

Exhibit N

F E A S I B I L I T Y S T U D Y

Final Feasibility Study

Homestead Woolen Mills Dam West Swanzey, New Hampshire



Submitted to:
NH Department of Environmental Services &
Town of Swanzey, New Hampshire



Submitted by:
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In association with:
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Field Geology Services
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Proposed dam on the site of the current Homestead Dam with
Swanzey Street and Pines Hotel in the background, ca. 1860.

- Hydraulic analysis of the river concludes that potential damage to a Native American fish weir is unlikely.

Natural Resources

- The NJ Fish and Game Department estimates that approximately 94 hectares (232 acres) of spawning and nursery habitat from the Surry Dam to the Kelly Farm in Winchester and estimated that an additional 45 hectares existed from Kelly Farm to the confluence with the Connecticut and in the lower reaches of the South Branch of the Ashuelot. From these habitat surveys, Sprankle (1999) estimated that the Ashuelot River could produce an annual run of more than 11,500 shad and 47,000 herring.
- Removal of the dam would benefit numerous fish species including salmon, American shad and herring. Not only would this have importance to the ecological functioning of the river, but it would offer a sport fishing experience and would become an important food source to larger marine fish (especially the herring, which are a main food source for striped bass and blue fish along the coast).
- A restored channel would be passable to shad and other fish because the stream gradient and velocities during the upstream migratory season will be within ranges commonly observed to be passable in laboratory and natural settings.
- Removal of the Homestead Dam may affect the hydrology of adjacent wetlands and floodplain forests such that the species composition on the existing communities would shift to drier species/cover types. For example, aquatic bed communities would develop characteristics of emergent marsh systems. Scrub-shrub wetlands would likely acquire an overstory of silver and red maple, and understory species would shift to those characteristic of forested wetlands. These changes are estimated to affect approximately 40 acres of wetlands, but would be detectable only after several decades. It is important to note that loss of wetlands at the margin would likely be at least partially offset by the development of new riparian aquatic bed, emergent, and scrub-shrub systems within the reconfigured Ashuelot River channel.
- The dwarf wedge mussel (*Alasmidonta heterodon*) is a federally endangered freshwater mussel known from the Connecticut River basin. Biological survey of the river in West Swanzey in 2003 and 2004 determined that two live individuals of this rare species are located within the impoundment. Removal of the Homestead Dam will benefit this federally listed species by enabling the upstream movement of the mussels host fish species (the tessellated darter) and by opening new habitat for the mussel.



2

Alternatives

2.1 Introduction

One key element of the feasibility study is to define a reasonable range of alternatives for consideration by the stakeholders. Based on discussions with the resource agencies, the Advisory Group and the public, the following conceptual alternatives were developed for discussion in the Feasibility Study. The study provides a discussion of the costs associated with each of these alternatives (See also Appendix E), and later chapters provide an assessment of the impacts and benefits of each of these alternatives.

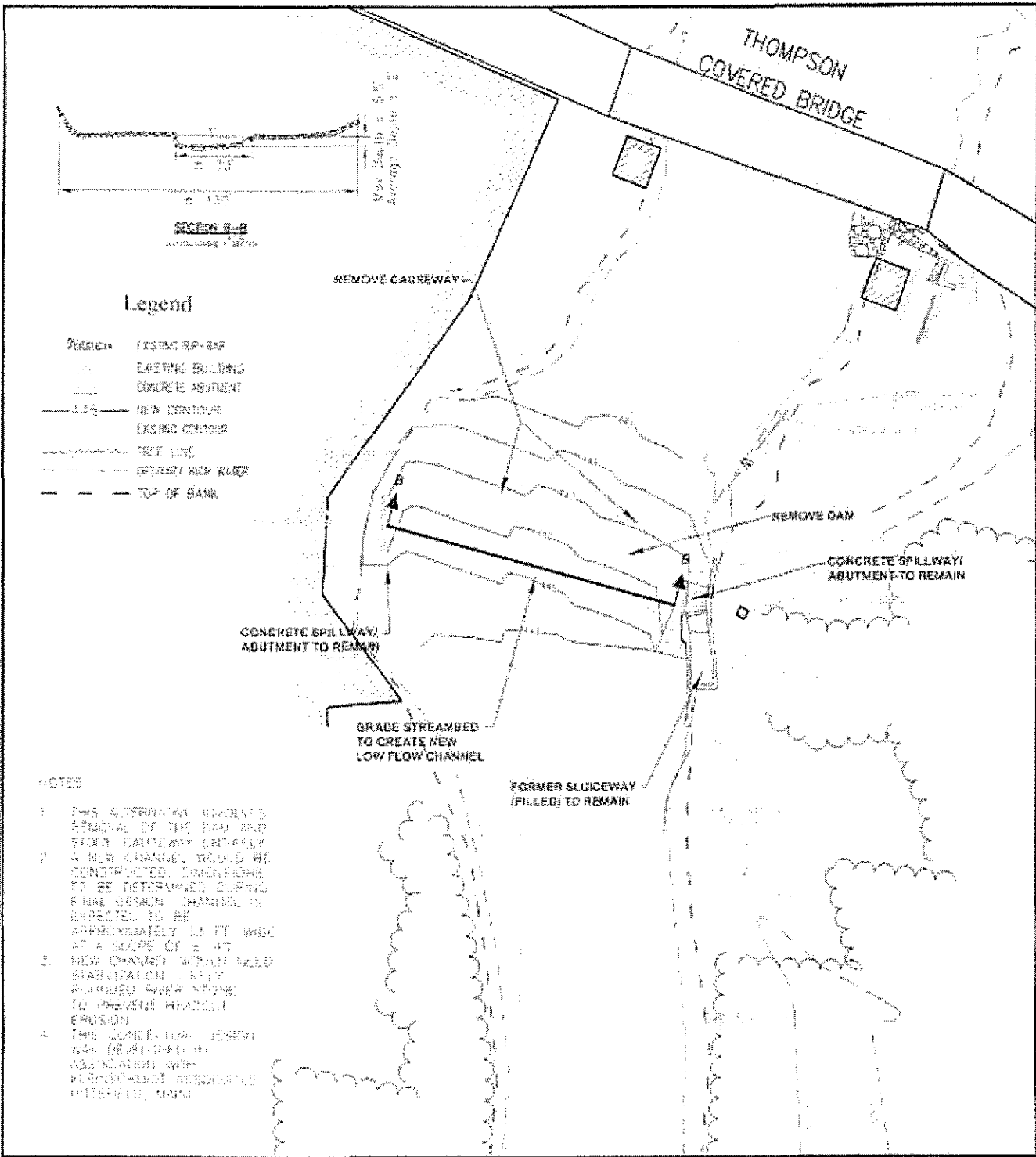
2.2 Alternative A - No Action

This alternative is defined as “no repair or restoration work on the Homestead Dam.” Under this scenario, the existing dam would remain as is, with no repair or maintenance. The condition of the dam would certainly continue to deteriorate, and safety and liability concerns would become even more acute. Additionally, due to additional and increased leaking of the dam, the impoundment level is expected to fall. Inevitably, the dam would fail, resulting in unpredictable damage to property.

As explained in Chapter 1, it is readily apparent that this alternative is not feasible due primarily to safety issues, based on the 2004 inspection, a review of dam inspection reports and on a general knowledge of the Ashuelot River. Nevertheless, its inclusion in the study is useful to provide a baseline against which to evaluate other alternatives. Obviously, there are no direct economic costs associated with this alternative.

2.3 Alternative B - Full Dam Removal

This alternative involves the physical removal of the entire existing dam structure, the associated cofferdam, and subsequent reshaping of the river channel upstream and immediately downstream of the dam. (See Figure 2.3-1.) While the full removal alternative typically provides the greatest ecological and water quality restoration



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Alternative B
 Dam Removal

Figure 2.3-1



Homestead Dam Feasibility Study
 West Swanzey, New Hampshire



benefits, it will also create the most substantial change in the headpond elevations and river hydraulics. These changes, in turn, may consequently have effects on the Thompson Covered Bridge, on wetlands and floodplain communities along the impoundment, potential impacts to wells along the river, etc. These potential impacts are discussed in more detail in Chapter 3 while the direct economic costs associated with the construction work are presented in Section 2.7 below.

Removal of the dam is expected to take approximately ten days to two weeks of work, and would occur under environmental controls designed to limit any temporary environmental effects. Such work would only occur during the low flow months of August and September. Equipment would be staged on the east bank of the river, near the USGS gauging station, where equipment has previously accessed the river. A portion of the bank would need to be graded to allow equipment access, and the existing causeway would be raised and leveled. Removal of the timber decking and interior crib work would use standard construction equipment such as a track excavator. All of the timber decking and cribbing would be removed from the river, working from west to east, and hauled for disposal at a landfill. It is assumed that any stone ballast remaining within the dam could be dispersed on the stream bed. However, the causeway would be removed entirely because it is constructed of non-native fill and needs to be removed to create a stable stream bed. The concrete abutments on either end of the dam would remain in place to minimize construction costs and protect the mill foundation.

Because removal of the dam would result in an unstable riverbed in the immediate vicinity, dam removal will also require reshaping the channel. Preliminary engineering indicates that a reconstructed channel would start at the present base of the dam and would slope upward at a 4 percent grade for a distance of 100 feet (*i.e.*, from elevation 444 feet to elevation 448 feet. This approximately matches the present bathymetry at the channel end points. The new channel would be roughly trapezoidal in cross section, 33 feet wide at the top and up to 4 feet deep (averaging 2 feet deep). Structures such as cross-vanes or rock weirs could also be used in combination with channel reshaping to arrest any potential erosion.

It is interesting to note that removal or modification of the Homestead Dam was previously considered by the Army Corps of Engineers for additional flood relief for the City of Keene. But, due to the low gradient through this portion of the valley and the fact that the Homestead Dam actually has minimal effect on flooding in Keene, it was determined that flood mitigation benefit would be minimal and the plan was not acted upon. Additionally, the City of Keene also considered removal of the Homestead Dam in an effort to remedy water quality issues associated with the Keene sewer treatment plant that discharges to the Astuelot (Stephanie Lindloff, personal communication, 2004).

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