Third Street Bridge – Overview of Dam Decommissioning

Dam Decommissioning

Definition: a generic term for the alteration of a dam that so it can no longer impound water.

1. Total Removal

To totally remove a dam is to fully deconstruct a dam and all of its parts, down to the foundation and from abutment to abutment (end to end). The goal of total removal is to remove all man-made and artificially placed material from the river and leave little or no evidence of a dam having existed. The river channel is then typically restored to the before the dam state.

2. Full Breaching

To fully breach a dam is to raze the structure down to or close to the original streambed. Full breaching does not require removal of all the dam structure. But virtually no portion should be left visible above the restored stream banks.

3. Partial Breaching

Partial breaching involves removal of enough of the dam structure to prevent the impounding of water behind the remaining structure. Significant portions of the dam may remain intact so long as typical and flood flows (generally up to the 100-year flood) may pass through the new channel unimpeded.

4. Drawdown

When an impoundment is drawn down, the water surface is lowered to reduce pressure on the dam. This is a temporary response to a dam safety emergency or prelude to a dam decommissioning. Drawdown is typically accomplished by opening the

outlet works. Complete drawdown can give indication of post –decommissioning conditions in the impoundment after a stream channel is formed and vegetation is reestablished.

5. Stream Restoration

Stream Restoration is the reestablishment of the ecosystem of the river and the adjoining wetlands and stream banks. After a Dam decommissioning, the stream restoration may require more work than just the removal of the dam. Other stream corridor improvements such as sediment management, stream stabilization, habitat improvements, stormwater management and other physical improvements may be required to fully restore the stream and surrounding banks and wetlands. It is important to note that each of the above methods of dam decommissioning usually require different levels of stream and corridor restoration.

Permitting

With any dam decommissioning, permits will be required for the dam removal. Below is an alphabetical listing of some of the permitting agencies that will be involved in the decommissioning process:

- Delaware County Conservation District
- Delaware County Planning Commission
- Environmental Protection Agency
- Federal Emergency Management Agency (Office of Homeland Security)
- Pennsylvania Department of Environmental Protection
- Pennsylvania Department of Transportation
- Pennsylvania Historical Commission

- Public Utility Commission
- United States Army Corp of Engineers
- United States Fish and Wildlife Services

Community Issues

The following are some Community Issues that should be considered for the dam decommissioning:

1. Aesthetics: What will the stream look like after the removal of the dam?

2. Resources: How will the decommissioning impact resources upstream and downstream of the current structure?

3. Property: What effects will the decommissioning have on property owners adjacent to the dam and stream corridor upstream and downstream of it?

a. Will the decommissioning create “new” wetlands or remove existing wetlands along the stream corridor?

b. Will the property owners adjacent to the dam gain or lose property?

c. What kind of public access to the new stream corridor can be expected?

Engineering Issues

Engineering issues for dam decommissioning involve the method that is chosen for the specific site conditions at the Third Street Bridge; the protection of the stream during and after decommissioning; the short and long term reaction of the natural stream system after the decommissioning. The following are engineering issues that should be considered before performing the dam removal:

1. Conceptual Demolition Plan

a. Will the dam will be removed fully; breached; or partially breached?

b. The steam channel configuration will need to be estimated for the type of dam removal.

2. Demolition

The means and methods of the removal will need to be examined and documented for the dam decommissioning.

3. Sediment Relocation

a. The engineering analysis will require that the existing sediment be modeled and a volume of sediment be relocated downstream of the dam and deposited along the stream channel. This will need to be analyzed.

4. Sediment Management

The issue is the long time migration of the sediment from behind the dam. Will any of the sediment that has accumulated during the life of the dam be removed to prevent sediment relocation? Will this sediment be allowed to remain in place and be naturally transported downstream over time?

5. Stream Bank Stabilization

After decommissioning, there is the potential for excessive stream bank erosion. Analysis of areas that are at risk for increased erosion will be necessary. The stream bank stabilization methods to best control erosion in these areas should be considered.

6. Existing Infrastructure

Removal of the dam can result in the potential for downstream utility, bridge, culvert and pipeline damage due to changes in the velocity and configuration of the

stream corridor. The pre-decommissioning analysis should address effects on the existing infrastructure downstream by a breach analysis.

7. Water Quality

Will the stream water quality be affected by the decommissioning?

8. Stream flow elevation changes

What will the stream flow depths and velocities become after the decommissioning? The decommissioning may require that the FEMA flood map be revised to reflect the new stream channel below the decommissioned dam.

9. Storm Water Management

How will the storm water flow, depths and velocities become after the decommissioning? The decommissioning should require a breech analysis and flood analysis of the existing conditions as well as the post condition of the breech. The study should determine the impacts of all downstream properties, structures, infrastructure and property.

Summary of Potential Benefits of Dam Decommissioning

1. Aquatic Habitat Restoration

After decommissioning, the aquatic wildlife can return to the state that existed prior to the dam's construction.

2. Habitat Reconnection

The decommissioning can restore the steam channel and connect the natural ecological communities upstream and downstream from the dam.

3. Habitat Access

With removal of the dam, the resident wildlife can move throughout the stream corridor.

4. Wetland Restoration

Areas that were underwater behind the dam may become stream wetlands.

5. Stream Corridor

With removal of the dam, the stream corridor is restored which allows for passage through the area of the former dam.

6. Improved Sediment Transport

After decommissioning, the natural sediment transport is re-established in the stream corridor.

7. Stream Flow

The natural stream flow that had been inhibited by the dam structure will be re-established for that portion of the stream that had been affected.

8. Water Quality

The dam removal improves the water quality by flushing the stream, resulting in lower water temperature and increased dissolved oxygen for wildlife.

9. Open Space

The removal of the dam will allow the impoundment area to be potentially utilized as additional open space.

10. Natural System Restored

The dam removal will allow the stream channel area to revert to a more natural state similar to what existed prior to the construction of the dam.

11. Dam Decommissioning Costs

The cost to remove or breach the dam is typically less than the cost to improve, upgrade the existing dam.

12. Maintenance Costs

With a decommissioned dam, no maintenance cost would be required.

13. Liability

A decommissioned dam should not have liability for the dam

14. Public Relations Benefits

Removal or breaching a dam can highlight the owner's commitment to environmental conservation.

Summary of Likely Benefits to Maintaining the Existing Dam

1. Recreation:

The impoundment created by the dam can support recreational activities such as swimming, boating, fishing, bird watching, and ice skating.

2. Fire Protection:

In case of an emergency, the water storage can be used for fire protection.

3. Irrigation:

The water storage can be used for watering lawns and plants.

4. Warm Water Fish:

Typically dams provide a favorable environment for warm water fish such as bass and catfish.

5. Waterfowl:

The impounded water provides habitat for waterfowl and migratory birds.

6. Wetlands:

The impounded water can create wetlands due to the higher water table around the water's edge.

7. Aesthetics:

The impounded water has a pleasing look for the surrounding property owners.

8. Waterfall:

The dam spillway creates a pleasing "falling water" sound for the surrounding visitors.

9. Property Owners:

Maintaining the dam has no effect on the surrounding property owners.

10. Existing Stream Banks:

The dam helps control the water outlet and in turn diminishes the potential for stream bank erosion.

11. Existing Infrastructure:

The dam keeps the existing infrastructures downstream in balance and prevents potential damage to the structures.

12. Access:

The existing roadway allows access for emergency vehicles to cross the dam to and from neighboring communities.

13. Stormwater:

The existing dam will reduce and control the amount of stormwater flowing downstream from the dam, helping to control flooding and property, infrastructure damage.