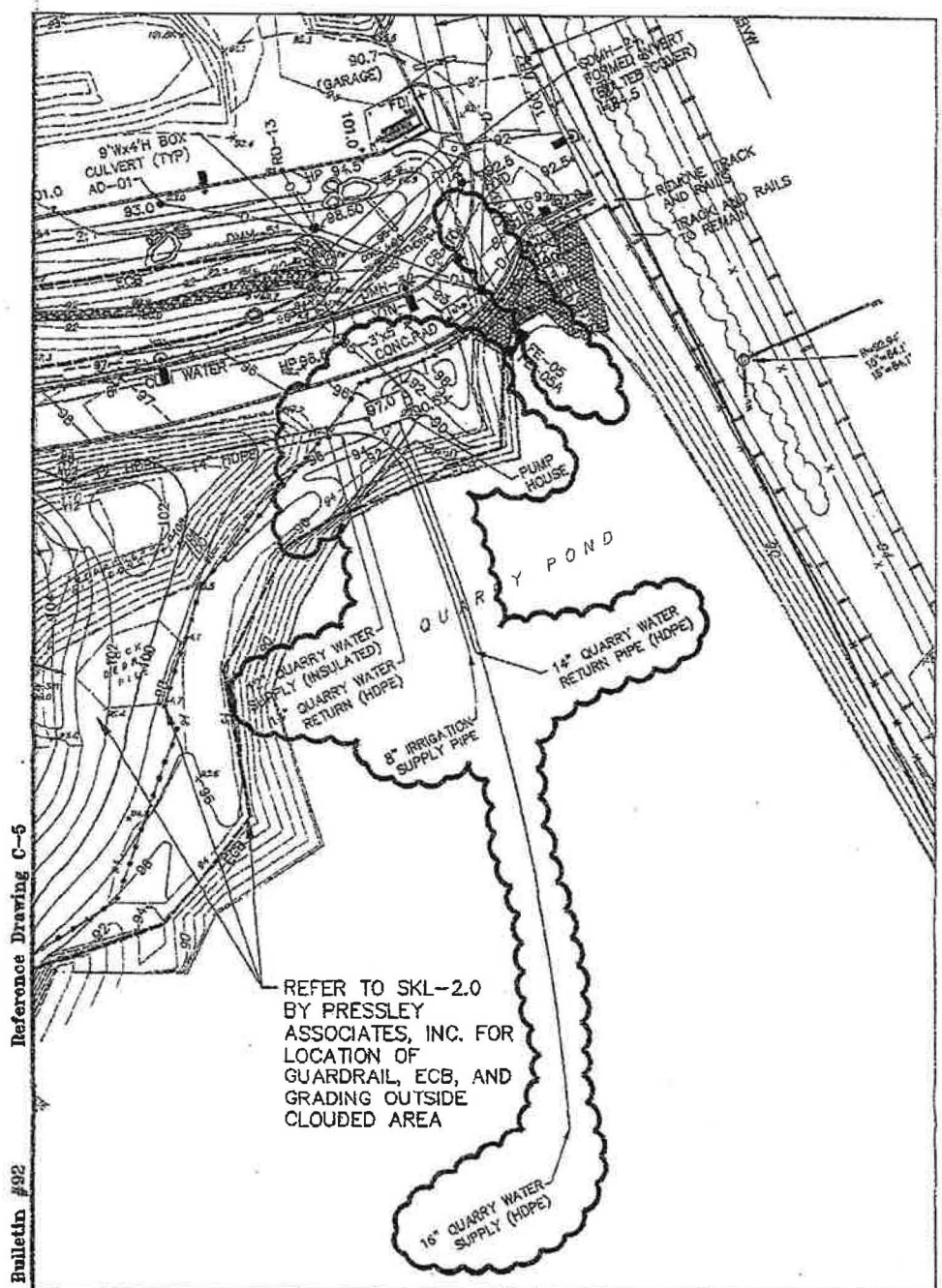


**Noncontact Cooling
Water General Permit**
Weston, Massachusetts

Weston Corporate Center
33 Boston Post Road
Weston, Massachusetts

Flow Diagram

M491433OT001



Reference Drawing C-5
Bulletin #92

REFER TO SKL-2.0
BY PRESSLEY
ASSOCIATES, INC. FOR
LOCATION OF
GUARDRAIL, ECB, AND
GRADING OUTSIDE
CLOUDED AREA



The Corporate Center
Weston, Massachusetts
**Boston Properties Limited
Partnership**
800 Boylston Street
Boston, Massachusetts

Revised Grading at Pump Vault
CSK-019C
Scale: 1" = 40' Date: 02/11/2003
Source File: 01960003.dwg
Drawing No. 0196P086.dwg
SIT Project No. 0193.06

Permit Item # E.5

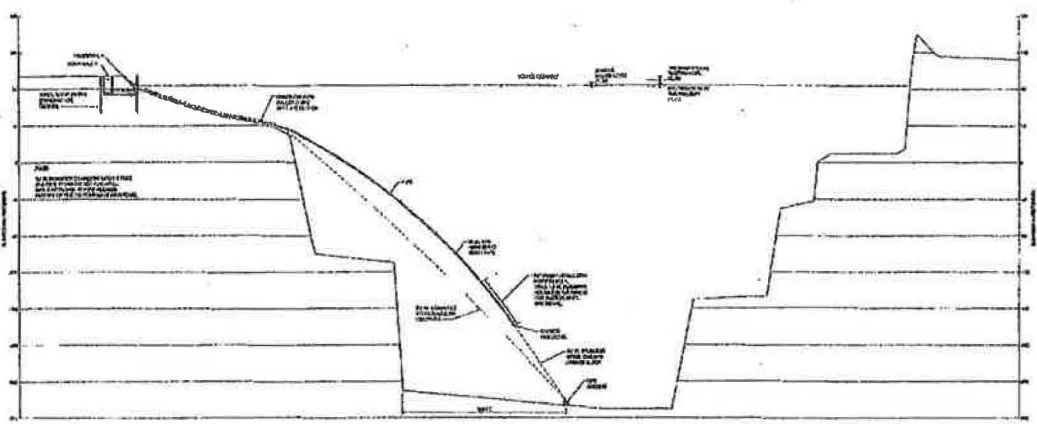
Permit Item # E.5

Weston Corporate Center

Weston, Massachusetts

Progress DD 601

DATE: 01/15/2010
 DRAWN BY: J. J. [unreadable]
 CHECKED BY: [unreadable]
 PROJECT: Weston Corporate Center
 SHEET: Progress DD 601
 SCALE: AS SHOWN
 PROJECT LOCATION: Weston, MA
 PROJECT NO.: [unreadable]
 SHEET NO.: [unreadable]



Revisions:

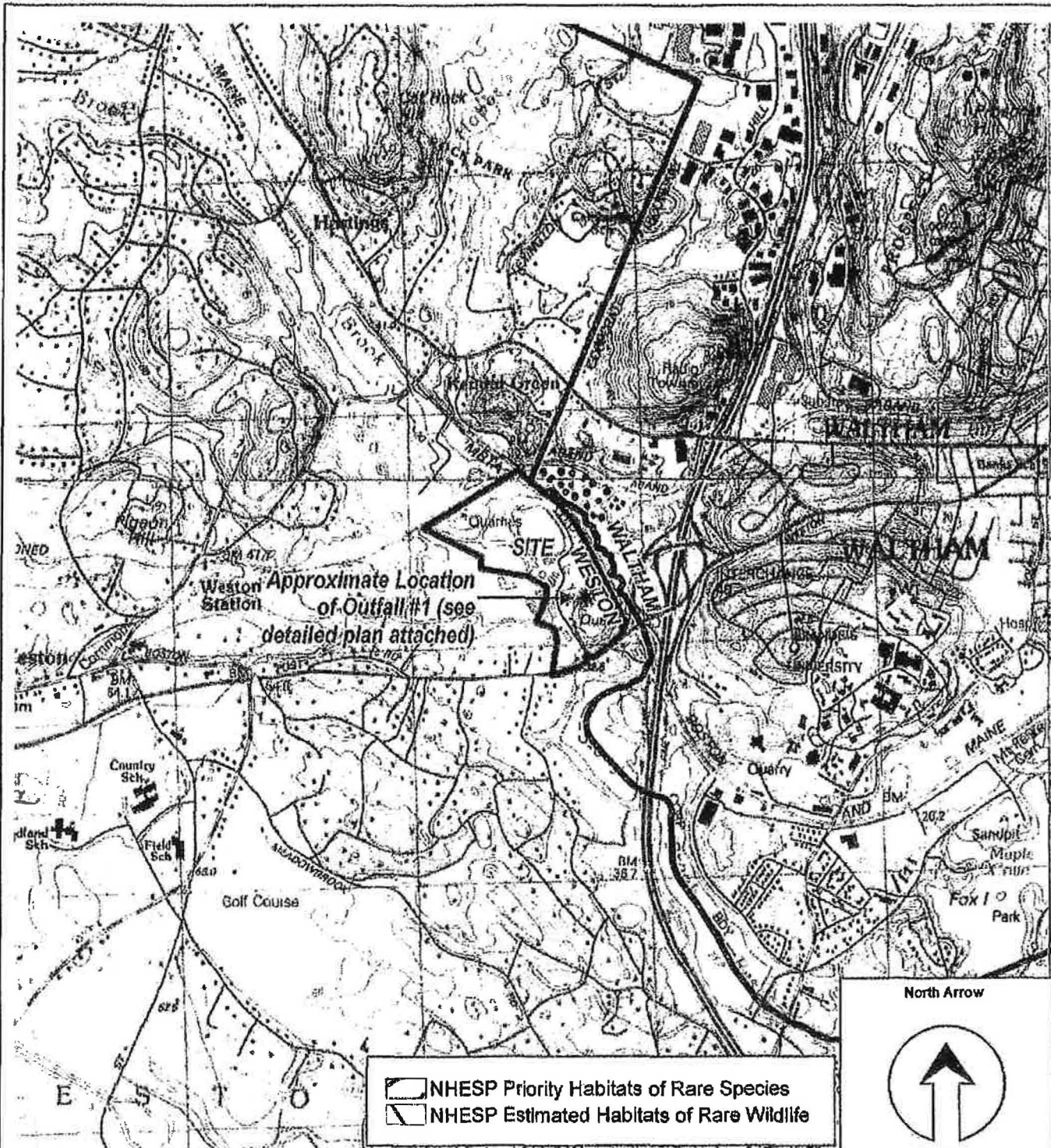
No.	Description	Date
1	Issue for Review	01/15/2010
2	Issue for Construction	01/15/2010



DATE: 01/15/2010
 DRAWN BY: J. J. [unreadable]
 CHECKED BY: [unreadable]
 PROJECT: Weston Corporate Center

QUARRY SECTION
 GT-4





Digital USGS Maps of Concord and Natick, MA, dated 1987, provided by the Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs.

**Noncontact Cooling
Water General Permit**
Weston, Massachusetts

Weston Corporate Center
33 Boston Post Road
Weston, Massachusetts

Natural Heritage Map

Scale: 1" = 2,000'

Date: 01/26/2015

Source File M491433P002A.mxd
BTI Project No. M4914.33

Invertebrate Study

Weston Corporate Center

**(DEP File #337-0368)
Weston Corporate Center
Weston, Massachusetts**

Prepared for:
**Boston Properties
The Prudential Center
800 Boylston Street
Boston, MA 02199-8103**

Prepared by:
**Eric J. Las, P.E.
Beals and Thomas, Inc.
Reservoir Corporate Center
144 Turnpike Road
Southborough, MA 01772**

March 28, 2008

Introduction

Boston Properties has obtained municipal and state approvals to construct a 350,000-square-foot building with associated parking, drainage, and other site improvements, known as the Weston Corporate Center. The project is generally located northwest of the I-95 and Route 20 intersection within the town of Weston, near the town line of Waltham. A majority of the project development will be located between two quarry ponds on the site of the former Massachusetts Broken Stone mining operation.

The Massachusetts Department of Environmental Protection issued a Water Quality Certification for the proposed project on May 22, 2002, Transmittal No. W012668 for work associated with the relocation of a man made drainage ditch associated with the development of the proposed building and related improvements. Beals and Thomas, Inc. submitted a minor plan change request on May 17, 2004 and the DEP confirmed that the request was minor and did not require a formal modification to the Certification. The currently proposed site plan changes do not involve discharge from fill or excavation in waters subject to regulations of the U.S. Army Corps of Engineers, Federal Energy Regulatory Commission or other federal agencies, therefore, no further review under the Water Quality Certification is required.

The currently proposed changes to the original site plan include the potential water withdrawal from the north and/or south quarries for non-contact cooling purposes. Boston Properties is studying the feasibility of a deep water source cooling system, which would use water from the quarry ponds to cool the building. A small pump house structure (approximately 12 feet by 18 feet) will be located adjacent to one or both quarry ponds. In addition, intake and outflow piping will be installed in the quarry ponds. The quarry water will be pumped from the lower depths of the quarries to heat exchangers in the pump houses and returned to the quarry ponds near the surface. Supply and return piping in a separate loop will connect the pump houses to the building. Details regarding the cooling water are discussed in the Hydrothermal Study section of this report. It is not anticipated that the withdrawal of water for non-contact cooling purposes from the quarry ponds will warrant further review by DEP regarding the Water Quality Certification. The purpose of this report is to provide a qualitative assessment of the estimated macroinvertebrate habitat conditions within the quarries and potential implications of the cooling water withdrawal and discharge.

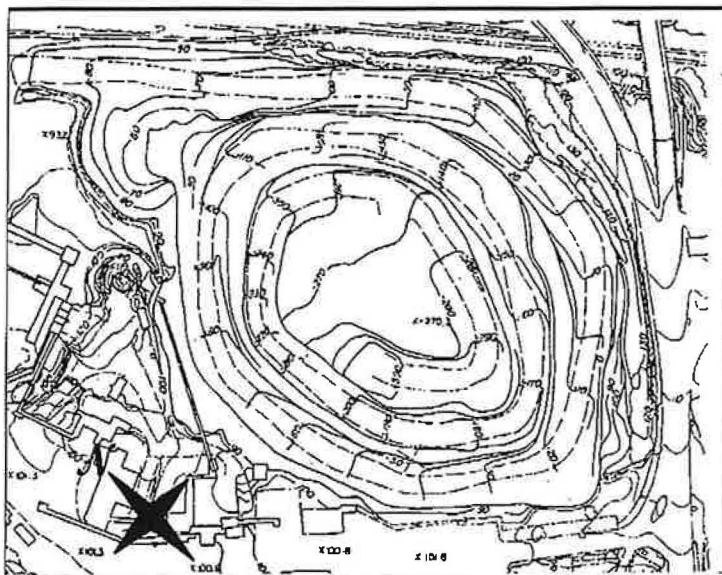


Site Aerial Photo

Source: Microsoft Live Maps, 2008

Historical Information

Massachusetts Broken Stone began mining operation at the site in 1902. Mining was conducted within two open-pit quarries, commonly referred to as the North Quarry and the South Quarry. Massachusetts Broken Stone concentrated on removing calcite and quartz from the two quarries. Calcite is extremely common and found in sedimentary, metamorphic and igneous rocks. Quartz is very durable, and is chemically inert with most substances.



South Quarry Topography Circa 1986.

Mining operations ended in 1985 at which point the natural flow of groundwater began to exfiltrate and started filling up the quarries.

Today both quarries have completely filled with water. The water elevation varies slightly with seasonal changes equal to the surrounding ground water at approximately 88-feet above mean sea level in the North Quarry and 84-feet above mean sea level in the South Quarry.

Site Conditions

For purposes of this report, only the South Quarry will be examined, although conditions within the North Quarry are generally similar. The South Quarry covers an area of approximately 10-acres. While the quarry was in operation, the South Quarry floor was accessed by a road originating in the northern most corner and spiraling along the outer wall. The quarry floor is located approximately 300 feet below mean sea level, therefore the quarry is over 380 feet deep. The quarry access road was often very steep reaching grades of 20-percent. During mining operations, a wall along the northwest edge of the quarry collapsed adjacent to the entrance road. The wall collapse left a steep slope of loose 1 to 2 inch diameter gravel instead of a typical vertical rock wall near the entrance of the quarry. With the exception of the collapse area, the quarry walls around the perimeter are vertical, with cliffs starting in the northeast corner and continuing in a clockwise manner to the southernmost portion of the quarry. The cliffs range in height from 5 to 80 feet above the water surface, with the highest cliffs on the eastern side of the quarry.

The terrain around the South Quarry is generally a barren landscape. Little vegetation has grown on the site or the area around the quarry, likely due to the lack of topsoil. There are a few poplar (*Populus spp.*), dogwoods (*Cornus spp.*), milkweeds (*Asclepias spp.*), and cattails (*Typha spp.*) along the perimeter of the quarry. With only a few large trees or other vegetation around the quarry, very little detritus is deposited within the pond. Also contributing to the lack of organic debris and nutrients is the absence of a fluvial tributary to the quarry which could contribute sediments or organic matter.



View of South Quarry
Source: BTI March 24, 2008

Aquatic Invertebrate Habit

Since the quarry has filled with water, little has changed in terms of suitable habitat. Although a detailed aquatic survey could not be conducted due to safety concerns, site visits along the periphery of the quarry were performed. Due to the excellent water clarity present within the pond, visual observations could be made from the shoreline. Aquatic macrophytes are non-existent within the limited areas that are shallow enough to support vegetative growth due to a lack of organic substrate. As seen in the photo



Typical pond substrate
Source: BTI March 24, 2008

below, the majority of the shallow quarry substrate consists of fine to coarse-grained gravel with few cobbles or boulders. The steep surrounding cliffs and deep conical shape of the quarry reduces light penetration in many areas. The littoral zone is generally the most suitable environment for invertebrates within aquatic environments. The low sunlight penetration however, combined with the steep quarry walls, extreme depth, infertile soils, lack of detritus food sources, and minimal structural habitat provides a diminutive and desolate littoral zone within the pond.

Due to the lack of aquatic macrophyte growth, with the exception of approximately 50 square feet of cattail growth, there is virtually no biotic habitat available for epiphytic macroinvertebrates within the pond. In addition, little non-biotic structural habitat was observed within the littoral zone of the pond, however the existing gravel substrate does offer a minimal amount of habitat for benthic macroinvertebrates. Macroinvertebrates consisting of molluscs,

nematodes, amphipods, isopods, crayfish, mysids, chironomids, and larvae of caddisfly, mayfly, dragonfly or others could therefore be present in low concentrations. Regardless of the water quality in the pond, since the pond lacks significant detritus, littoral zone area, and biotic/non-biotic structural habitat, it is unlikely that macroinvertebrates are present in the pond in significant numbers. In addition, anecdotal evidence from representatives of the Cambridge Water Department as well as observations of abandoned spawning beds by Beals and Thomas, Inc staff indicates that populations of fish (likely shiners *{Luxilus spp., Notemigonus spp.}* and sunfish *{Lepomis spp.}*) may be present within the pond. The presence of predatory fish would further reduce the potential for high concentrations of macroinvertebrates.

Hydrothermal Study

To better understand the potential effects on the South Quarry resulting from the proposed cooling system withdrawal and discharge, Boston Properties retained the services of Haley & Aldrich and TMP Consulting Engineers, Inc. to prepare a preliminary hydrothermal study for the project. It is proposed that water will be withdrawn from the hypolimnion layer of the quarry at a depth of approximately 245 feet below the water surface. The estimated temperature of the water at that depth is a constant temperature of approximately 40°F throughout the entire year. The water will be circulated through the pump house building and will be discharged back into the epilimnion layer of the quarry at a depth of approximately 25 feet. The estimated temperature of the returning water is 52°F to 54°F. The ambient water temperature near the discharge point was tested by Halcy and Aldrich in the summer and fall of 2007 and found to range from 55°F to 59°F. The annual system circulation is estimated to be approximately 100 million gallons. The estimated total volume of the quarry is approximately 540 million gallons. Overall it is believed that the re-introduction of cooling water will have a negligible effect on the summer temperature profile. The temperature difference between the return water temperature and the ambient water temperature will be small and the reinjection water will be absorbed into the surroundings readily. TMP noted that the dynamics of the temperature profiles under summer conditions are more strongly influenced by the natural processes of wind, solar radiation, and evaporation.

Conclusions

Considering the lack of suitable habitat features and apparent absence of food sources within the littoral zone of the pond, as well as potential predation by vertebrate species, it is unlikely that the quarry supports robust macroinvertebrate populations. Based on the minimal anticipated thermal effect on water quality, it is further believed that the proposed cooling system component of the project will have a negligible effect on any macroinvertebrate populations that may be present within the South Quarry. Although not studied specifically, the same conclusions are supported for the North Quarry as well.