PENINSULAR PAPER DAM: DAM REMOVAL ASSESSMENT AND FEASIBILITY REPORT

City of Ypsilanti

Originally presented by Princeton Hydro to City Council, 12/4/18
Summarized for presentation by HRWC to the Sustainability Commission, 1/14/19

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The City of Ypsilanti approached the Huron River Watershed Council (HRWC) to explore the options for the future of Peninsular Paper Dam and the restoration of the Huron River.

Why: Pen Dam was classified as high hazard* and needs to be repaired or removed.

Goal of the study: Assist the city in the decision-making process by completing the preliminary studies to determine if dam removal is feasible.
To ensure community and stakeholder involvement, a working group was developed early in the process.

- City of Ypsilanti
- Ypsilanti Township
- Superior Township
- Friends of Peninsular Park
- HRWC
- with guidance from MDEQ
The Feasibility Study
Assessed 3 Critical Issues:
1. Sediment quality and quantity
2. Potential infrastructure/utilities impacts
3. Riverfront land ownership
   Includes initial conceptual design and an estimate of construction cost for dam removal.

Additional study was deferred to a later phase, pending the outcome of the feasibility study.
• **Owned by the City** of Ypsilanti  
• **Built in 1867** to provide power for paper manufacturing.  
• **Failed in 1918.** Rebuilt 2 years later.  
• **High Hazard* dam** in fair condition (2016 inspection).  
• **Dam no longer generates power.** Powerhouse was abandoned. Electricity-generating equipment was removed.

* The high hazard classification (from 2016 inspection) relates to consequences if a dam were to fail, not condition. A “high hazard” dam that fails could result in loss of human life. Dams classified as high hazard require inspections every 3 years and updated Emergency Action Plans.
Peninsular Paper Dam

Dam Construction:

- **Type:** Concrete gravity dam.
- **Height:** 16 ft. **Length:** 290 ft.
- Stoplog outlet structure extends to base of dam.

Impoundment:

- 177 acres reach ~6,575 ft. upstream
- Within the City of Ypsilanti, Ypsilanti Township, and Superior Township
- ~37 abutting properties
- Includes two bridges: Conrail Railroad Bridge & Superior Road Bridge
Why Dam Removal Is Being Considered

The dam no longer generates power or serves an economic purpose to offset the required immediate repairs and ongoing maintenance.

Removing the dam would:

• Eliminate the public safety hazard.
• Deregulate the dam and relieve legal liability to the city.
• Remove city obligations for repair, safety inspections and maintenance.
• Improve water quality for this reach of Huron River.
• Restore >1-mile of free-flowing river, associated fishery, with adjacent vegetated floodplain.
• Reconnect >2 miles of river that have been isolated for over 100 years.
Photograph 4: Full dam breach
Photograph 5: Rebuilding dam after breach – dated June 15, 1918

Photograph 6: Spillway after reconstruction
Field Investigation, Survey, and Observations

• Site investigation (included identification of streambank slope failures)
• Survey of dam, riverbed profile, and bridges
• Impoundment sediment probes, identified sediment distribution, type, amount
• 10 vibracores with sediment sample collection
• Upstream and downstream sediment samples
Sediment Analysis

- Majority of samples were below ecological and human health criteria for Metals, PNAs, and PCBs.
- Exceedances were infrequent and of low magnitude.
- Quantity was lower than expected for a dam of this size.

Results:

- Support dam removal and passive, in-stream, sediment management.
- Likely do not necessitate excavation and off-site disposal of impounded sediments.
- Provide reasonable assurance that no further sediment investigation is necessary.
- Management approach requires discussion with regulatory agencies.
Potential Impacts to Infrastructure and Utilities

Utilities: **No anticipated impacts.**

Infrastructure: **Several considerations require more analysis but do not preclude dam removal feasibility.**

- **Conrail Railroad Embankment:** Potential for sediment erosion. Scour protection will be required.

- **Conrail Railroad Bridge:** *Built ~1899.* Current scour under bridge. Potential for increased scour around fortified timber piles. Increased scour protection likely required.

- **Superior Road Bridge:** *Built ~1977.* Current scour under bridge. Potential for increased scour that would undermine piers. Scour protection likely required.
Riverfront Landownership

There are many changes that would occur but none preclude feasibility of removal.

• Many properties would expand. No properties would be reduced in area.
• Recovered land will be within regulated floodplain.
• None of the municipalities, nor HRWC, is interested in acquiring restored land that emerges.
• Properties defined by the water boundary will expand to meet the new water boundary.
• Properties defined inland or away from water’s edge will not change.
• Some land boundaries are unclear. Along North Huron River Drive, property owners have been using the land from the top of bank to the edge of water for some time (i.e. staircases, sitting areas, and docks). It may be necessary to locate the monuments to determine if the lots go to the top of bank or extend down to the water.
• Some properties would extend across municipal boundaries which could complicate taxation.
• Reasonable to assume individual riverfront landowners will have a choice regarding their property expansion and that unclaimed land may revert to the municipality, county, or state, pending legal guidance pertaining to real estate.
Anticipated Landscape Change

- Exposed land will revegetate rapidly.
- View will transition to a river meandering through a floodplain meadow.
- Sediment erosion will be limited and predictable.

“Meandering floodplain” example: Delhi-Barton Pond
Proposed Conditions
Proposed Conditions
Conceptual Dam Removal Design and Sediment Management Approach

The conceptual design for this dam removal includes the following aspects:

• Remove spillway.

• (Optional) Preserve the Peninsular Paper Dam powerhouse and sign.

• Active management of sediment near dam. Passive management of sediment in the impoundment.

• Stabilize banks near Peninsular Park.

• Active planting and landscaping to extend Peninsular Park.

• Large swaths of the impoundment will revert to natural landscape.

• Stabilize stormwater outfalls.

• Structural reinforcement of Conrail Railroad Bridge and Superior Road Bridge.
Conceptual Level Cost Estimate

Peninsular Paper Dam Removal
~$1,734,000

Railroad Bridge Scour Protection/Reinforcement
~$705,000

Superior Road Bridge Scour Protection
~$225,000

Total:
~$2,664,000
Conclusions of Dam Removal Feasibility

Results of the initial study show that dam removal is feasible.

Sediment Quantity & Quality

- **Quality**: Generally within human health and ecological criteria and support the feasibility of dam removal.
- **Quantity**: Relatively low compared to dam height. Can be addressed with passive and active approaches.

Potential Impacts to Infrastructure & Utilities

- Potential impacts on the two bridges. Bridges will need further analysis and likely stabilization.

Riverfront Landownership

- Most riverfront landowners will gain land. No property owners will lose land area.
- View will transition to a river meandering through a floodplain meadow.
- *HRWC Note: Following similar dam removals, land values have increased.* (Provencher 2008)
HRWC Discussion

The results of the feasibility study strongly favor removal.

Ecological Benefits of Removal

• Water quality will substantially improve, restoring the natural temperature and flow profile of the river.

• Ecological health of the river will improve through Ypsilanti, especially for fish. Fishing conditions may resemble Riverside.

• Removal will create habitat in a segmented urban area, important for helping wildlife and ecosystems adapt to climate change and stressors.
HRWC Discussion of Cost Considerations

Repair cost: ~$807,000 (20% contingency. Does not include additional and ongoing costs for future inspections, repairs, EAP updates).

Removal cost: ~$2.66M (30% contingency, incl. bridge reinforcement)

The one-time cost of removal is difficult to compare directly against the immediate cost of repairs and ongoing costs of maintenance.

- Outside funding sources are available to cover some of the costs of removal.
- No funding opportunities exist to cover repair and maintenance costs.
HRWC Discussion of Hydropower Feasibility

For comparison, the hydropower feasibility of Ann Arbor dams was investigated in 2008 and 2010.

• Neither Geddes Dam nor Argo Dam were found to be cost-effective.

• Across 7 criteria, Geddes was favorable in 3. Argo was favorable in none. (Favorable being a benefit-to-cost ratio > 1.0. Geddes scored 0.66).

• Preliminary costs for enabling hydropower: $4.4M to $9.3M, depending on the option considered.

Source: Argo and Geddes Dams, Ann Arbor Hydropower Study Final Report, 2010)
HRWC Discussion: PFAS and Dams

PFAS concentrates in foam. Dams create hotspots of foam.

PFAS generally remain near the water surface. Dams may inhibit flushing of the contaminants.

HRWC.org/PFAS
HRWC Discussion of Sustainability Benefits

Removal would improve community resilience, provide a sustainable river corridor, and would remove risk of dam failure to Ypsilanti residents.

Removal would reduce the increasing risks of severe precipitation and flooding due to climate change and increasing impervious surface from development.

Removal improves public safety by avoiding contaminant buildup and removing the physical safety hazards of the dam.
Sediment Quantity

• Total impounded sediment volume ~ 1 million CY

• Mobile sediment ~60,000 CY

• Extends ~6,000 feet, with average depth of 2.5 feet in center of channel.

• Requires discussion with regulatory agencies, and consideration of potential sediment management options.
Photograph 1: View of Dam site
Photograph 2: View of construction of Dam