



FUSS & O'NEILL

January 3, 2012

Town of Bolton
Attn: Carol Gumbart
Town Hall
663 Main Street
Bolton, MA 01740

Re: Phase II Addendum – Additional Alternative
Fyfeshire Dam, Bolton, MA

Dear Ms. Gumbart:

Following discussions with you and the Massachusetts Department of Conservation and Recreation Office of Dam Safety (ODS), Fuss & O'Neill, Inc. has prepared this addendum to our Phase II Investigation Report dated October 30, 2009.

This addendum will conclude Fuss & O'Neill's current contractual services for the Phase II Investigation. The next steps in the process of addressing the issues with the dam will be to prepare final design documents for construction and as support for the permit applications for construction, as well as preparing the permit applications themselves.

Alternative 5 – Lower Dam Crest

This alternative includes partial removal of Fyfeshire Pond Dam through excavation of the dam crest such that the dam still impounds water but is no longer a jurisdictional structure subject to the Dam Safety Regulations. This would maintain the existing spillway elevation and would not involve movement of sediment downstream. It would also require no construction of swales or fish passage considerations upstream of the dam. This alternative includes the following elements:

- Demolish and remove the existing spillway vertical concrete walls.
- Excavate a section of the embankment surrounding the spillway to an elevation less than 6 feet higher than the bottom of the stream bed immediately downstream of the spillway.
- Armor the remaining embankment with riprap of suitable size or other armoring material to withstand overtopping flows, to be determined during final design of the dam alteration.
- Seed and plant grass at disturbed abutments.

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Hydrologic and Dam Safety Considerations

This alternative maintains the existing pond elevation under normal conditions, it does not remove the potential hazard posed by Fyfeshire Pond Dam on downstream areas it would reduce the hazard. Designing the dam to withstand overtopping flows causes the dam embankment to serve as a spillway, and the reduction in crest elevation will greatly increase the capacity of the dam to pass storm flows safely. As a result, the peak pond elevation during storms will be reduced; therefore the volume of flood waters stored will be reduced, thus reducing the impacts on downstream areas if the dam were to fail. The result would be that the dam could be deemed non-jurisdictional by the Office of Dam Safety (ODS). Discussions with ODS have indicated agreement with this assessment.

The resulting loss of impoundment storage would result in increased peak flows downstream, resulting in increased overtopping frequency and depth of flooding on Collins Road. Currently, the roadway is predicted to overtop by approximately 0.18 feet (approximately 2 inches) during a 10-year event, whereas with the dam crest lowered, the roadway overtopping would be expected to increase slightly, but not as much as predicted for full dam removal. An important corollary to increased depth of overtopping during events of a specified size is that there will also be an increased frequency of overtopping of the roadway with the dam crest lowered, as the roadway will be overtopped by storms of smaller sizes.

Habitat and Listed Species Considerations

This alternative will maintain the existing spillway elevation, and therefore will retain the existing pond. There should be a negligible change to the habitat of any species.

Historical Considerations

In order to meet the non-jurisdictional dam height, the crest will need to be lowered to less than two feet above the existing spillway elevation, requiring a substantial amount of the existing embankment and stone facing to be removed. Therefore, this alternative is not consistent with the historical nature of the pond or property. Massachusetts Historical Commission may require mitigation for partial loss of the resource. However, the dam upstream of Fyfeshire Pond, which would remain in-place, is thought to be the structure with the most historical value, so the majority of the property's historical interest would remain. Mitigation for loss of a historically-listed structure may require photographic and written documentation of the structure and its components.

Permitting Considerations

The permitting effort associated with removal of Fyfeshire Pond Dam is likely to be less than other alternatives since the project is likely limited to the area immediately around the existing embankment. Wetlands disturbance, wetlands loss, habitat transformation, and

flood impacts will be limited under this alternative. Construction period resource area impacts and post-construction (permanent) resource area impacts are discussed below.

- **Construction Period Impacts**

Construction will likely consist of excavation of the dam's embankment and removal of the dam's spillway walls. These activities can occur with equipment located in upland areas. Heavy machinery would need to cross the stream channel downstream from the spillway to access the left portion of the dam, requiring the use of construction mats. These mats could also be used to position construction equipment in the downstream area if equipment cannot reach certain areas from the crest. Army Corps of Engineers and MADEP now consider construction mats to be a best management practice for avoiding wetland impacts and are not included in 'fill' calculations if left in-place for less than 90 days and if the underlying wetlands are restored upon removal, although the area would still be considered an 'alteration' under the Massachusetts Wetlands Protection Act.

Careful equipment operation could avoid the discharge of turbidity to the stream and pond and avoid the discharge of dredged or fill material during excavation of the embankment and removal of the spillway training walls. Minimal excavation of material from below the upper limit of bank is expected, such that the dredging permitting thresholds of MADEP and Army Corps of Engineers (100 cubic yards) will not be exceeded. It is not anticipated that significant dewatering or pond drawdown would be required during construction, although the use of cofferdams to dewater a limited area surrounding the spillway training walls may be required. Regardless, construction should be limited to the Blanding Turtle's active season from May 15 through October 1 to allow turtles to escape the construction area.

- **Permanent Impacts**

Installation of armor on the dam to allow the structure to overtop safely will likely require permanent filling of wetlands on the upstream face and downstream side of the dam. The armor layer will need to extend below the impoundment water surface elevation on the upstream face to keep the face stable under normal and unusual (overtopping) loading conditions. The vertical downstream masonry wall will be replaced with a stable rock buttress or earth slope protected with an armor layer. The composition of the armor will be determined during design; options include riprap, grouted riprap, cabled concrete or other material. The permanent wetland fill will need to be mitigated; a nearby location shown on the plan-view concept sketch may be appropriate.

Unlike dam breach or removal alternatives, this alternative would not adversely impact the impoundment or associated wetlands since the normal pond volume

and extents will remain the same as existing conditions. As a result, the pond's habitat, recreational, and aesthetic value will remain following construction. Sediment accumulated in the impoundment will remain in place and will not require management or removal.

This alternative will result in "hydraulic changes to a dam located within a flood zone." As such, it may be necessary to coordinate the project with FEMA, model the proposed changes with hydraulic modeling software, and request a Letter of Map Revision (LOMR) from FEMA to present the changes in flood elevations.

It is important to note that, since the Phase II investigation report was written, FEMA has revised its flood mapping for North Brook, including the reach upstream and downstream from Fyfeshire Pond. The revised map shows that a detailed flood study was not performed for North Brook in Bolton; instead, the detailed study begins at the Bolton/Berlin town line. Since the area surrounding Fyfeshire Pond was not studied in detail, it is possible that the dam was not included as a hydraulic control structure in the analysis. As such, the flood mapping may already assume the absence of the dam. If this were the case, a LOMR may not be necessary since the mapping may already represent proposed conditions better than existing conditions. During the design phase of the project, the flood study and supporting data should be obtained and reviewed to confirm this finding.

Additionally, this alternative may require environmental policy act review. Dam removal projects typically require Massachusetts Environmental Policy Act (MEPA) review since one of the MEPA review thresholds is "structural alteration of an existing dam that causes an Expansion of 20% or any decrease in impoundment capacity." It is unclear whether this alternative would be considered a decrease in impoundment capacity since the spillway capacity and impoundment volume would remain unchanged under normal conditions but differ from existing conditions during larger storms. The MEPA office should be contacted to determine if a past advisory opinion exists that provides an applicable interpretation, and, if not, to request an advisory opinion.

If the project does trip the review threshold, the MEPA regulations require filing of an Environmental Notification Form (ENR) and an Environmental Impact Report (EIR). In at least one recent instance, MEPA has waived a required EIR in favor of an expanded ENF for dam removal and resource area improvement projects. It is uncertain whether this alternative could qualify for the expanded ENF in lieu of an EIR since the dam would remain in-place. Such a determination could be made

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during the standard ENF review process, or potentially through a separate advisory opinion.

This alternative will require submission of Part A of the Dam Safety Permit form to determine whether a full dam safety permit will be required including plans and specifications. Dam Safety permits are required for construction or alteration of jurisdictional dams. Complete filing will likely be necessary such that the removal is documented and accepted by ODS.

In summary, the table below presents the permits typically required for dam work and our assessment of the likelihood that each would be necessary for this project. Additional design and regulatory coordination is necessary to confirm these findings.

Permitting Program	Potential for Applicability and Process	Next Steps
Wetland Protection Act	Yes – Notice of Intent/Order of Conditions	Preliminary Design with permitting level-of detail. Prepare Notice of Intent.
Clean Water Act Section 401 (Water Quality Certification)	Filing may be avoided with careful design and Implementation. Currently-unknown factors could trigger program, but is now thought to be unlikely	Preliminary Design with permitting level-of detail. No application will be necessary if impacts are below 5,000 square feet, although a self-certification form will need to be submitted to Army Corps for any wetland impacts
Clean Water Act Section 404 (Army Corps Individual or General Permit)		
MEPA	May be applicable. EIR possible	Contact MEPA office, submit a Request for Advisory Opinion
MESA	Yes – Project Review	Preliminary Design with permitting level-of detail
FEMA LOMR	May be applicable	Review Flood Insurance Study and request and review supporting documentation
Massachusetts Historical Commission	Yes – Cultural resources review and approval	Preliminary design with permitting level of detail.
Dam Safety (Chapter 253) Permit	Yes – Part A necessary, Part B a possible requirement	Preliminary design with permitting level of detail. Prepare and submit a Part A application to determine applicability of Part B.

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Maintenance and Monitoring Considerations

Monitoring should be conducted on a regular basis following construction to be sure re-vegetation is proceeding as planned and to assure erosion and sedimentation controls are effective until they are no longer necessary. Following stabilization, monitoring should still be performed to check for dislodged riprap and for beaver activity. Maintenance will be relatively minor, although clogging of the spillway area will likely remain a problem as it is now. However, debris removal should be less problematic with the reduced embankment.

Cost Considerations

This alternative is estimated to cost \$187,000, including engineering and permitting. The budgetary estimate range of accuracy associated with this cost is \$159,000 to \$243,000 (-15% to +30%). It is the least expensive alternative overall.

Funding Opportunities

Since this alternative would not include improvement of a resource area, funding opportunities are not likely to exist for permitting or construction. Passage of the current Dam Safety Bill (S.1985) may allow the Town to bond the construction as a capital improvement. However the timing of the bill's passage may not be favorable to the Town's schedule.

Additional Engineering Required

This alternative will require engineering plans and specifications to be prepared to support permit applications.

We would welcome the opportunity to meet with you and to discuss the specifics of our proposal. If you have any questions or need additional information, please call us at 800-286-2469.

Sincerely:



Christopher J. Cullen, P.E.
Project Manager



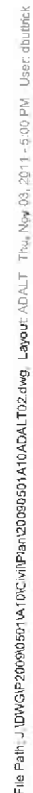
Philip W. Moreschi, P.E.
Vice President

FUSS & O'NEILL, INC.
146 HARTFORD ROAD
MANCHESTER, CONNECTICUT

OPINION OF CONSTRUCTION COST			DATE PREPARED :	6-Dec-11
Type:	Budget			
PROJECT :	Fyeshire Pond Phase II		BASIS : R.S. Means, Previous Project Cost Data	
LOCATION :	Bolton, MA			
DESCRIPTION:	Additional Alternative			
DRAWING NO.	ADD. ALT.	ESTIMATOR :	DRB	CHECKED BY :CJC

OPINION OF CONSTRUCTION COST - BUDGET: An opinion of cost based on design information available early in the design process. It can be used by an owner to establish his budget. It is normally expected that an estimate of this type would be accurate to within plus 30% or minus 15%. Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s)' methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Costs are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry, but Fuss & O'Neill cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.

ITEM NO.	ITEM	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST
SITE CONTROL					
	Sedimentation and Erosion Control	L.S.	1	\$ 1,500.00	\$1,500.00
	Water Control	L.S.	1	\$ 10,000.00	\$10,000.00
SITE PREPARATION WORK					
	Access Road Improvements	L.S.	1	3,500.00	\$3,500.00
	Clearing and Grubbing	EA	20	\$ 475.00	\$9,500.00
DEMOLITION					
	Concrete (assumes off-site disposal)	C.Y.	10	\$ 750.00	\$7,500.00
	Disassemble Rubble Masonry Wall	C.F.	450	\$ 4.50	\$2,025.00
EARTHWORK					
	Sediment excavation (assumes on-site disposal)	C.Y.	0	\$ 15.00	\$0.00
	Embankment excavation and haul off-site	C.Y.	400	\$ 25.00	\$10,000.00
	Riprap armor (12-inch)	C.Y.	110	50.00	\$5,500.00
	Geotextile bedding	S.F.	2000	2.00	\$4,000.00
PLANTINGS					
	Plant with Wetland Seed Mix	L.S.	1	1,500.00	\$1,500.00
GENERAL CONDITIONS					
	Mobilization & Demobilization	L.S.	1	22,500.00	\$22,500.00
	Construction Subtotal				\$77,525.00
ENGINEERING/PERMITTING					
	Engineering	L.S.	1	25,000.00	\$25,000.00
	Permitting				
	Wetland Protection Act	EA	1	6,000.00	\$6,000.00
	MEPA applicability determination	EA	1	1,000.00	\$1,000.00
	Endangered Species	EA	1	1,000.00	\$1,000.00
	Dam Safety Permit	EA	1	2,000.00	\$2,000.00
	MHC (coordination only)	EA	1	\$ 3,000.00	\$3,000.00
	Construction Admin	L.S.	1	30,000.00	\$30,000.00
	Long Term Monitoring	Year	2	5,000.00	\$10,000.00
	Engineering / Permitting Subtotal				\$78,000.00
SUBTOTAL					
					\$155,525.00
	CONTINGENCY (20%)				\$31,105.00
	TOTAL COST (ROUNDED TO NEAREST \$1,000)				\$187,000.00
			RANGE	\$159,000.00	\$243,000.00



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TOWN OF BOLTON CONSERVATION COMMISSION
NON-JURISDICTIONAL ALT. PLAN
FYFESIRE POND DAM

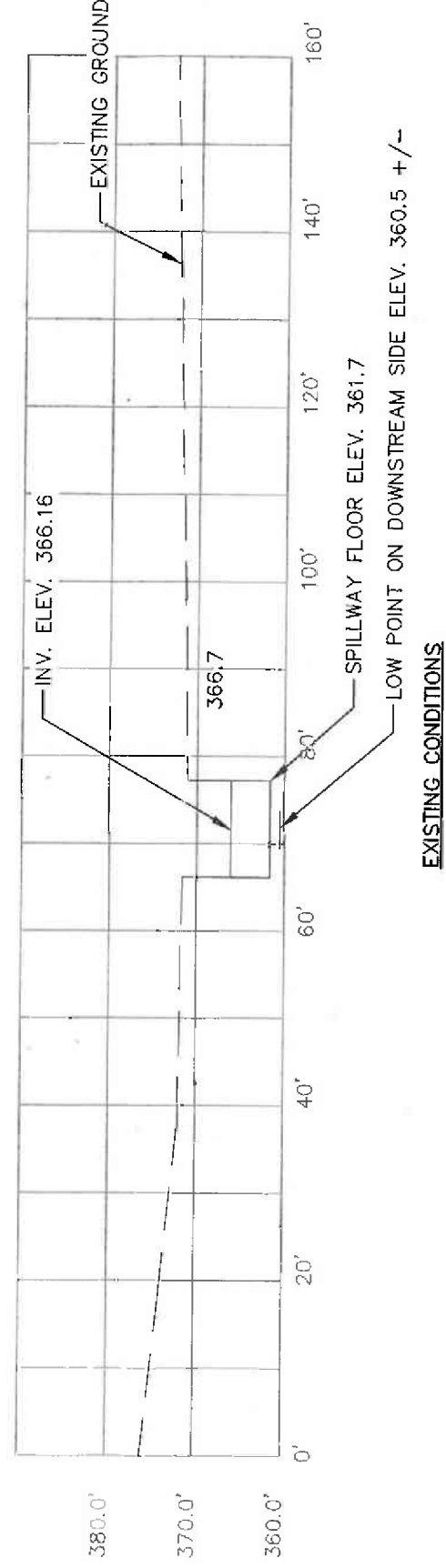
BOLTON

MASSACHUSETTS

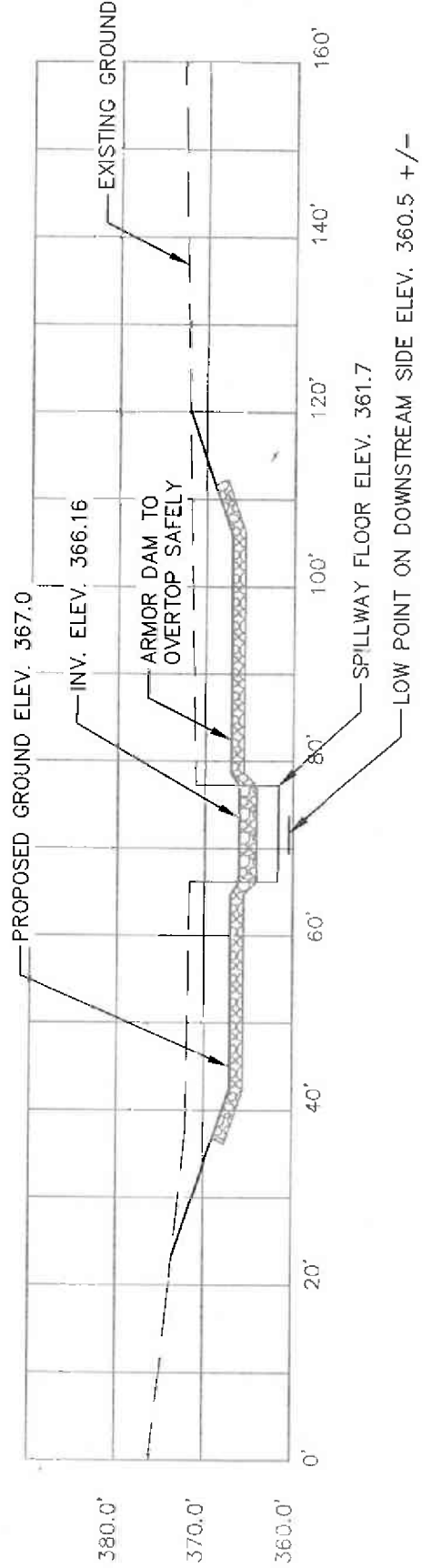
PRJ. No.: 20090501A10
DATE: NOVEMBER 2011

DATE: NOVEMBER 2011

ADD.ALT.



EXISTING CONDITIONS



NON-JURISDICTIONAL CONVERSION ALTERNATIVE
STRUCTURAL HEIGHT = 5.5 FT +/-

SCALE	HORIZ: 1" = 20'
VERT:	
DATUM:	
HORIZ:	
VERT:	
GRAPHIC SCALE	0 10 20



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TOWN OF BOLTON CONSERVATION COMMISSION

NON-JURISDICTIONAL CONVERSION ALTERNATIVE CROSS SECTION

FYFESHIRE POND DAM

BOLTON

MASSACHUSETTS

PROJ. NO.: 2009001.010
DATE: NOVEMBER 2011

ADD. ALT