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## IDENTIFYING ALTERNATIVES

Within the Narragansett Bay and coastal watersheds, there is a need to address aging dams that are in poor condition and in need of repair. Each dam is unique and has different ecological, social, physical and economic factors that need to be considered when exploring solutions. Given that most dams within New England are small, there are often a range of alternatives that can achieve multiple objectives. Dam removal is frequently the most cost-effective way to manage aging dams. Removal will restore most natural river functions and ecological connectivity, eliminate future risks of failure, and avoid long term maintenance and repair costs. However, the social, physical and economic aspects of the local community often warrant consideration of alternatives. Conventional fishways or nature-like fishways are often used in combination with either no or partial lowering of the water levels upstream of the dam. Where dams are not removed, repair and long-term maintenance costs and the potential consequences of dam failure to property, infrastructure and livelihoods need to be identified through engineering studies. The future of any particular dam may warrant the exploration of other options that move beyond what is often perceived as just two options of either keeping or removing the dam.

# CASE STUDIES

**WHO:**  
Steering Committee and/or General Public

**TIME:**  
1 hour

**PURPOSE:**  
Review case studies of other similar projects to help understand possible alternatives

**MATERIALS:**  
Case Study Cards

## OVERVIEW

Each dam is unique and the specific ecological, social, physical and economic factors need to be considered when exploring future scenarios. Unlike large dams, where there are often very few options beyond removal to achieve multiple project objectives, with small dams, there are often a range of alternatives that can achieve multiple objectives. While dam removal may be the best way to restore river functions and ecological connectivity, the social, physical and economic aspects of the local community may benefit from considering a range of alternatives. While typical design charrettes tend to be more open ended, with dams, there are common sets of known alternatives. Public processes around dams benefit from exploring and evaluating the known alternatives while also leaving open the space for creative problem solving if there are new alternatives that can be introduced that are unique to the site.

Case studies allow for the steering committee and general public to learn about how other communities have found solutions to address their aging dam infrastructure. Case studies allow the group to gain familiarity with the common alternatives and use this as a starting point for discussions about possible alternatives for the project at hand. It also can help the group imagine what is possible and reduce fears of the unknown future conditions- for example, seeing photos of projects where the dam has been removed can help the group imagine what that future condition might look like. Case studies can also provide an understanding of the support that is needed to move projects forward and the regulatory and funding opportunities and constraints of a project.

## PRE-WORKSHOP PREPARATION:

The meeting organizers should choose case studies that are appropriate to the scale, type and context of the dam being discussed. There are downloadable PDF's of case studies included in this resource as well as a Microsoft Word and Google Doc template that can be used to create new case studies. If the case studies that are

Prior to the workshop, these case studies should be printed so that every table has at least one of each case study. If you do many workshops- consider printing on card stock paper so that they can be used at multiple workshops.

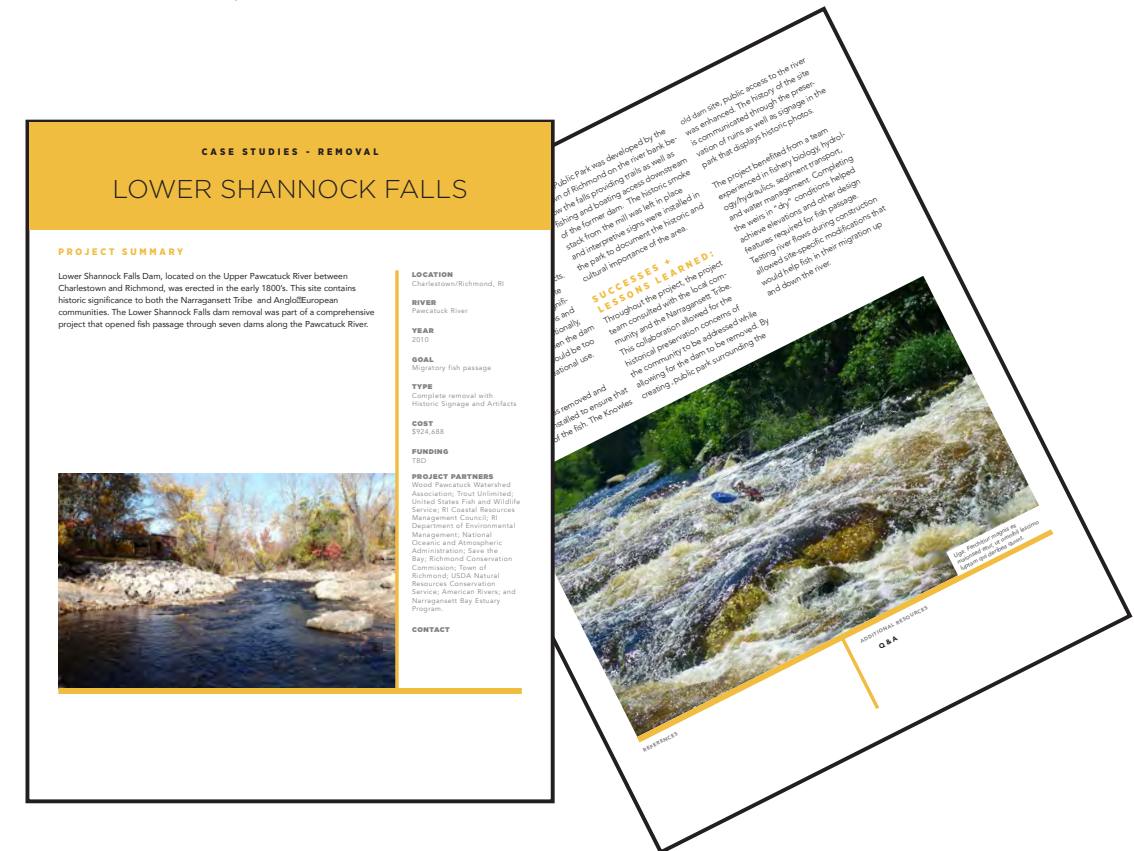
## THE EXERCISE:

During the presentation, the facilitator can present the case studies. Using before and after photos is a great way for people to understand the impact of the alternative.

Following the presentation, at each table, ask the participants to take time to review the case study cards.

Following the review of the case studies, ask participants to respond to the following questions:

- Are there any questions about the case studies?
- What aspects of each case study seems relevant to the decision at hand?
- Given what we learned from the case studies, what might be appropriate alternatives to consider for this project?



## REFERENCES and ADDITIONAL RESOURCES

# BRAINSTORMING ALTERNATIVES

**WHO:**  
Steering Committee

**TIME:**  
2-5 Hours

**PURPOSE:**  
Brainstorm alternatives

**MATERIALS:**  
Aerial and topographic survey printed at the same scale, photographs

## OVERVIEW

Each dam is unique and the specific ecological, social, physical and economic factors need to be considered when exploring future scenarios. Unlike large dams, where there are often very few options beyond removal to achieve multiple project objectives, with small dams, there are often a range of alternatives that can achieve multiple objectives. While dam removal may be the best way to restore river functions and ecological connectivity, the social, physical and economic aspects of the local community may benefit from considering a range of alternatives. While typical design charrettes tend to be more open ended, with dams, there are common sets of known alternatives. Public processes around dams benefit from exploring and evaluating the known alternatives while also leaving open the space for creative problem solving if there are new alternatives that can be introduced that are unique to the site.

Community sentiment around a dam may vary based on the location, structure, history, and the use of the dam and impoundment. Depending on whether the community attachment is to the dam or to the impoundment, various future scenarios may be considered. For example, a nature-like fishway can preserve a impoundment while significantly improving fish passage, however the dam structure will no longer be visible. If space exists around the dam, a bypass channel can preserve the view of the dam while also significantly improving fish passage and habitat connectivity. In addition, there may be ways to use design to maintain a sense of place and the aesthetics of the dam even if the dam is removed. There are now good case studies that exist for many of these alternatives that can be shared with community members to help them understand and visualize the different alternatives.

Although dam modification alternatives may be more costly than removing the dam and require long term maintenance and repairs, exploring a range of alternatives during the workshop allows for the conversation to move beyond what is often perceived as the binary option of either keeping or removing the dam. The goal of the process is to explore the aesthetic, ecological and historical implications of a range of alternatives and to encourage participants to think about creative solutions to addressing the issues and trade-offs. Community members often appreciate this type of creative thinking that clearly shows the project team trying to address community concerns and find solutions that address the multiple project objectives.

## SETTING UP THE EXERCISE:

Depending on the size of the steering committee group, it may be helpful to divide the group up into smaller groups of 5 that can comfortably sit around a table. At each table, have aerial images of the dam site, topographic surveys, measurements and photographs of the site. It may be helpful to have the areal and topographic surveys printed at multiple scales- one that is very zoomed into the dam sites and surrounding landscape, one that includes the larger reach of river upstream and downstream of the dam, and one that is of the larger regional context. All aerial and topographic maps should have a graphic scale. Each table should also have trace paper, scales and pens and markers. These tools can help with the brainstorming process and to quickly test ideas.

## BRAINSTORMING:

In this exercise, you will work with the steering committee to start brainstorming possible alternatives for the site. While the group may think that the only options are to keep or remove the dam, the goal of this brainstorming activity is to help the group think creatively and explore a wide range of possible future scenarios that can help address the project objectives.

Begin by asking everyone to start writing down ideas for alternatives individually. Once everyone has had a chance to brainstorm- you can go around the group and have them individually share their ideas with the

group. This helps to avoid group-think and improves creativity. As people are describing an alternative, if it is spatial, ask them to sketch the ideas out on the trace paper or you can do it for them as they are describing it and ask them to correct it.

It might be helpful to start brainstorming alternatives for the individual objectives. For each objective, ask how could it be best supported or achieved? What alternatives look desirable from the perspective of that objective alone? To get the group started, you can ask:

- “if you were considering only the objective of x, what alternatives might you consider?”

This should be a creative process of exploring the widest ranging possibilities. At this point the goal is to get the group to explore the “what if” possibilities. List alternatives first, evaluate them later. Critiquing them as they are offered hinders creativity.

Challenge constraints. Some are real but some are only assumed. Try out alternatives that assume the constraint is not there. If the alternative looks great, start questioning the assumed constraint. Remove implicit assumptions about what will be economically or politically feasible ...

Ask yourself what others would think. If you presented this alternative to others, what concerns might they have? What alternatives can you think of to address these concerns?

## CHARACTERISTICS OF “GOOD” ALTERNATIVES

**Value-Focused-** Explicitly designed to address the fundamental values or ends of the decision – the “things that matter” or “felt needs”, as defined by the objectives and the evaluation criteria;

**Technically Sound** - meaning that in developing alternatives for achieving the objectives, the project team has drawn on the best available information about cause and effect relationships and has designed creative and diverse alternatives based on sound analysis;

**Clearly and Consistently Defined-** Alternatives are defined to a sufficient and consistent level of detail using logically consistent assumptions, and that a base case against which all alternatives can be compared has been clearly established;

**Small in number and high in quality-** Poor alternatives have been eliminated and those remaining have been iteratively refined to incorporate new ideas and joint gains;

**Comprehensive and mutually exclusive-** Individual elements or components of a strategy are combined into complete packages, and that the packages are directly comparable;

**Able to expose fundamental trade-offs-** Emphasize rather than hide difficult but unavoidable value-based trade-offs and present real choices for decision makers;

## REFERENCES and ADDITIONAL RESOURCES

Gregory, R., Failing, L., Harstone, M., Long, G., McDaniels, T.L., & Ohlson, D.W. 2012. Structured Decision Making: A Practical Guide to Environmental Management Choices. Wiley-Blackwell, Chichester, U.K.



# SITE VISIT

**WHO:**  
Project Team and Steering Committee

**TIME:**  
2-5 Hours

**PURPOSE:**  
Gain familiarity with the site and help brainstorm possible alternatives

**MATERIALS:**  
Aerial and topographic survey printed at the same scale

## OVERVIEW

While discussing and developing a list of possible alternatives, it can be helpful to do a site visit with the project team and the steering committee to help ground the discussions of alternatives in the specific site context and realities. Each of the alternatives have specific site constraints that will need to be factored in to know whether they are viable alternatives to consider. For example, understanding the downstream conditions will influence whether a river wide nature-like fish ladder would be possible; Seeing the amount of space surrounding the dam and any adjacent buildings or infrastructure (bridges, utilities, etc) may help the group understand whether a by-pass channel or removal would be a viable alternatives; understanding which part of the dam structure is visible from adjacent roads may lead to ideas of how to preserve parts of the dam while removing others to improve habitat connectivity. It is important to think creatively at this stage and visiting the site can help the group brainstorm other ways to balance the various physical constraints and opportunities of a site.

Either prior to the brainstorming alternatives activity or after an initial list of alternatives have been developed, it can be helpful to visit the site with the steering committee. This can help everyone visualize the different possible alternatives on the site and realize if any were not considered that should be added to the list.

Bringing scaled aerial and topographic maps out to the field can help people connect what they are seeing in the field with the plan which can also help with future efforts to discuss the site conditions.

With the group, walk around the dam and the areas upstream and downstream of the dam site. If there is any missing data about the dam this may be a chance to gather data as well. Understanding height, slope, adjacent infrastructure can help the group explore the possibility of other alternatives such as bypass channels, nature like fishways and removal and think through what additional data would be needed to determine if those would be viable alternatives.

If the dam is in a populated area, walk around the adjacent streets as well. This can help build an understanding of how the dam is part of the built fabric of the community and if it might impact the sense of place. Is the dam visible from the surrounding roads, is the sound audible, are there houses or businesses adjacent to the structure?



### REFERENCES and ADDITIONAL RESOURCES

To Access Topographic Maps: <https://www.usgs.gov/faqs/how-do-i-find-download-or-order-topographic-maps>

PROBLEM FRAMING			DETERMINING OBJECTIVES			IDENTIFYING ALTERNATIVES			ESTIMATING CONSEQUENCES			EVALUATING TRADE-OFFS			DECIDING AND TAKING ACTION		
Project Team	Steering Committee	General Public	Project Team	Steering Committee	General Public	Project Team	Steering Committee	General Public	Project Team	Steering Committee	General Public	Project Team	Steering Committee	General Public	Project Team	Steering Committee	General Public