

PENINSULAR PAPER DAM: DAM REMOVAL ASSESSMENT AND FEASIBILITY REPORT

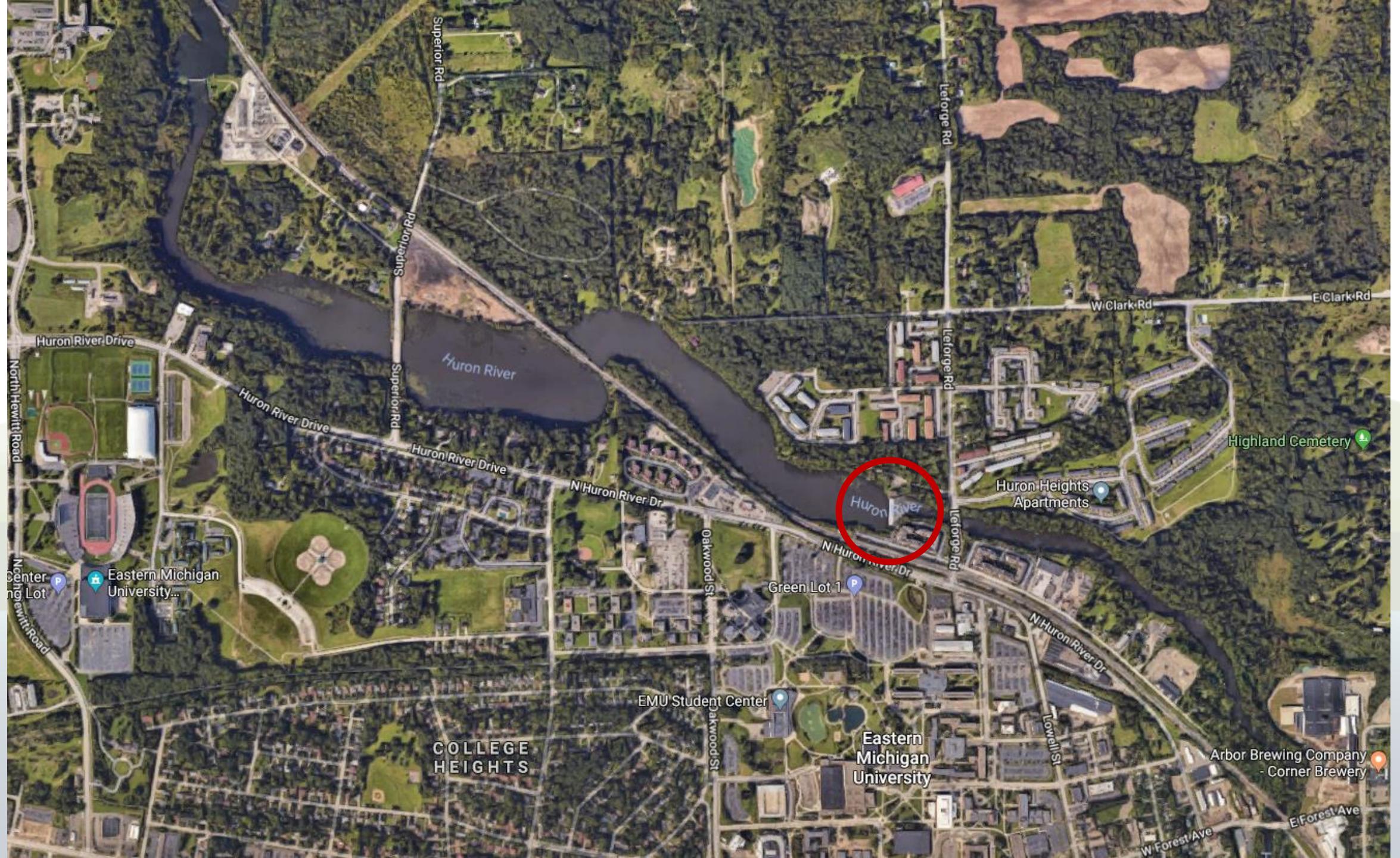
City of Ypsilanti

Originally presented by Princeton Hydro to City Council, 12/4/18

Summarized for presentation by HRWC to the Sustainability Commission, 1/14/19

Presented by Daniel Brown and Laura Rubin, Huron River Watershed Council





Background of Feasibility Study

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.

Peninsular Paper Dam



* 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.

PRINCETON
HYDRO

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

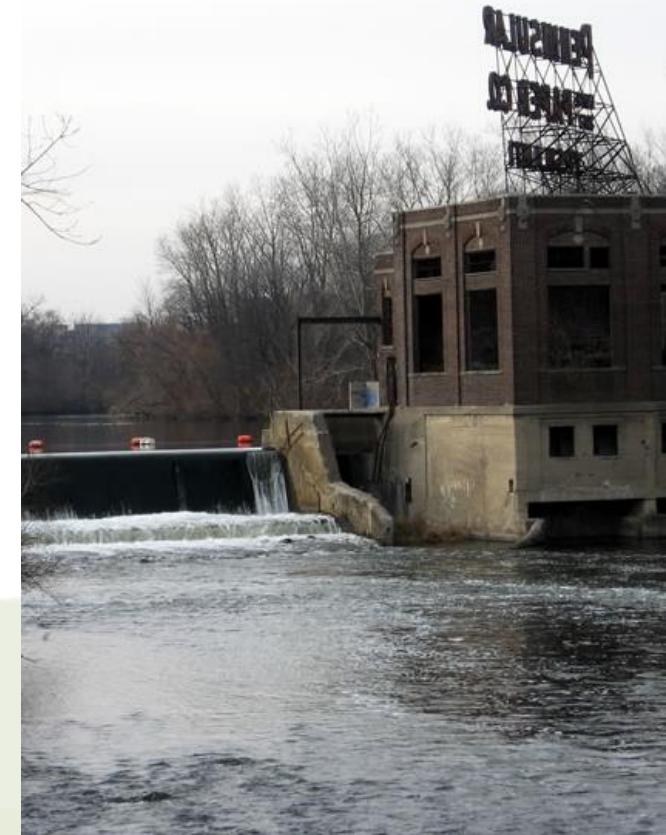


Why Dam Removal Is Being Considered

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

Removing the dam would:

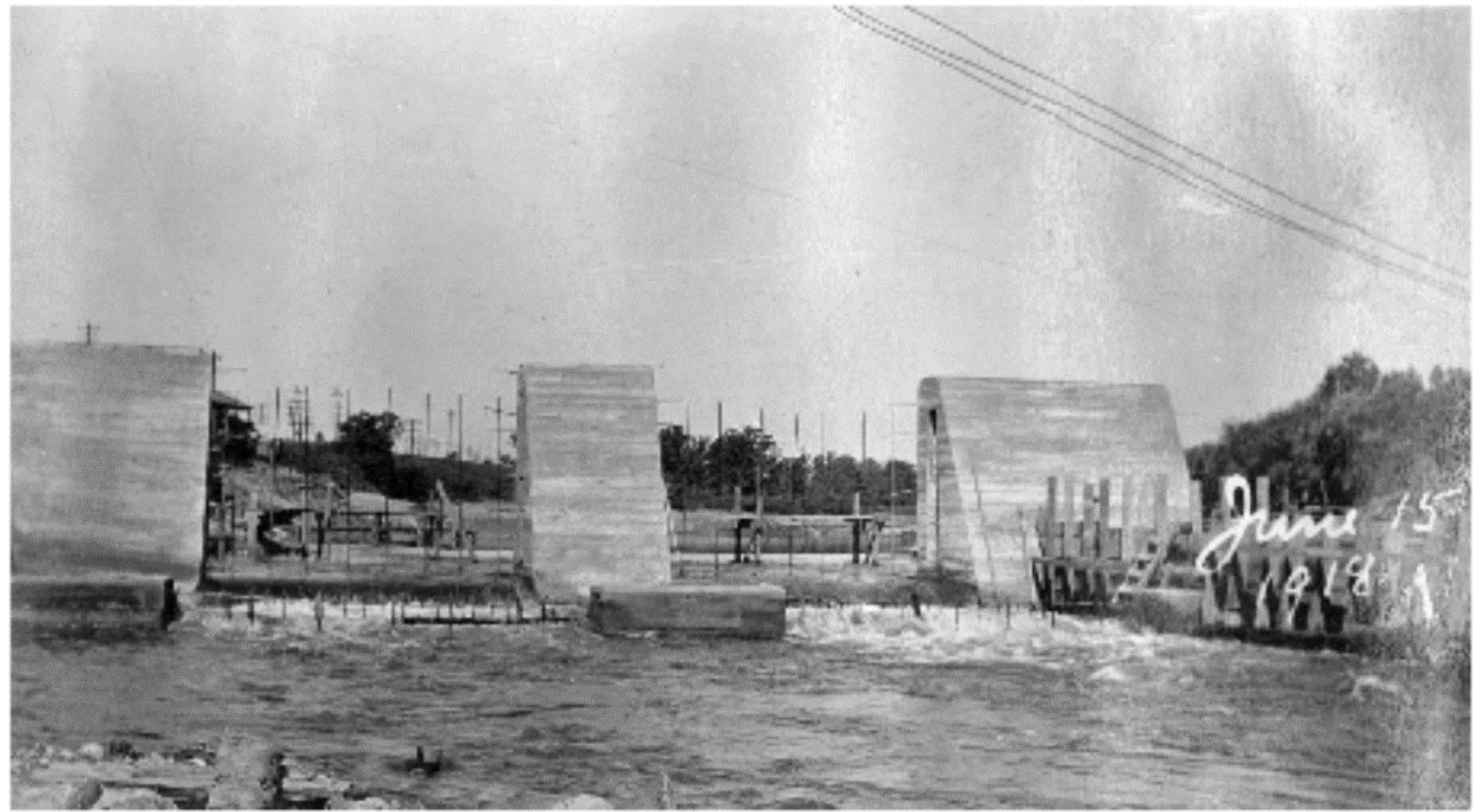
- Eliminate the public safety hazard.
- Deregulate the dam and relieve legal liability to the city.
- Remove city obligations for repair, safety inspections and maintenance
- Improve water quality for this reach of Huron River.
- Restore >1-mile of free-flowing river, associated fishery, with adjacent vegetated floodplain.
- Reconnect >2 miles of river that have been isolated for over 100 years.



Photograph 4: Full dam breach



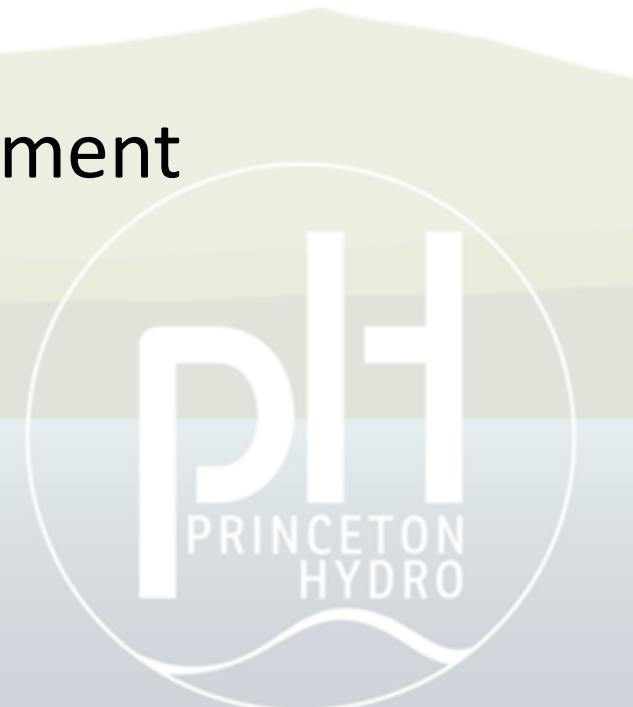
Photograph 5: Rebuilding dam after breach – dated June 15, 1918



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

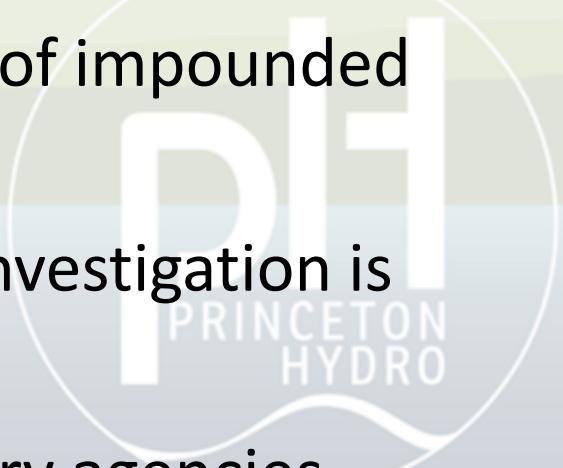


Sediment Analysis

- 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.

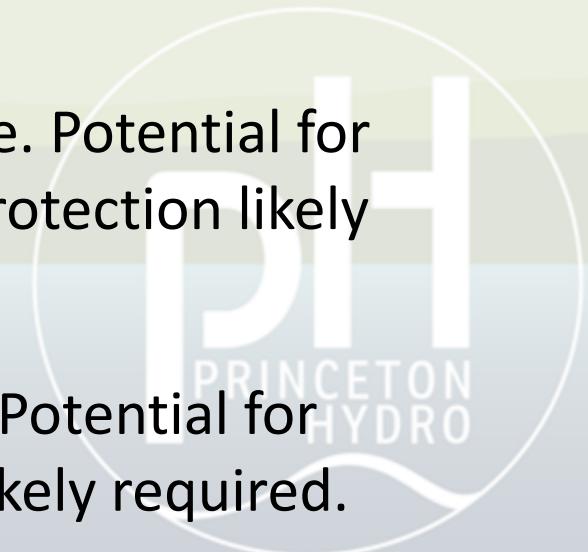


Potential Impacts to Infrastructure and Utilities

Utilities: No anticipated impacts.

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

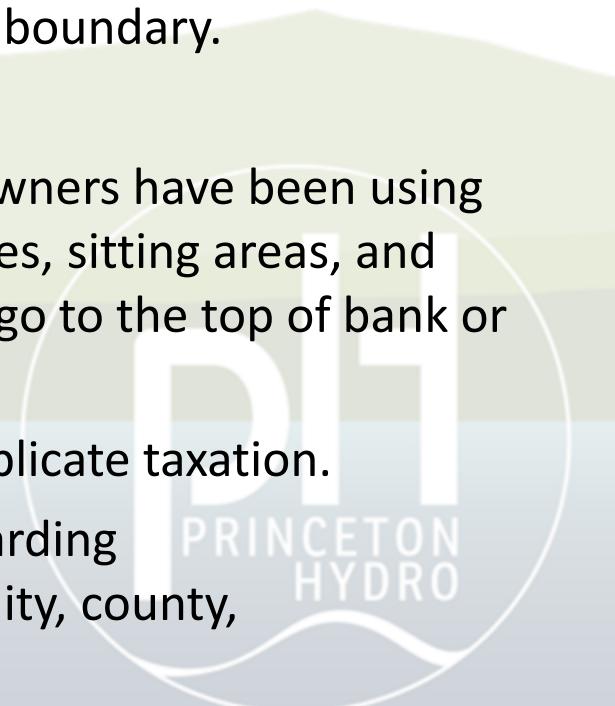
- ***Conrail Railroad Embankment:*** Potential for sediment erosion. Scour protection will be required.
- ***Conrail Railroad Bridge:*** Built ~1899. Current scour under bridge. Potential for increased scour around fortified timber piles. Increased scour protection likely required.
- ***Superior Road 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.





Orientation: Scale: GRAPHIC SCALE: 1" = 50'

Project:

PENINSULAR PAPER DAM

Project Location:

HURON RIVER
YPSILANTI, MI

Sheet Name:

RIPARIAN OWNERSHIP

Surveyor's Seal:

Revisions:

REV.	ISSUED FOR	DATE	BY
W1	ANTICIPATED MATCHLINE	08-20-2018	FRZ

Date:

09-13-18

SME Project No.:

079107.00

Project Manager:

JAS

Designer:

FRZ

CADD:

SRP

Checked By:

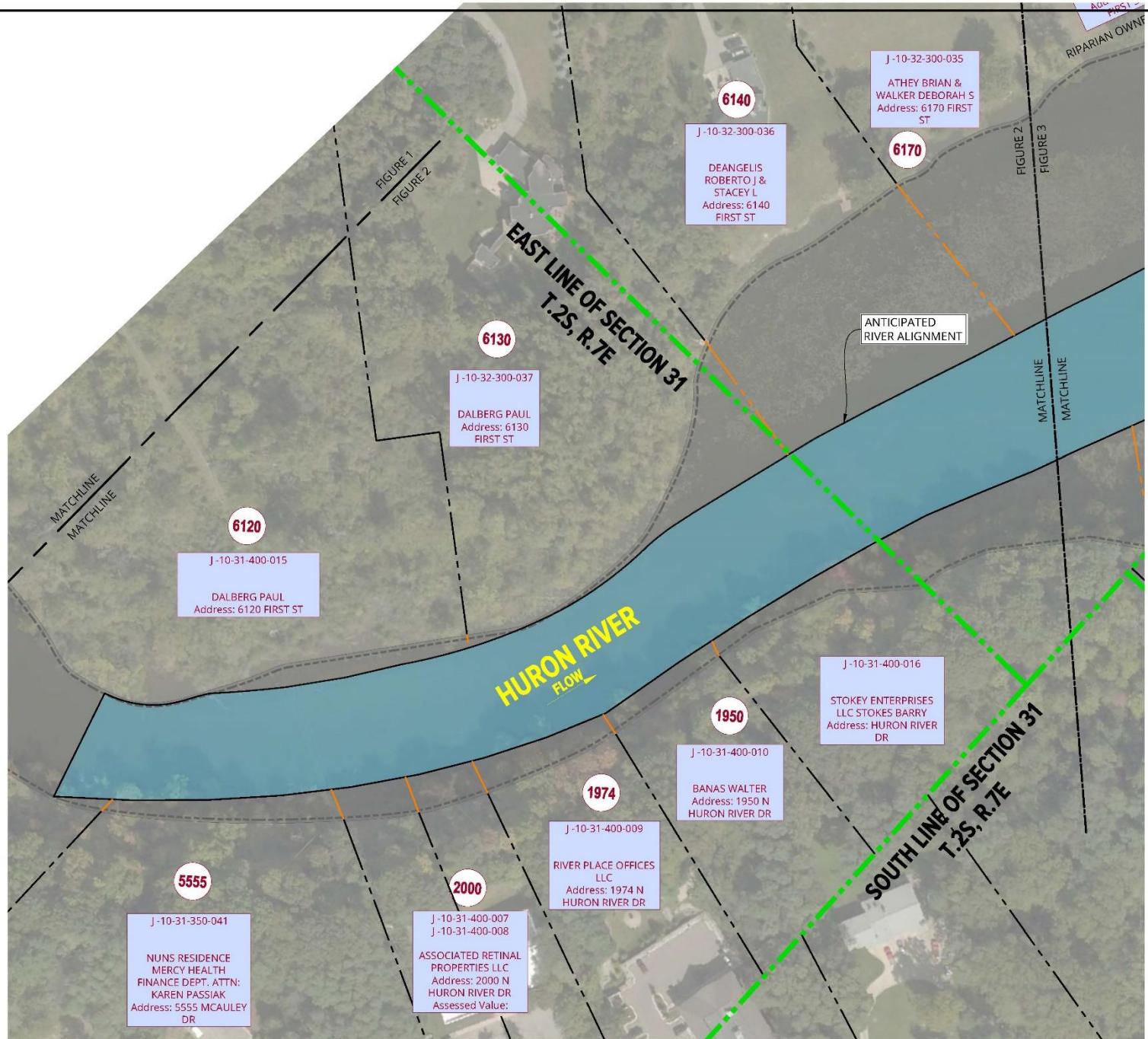
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Sheet No.:

FIGURE 2

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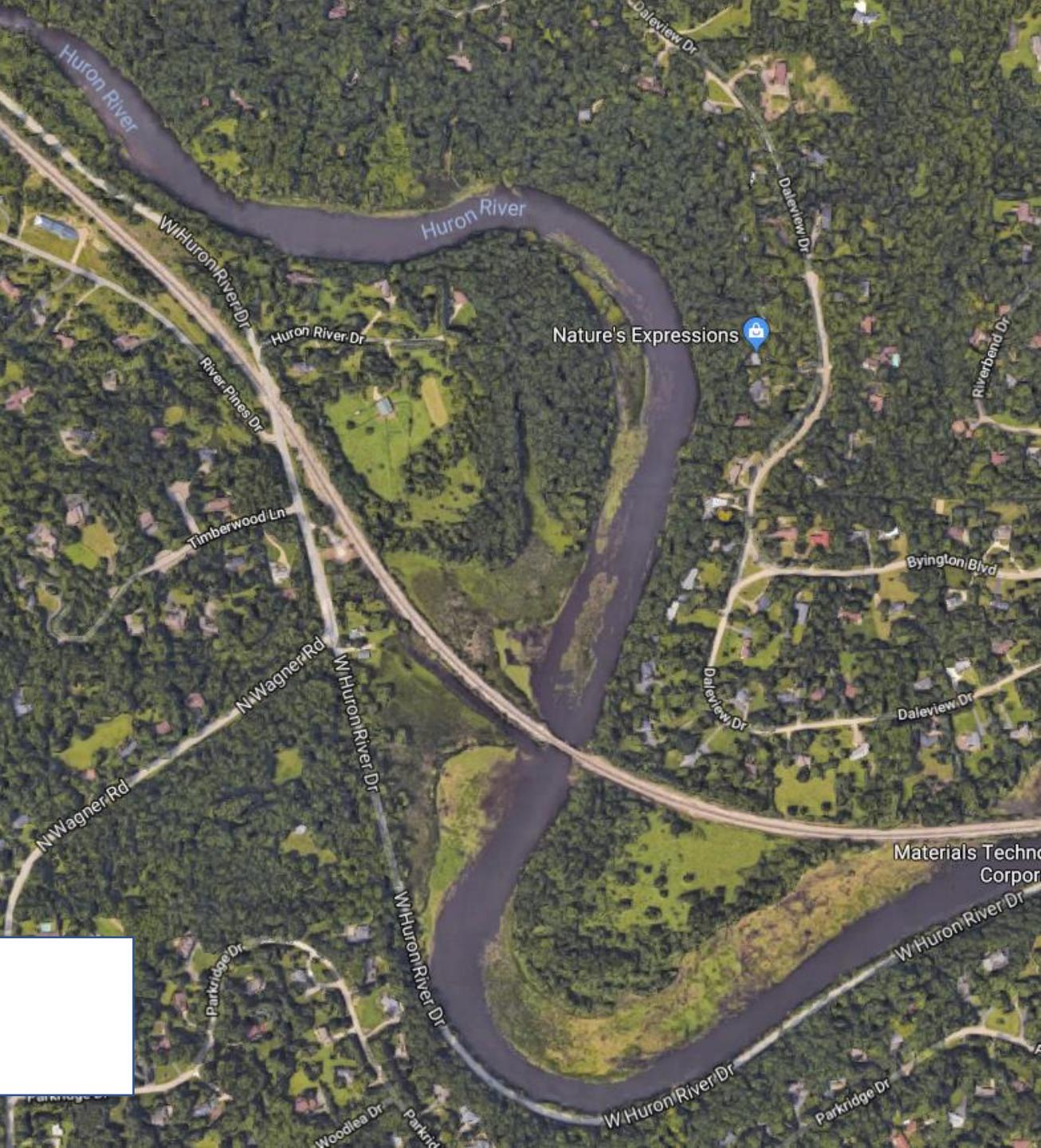
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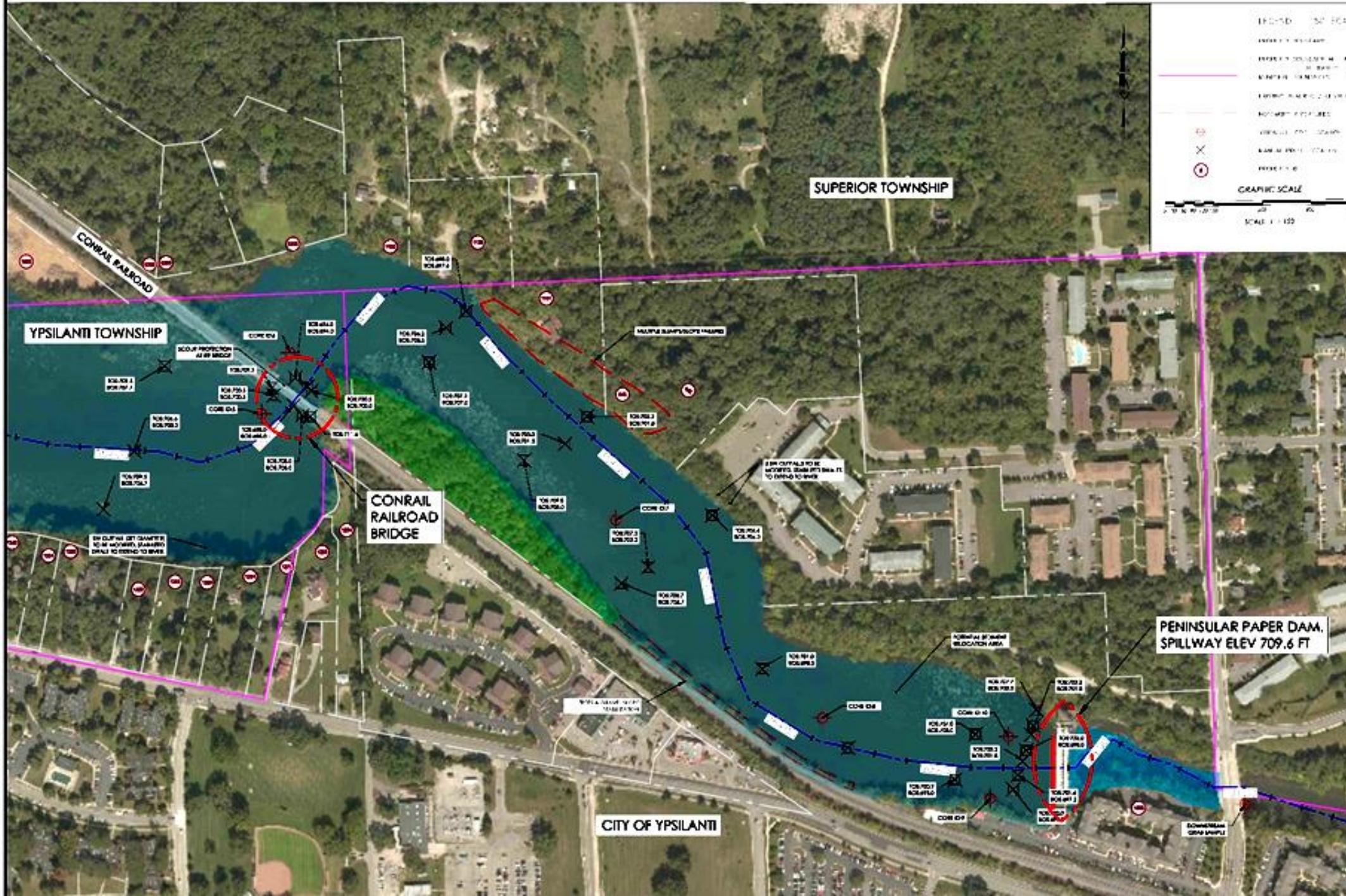


Anticipated Landscape Change

- 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

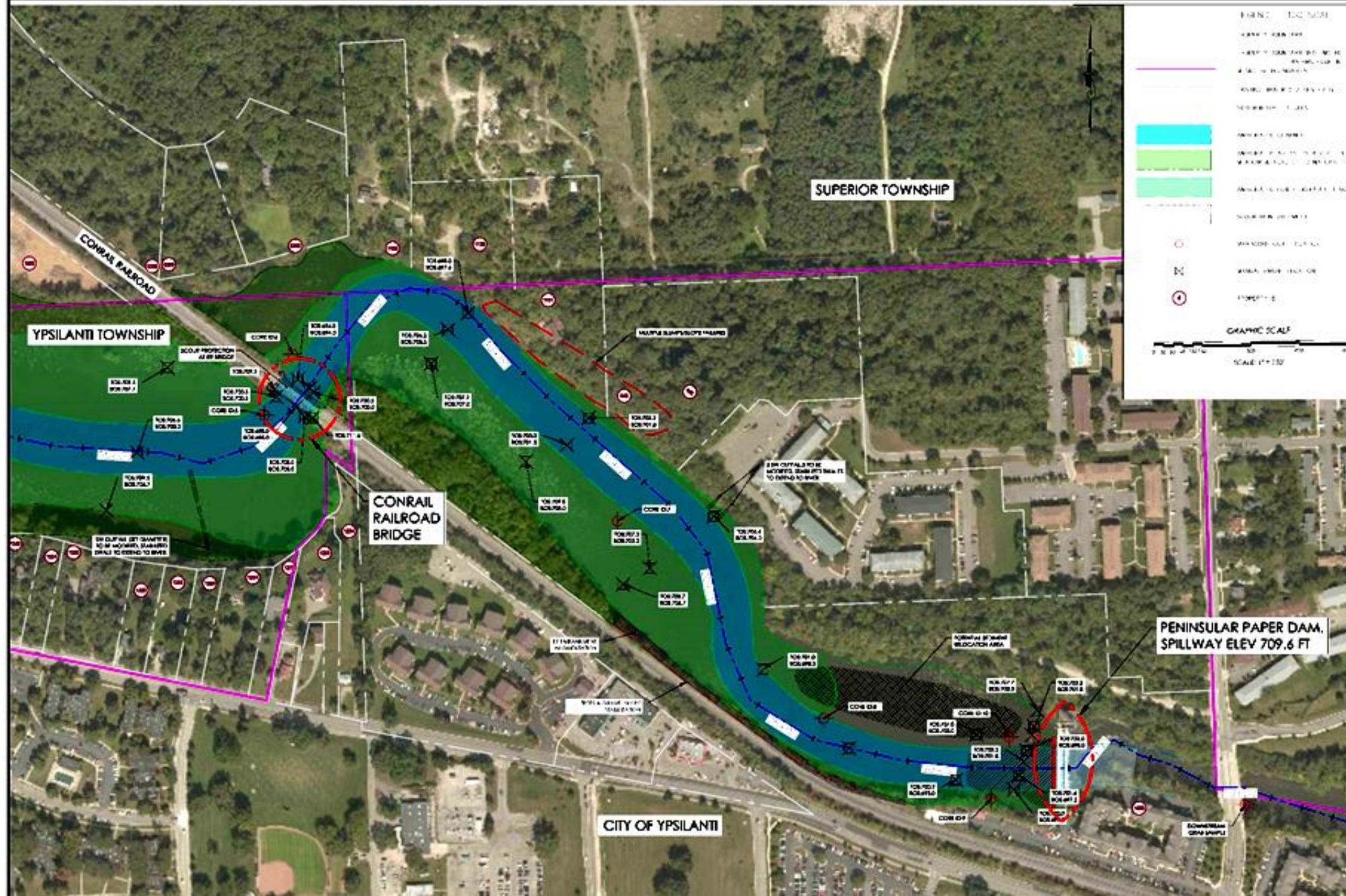




Existing Conditions

16
ACETON
HYDRO

Proposed Conditions



Existing Conditions



H
ACETON HYDRO

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

Concept Level* Cost Estimate

Peninsular Paper Dam Removal

*Estimated costs are rounded, and based on broad-estimate lump sums, or quantities and unit costs from similar projects
Princeton Hydro Project Number: 1792.001
Prepared by: PMW on 9/27/2018
Reviewed by: RiverLogic Solutions

Activity	Estimated Cost
Dam Removal	
Mobilization / Demobilization	\$ 100,000
Traffic Control	\$ 1,000
Erosion & Sedimentation Controls	\$ 3,000
Construction Entrance & Staging Area	\$ 10,000
Drawdown (assumes using existing low level outlet)	\$ 5,000
Access ramp / Construction Accessway	\$ 100,000
Hydraulic Sediment Dredging	\$ 300,000
Water Control (Materials, Installation, Maintenance & Modification)	\$ 110,000
Spillway Demolition / Excavation	\$ 105,000
Loading / Hauling of Concrete	\$ 35,000
Disposal of Concrete	\$ 105,000
Abutment Stabilization / Scour Protection	\$ 25,000
Bank creation / stabilization	\$ 360,000
Site Landscaping / Planting / Site Stabilization (not final site vision)	\$ 50,000
Stormwater Outlets Stabilization	\$ 25,000
Contingencies (30%)	\$ 400,000
Subtotal	\$ 1,734,000

RailRoad Bridge Scour Protection / Reinforcement

Mobilization / Demobilization	\$ 75,000
Traffic Control	\$ 1,000
Turbidity Barrier / Erosion & Sedimentation Controls	\$ 2,000
Construction Access and Staging	\$ 15,000
Water Control (Materials, Installation, Maintenance & Modification)	\$ 75,000
Structural Reinforcement (Optional)	\$ 250,000
Scour Protection Stone (e.g. D50=24")	\$ 76,000
Scour Protection Placement	\$ 8,000
Stormwater Pipe Outlet Modification and Swale	\$ 40,000
Contingencies (30%)	\$ 163,000
Subtotal	\$ 705,000

Superior Road Bridge Scour Protection

Mobilization / Demobilization	\$ 50,000
Traffic Control	\$ 3,000
Turbidity Barrier / Erosion & Sedimentation Controls	\$ 2,000
Construction Access and Staging	\$ 10,000
Water Control (Materials, Installation, Maintenance & Modification)	\$ 30,000
Scour Protection Stone (e.g. D50=24")	\$ 70,000
Scour Protection Placement	\$ 8,000
Contingencies (30%)	\$ 52,000
Subtotal	\$ 225,000

Conclusions of Dam Removal Feasibility

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

Sediment Quantity & Quality

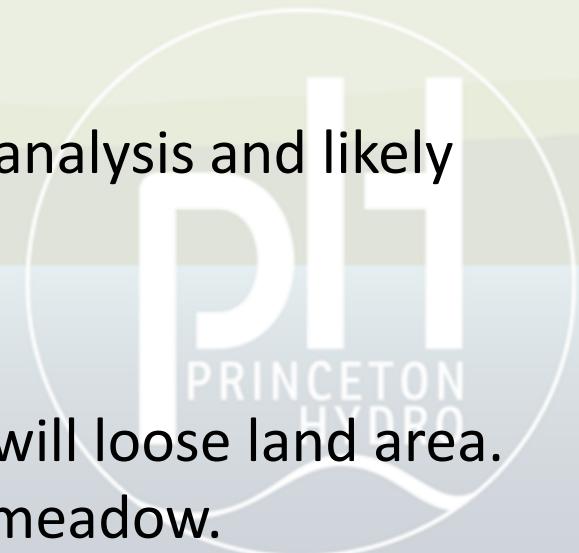
- Quality: Generally within human health and ecological criteria and support the feasibility of dam removal.
- Quantity: Relatively low compared to dam height. Can be addressed with passive and active approaches.

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)*

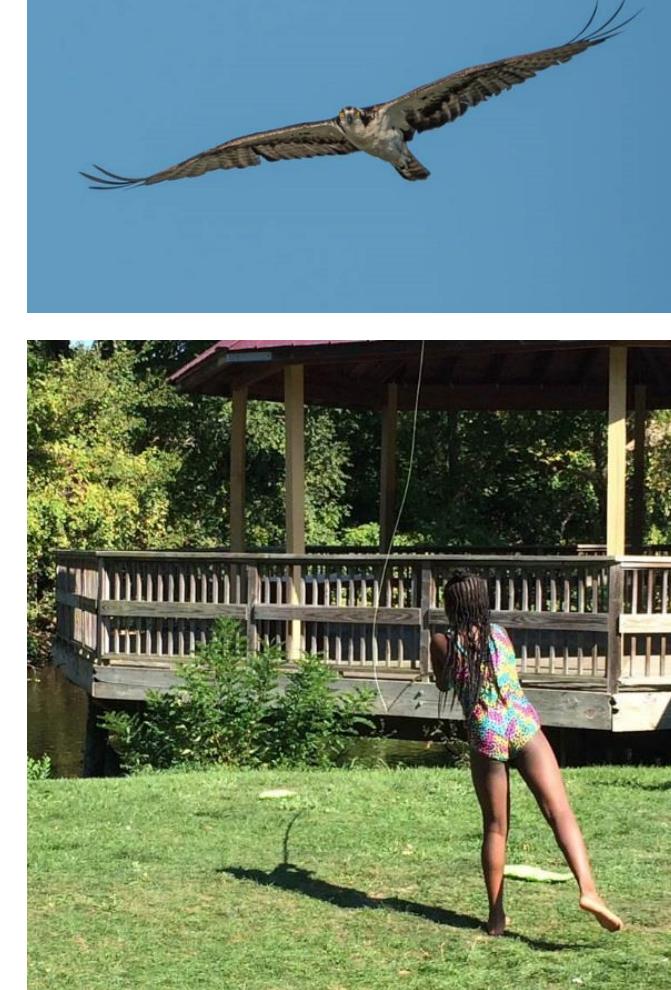


HRWC Discussion

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



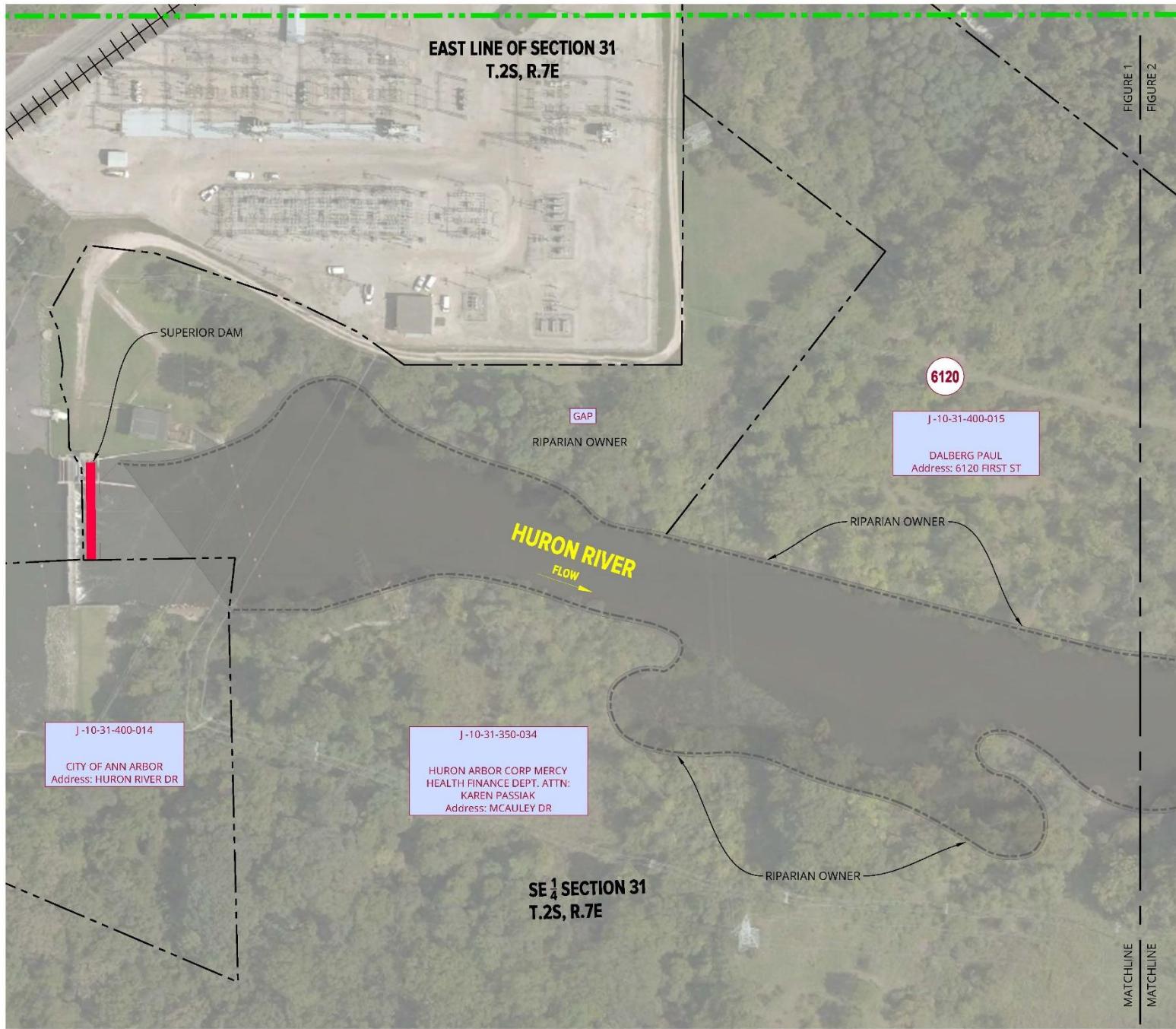
HRWC Discussion of Sustainability Benefits

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.





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Orientation: **NORTH** Scale: 0' 50' 100'
GRAPHIC SCALE: 1" = 50'

Project

PENINSULAR PAPER DAM

Project Location
HURON RIVER
YPSILANTI, MI

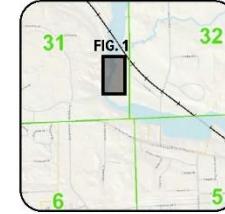


FIG. 1

LEGEND			
ORIGINAL HURON RIVER LIMITS			
ANTICIPATED HURON RIVER LIMIT'S			
DEEDS REFERENCE CALL TO OR ALONG LINE OF WA BR			
SECTION LINE			
PROPOSED PROPERTY LINE			
PROPERTY LINE			
NO REFERENCE TO WATERS EDGE			

NOTES

- THE INDICATED RIPARIAN OWNERSHIP BOUNDARIES ARE DERIVED FROM THE MOST RECENT RECORDED DEEDS.
- SOUTHEAST 1/4 SECTION 31, T.2S, R.7E
- NO'S ALIGNMENT OR REFERENCED WATER'S EDGE IN THE RECORDED PLAT OR DEED.
- THE PARCELS REFERENCED TO THE WATER'S EDGE ARE SHOWN FOR CONTRACT REVIEW ONLY. THESE PARCELS LINES DO NOT REFLECT LEGAL BOUNDARIES OR RIPARIAN RIGHTS AND ARE DISPLAYED FOR "THEORETICAL PURPOSES."

Revisions			
REV	REVISION NUMBER	DATE	BY
01	ANTICIPATED WATERLINE	10-26-2018	FZ

Date: 09-13-18

SME Project No.: 079107.00

Project Manager: JAS

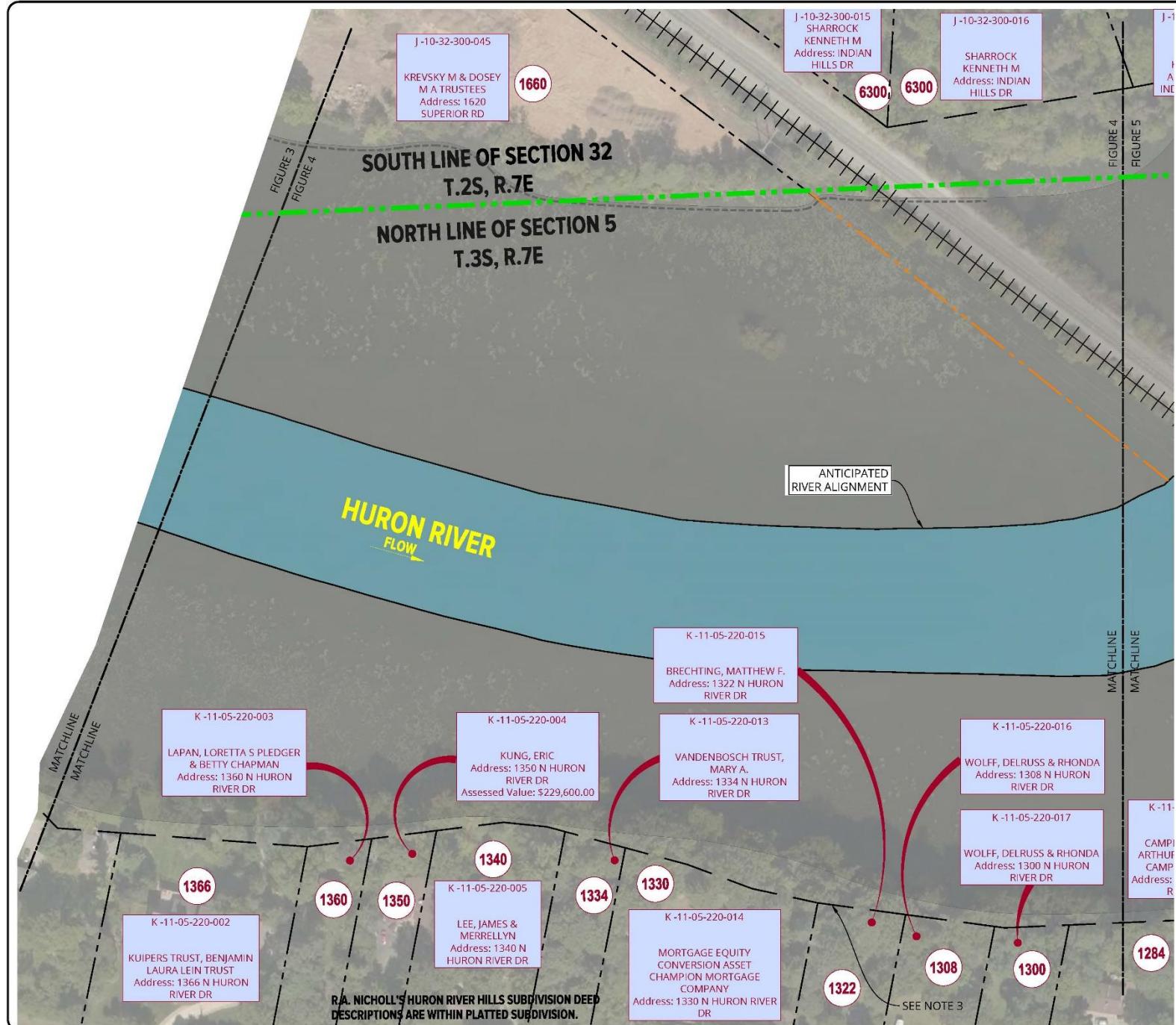
Designer: FRZ

CADD: SRP

Checked By: FRZ

Sheet No.: FIGURE 1

DRAFT



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Scale
0' 5'

1

INSULAR PAPER DAM

**ON RIVER
PLANTI, MI**

IRIAN OWNERSHIP

5/5

A circular icon containing a stylized letter 'I' with a vertical line extending upwards, representing a location map or pin.

A map of a city area with a green rectangular border. Inside the border, a black rectangle is positioned near a bridge over a river. The number '32' is in the top right corner of the map, and '5' is in the bottom right corner of the map area.

KEY MAP
NOT TO SCALE

LEGEND

The legend consists of five horizontal bars, each with a specific pattern and a corresponding label:

- ORIGINAL HURON RIVER LIMITS:** A solid grey bar.
- ANTICIPATED HURON RIVER LIMITS:** A solid blue bar.
- DIFFS. REFERENCE LINE TO OR ALONG LAKES & WA. BR.:** A dashed black line.
- SECTION LINE:** A solid green line.
- PROPOSED PROPERTY LINE:** A dashed orange line.
- PROPERTY LINE:** A solid black line.
- NO REFERENCE TO WATERS EDGE**: A solid black line.

NOTES

1. THE DEPICTED RIPARIAN OWNERSHIP BOUNDARIES ARE DERIVED FROM THE MOST RECENT RECORDED DEEDS.
 2. SOUTHEAST $\frac{1}{2}$ SECTION 31, T.25, R.7E
 3. NO ATTEMPT OR REFERENCE IS MADE TO THE EDGE IN THE RECORDED PLAT OR DEEDS.
 4. THE PARCELS EXISTING TO THE WALES EDGE ARE SHOWN FOR CONCEPTUAL VIEWING ONLY; THOSE PARTI LINES DO NOT REFLECT ACTUAL BOUNDARIES OR RIPARIAN

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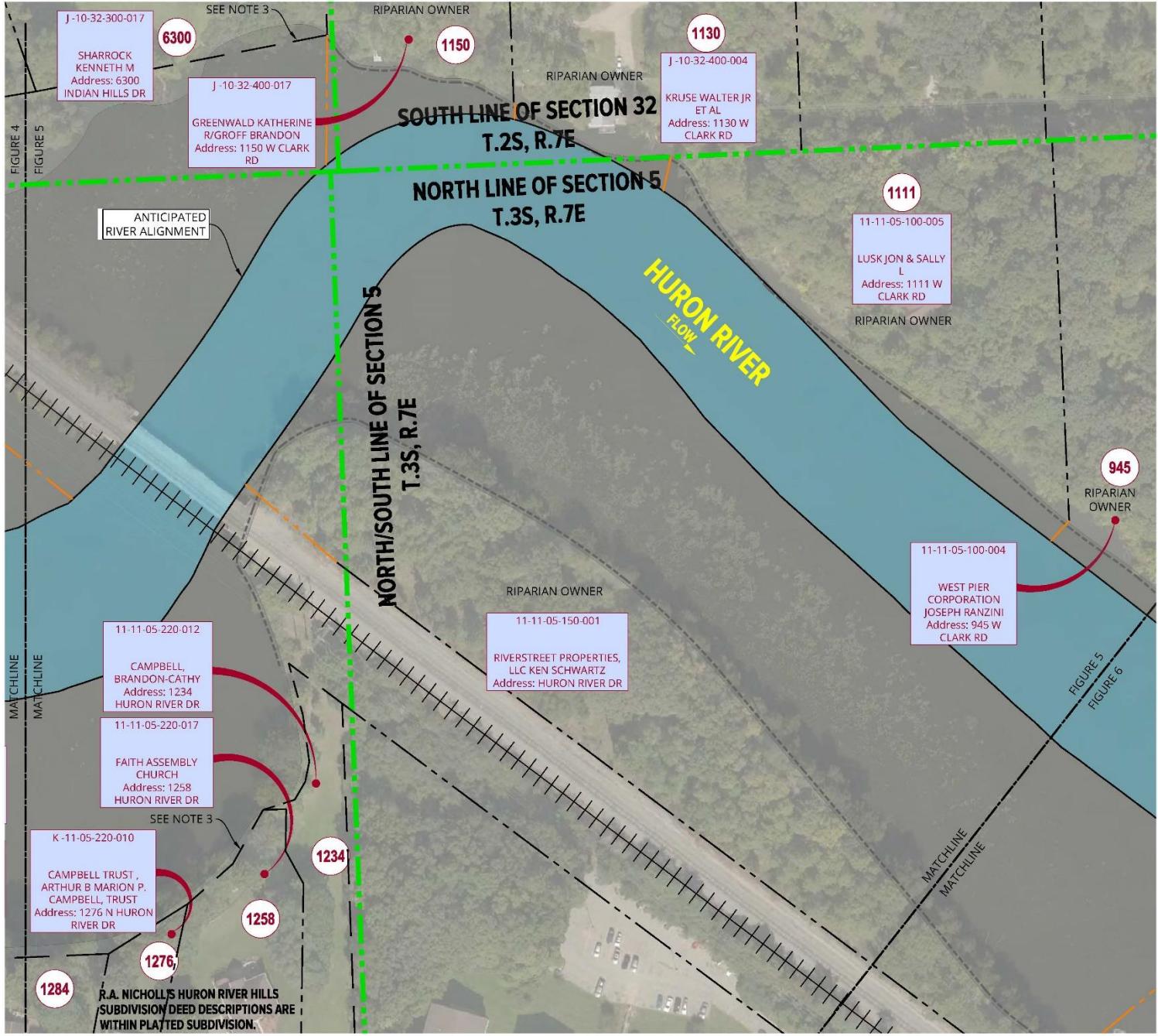
10 of 10

SRP

By:

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DATA FROM THE 1990 U.S. CENSUS
ARE USED IN THIS PAPER.
SEE APPENDIX FOR DETAILS.



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GRAPHIC SCALE: 1"

INSULAR PAPER DAM

Location

ARIAN OWNERSHIP

13

LEGEND

This legend provides key information for interpreting the map:

- ORIGINAL HURON RIVER LIMITS**: Indicated by a grey bar.
- ANTICIPATED HURON RIVER LIMITS**: Indicated by a blue bar.
- DEEDS REFERENCE CALL TO OR ALONG EDGE OF WATER**: Indicated by a dashed black line.
- SECTION LINE**: Indicated by a green line.
- PROPOSED PROPERTY LINE**: Indicated by an orange line.
- PROPERTY LINE**: Indicated by a solid black line.
- NO REFERENCE TO WATERS EDGE**: Indicated by a thick black line.

NOTES

1. THE DEPICTED RIPARIAN OWNERSHIP BOUNDARIES ARE DERIVED FROM THE MOST RECENT RECORDED DEEDS.
 2. SOUTHEAST ½ SECTION 31, T.25, R.7E
 3. NO STATEMENT OR REFERENCE TO WATERS EDGE IN THE RECORDED PLAT OR DEEDS.
 4. THE PARCEL LINES EXTENDED TO THE WATER'S EDGE ARE SHOWN FOR CONVENIENCE ONLY. THE ACTUAL PARCEL LINES ARE NOT SUBJECT TO LEGAL RIGHTS OWNED BY RIPARIAN RIGHTS OWNERS AND ARE DISPLAYED FOR THOSE OTHER PURPOSES.

55-12-17

Object No. 079107.00

Manager:

JAS

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SRP

and By:

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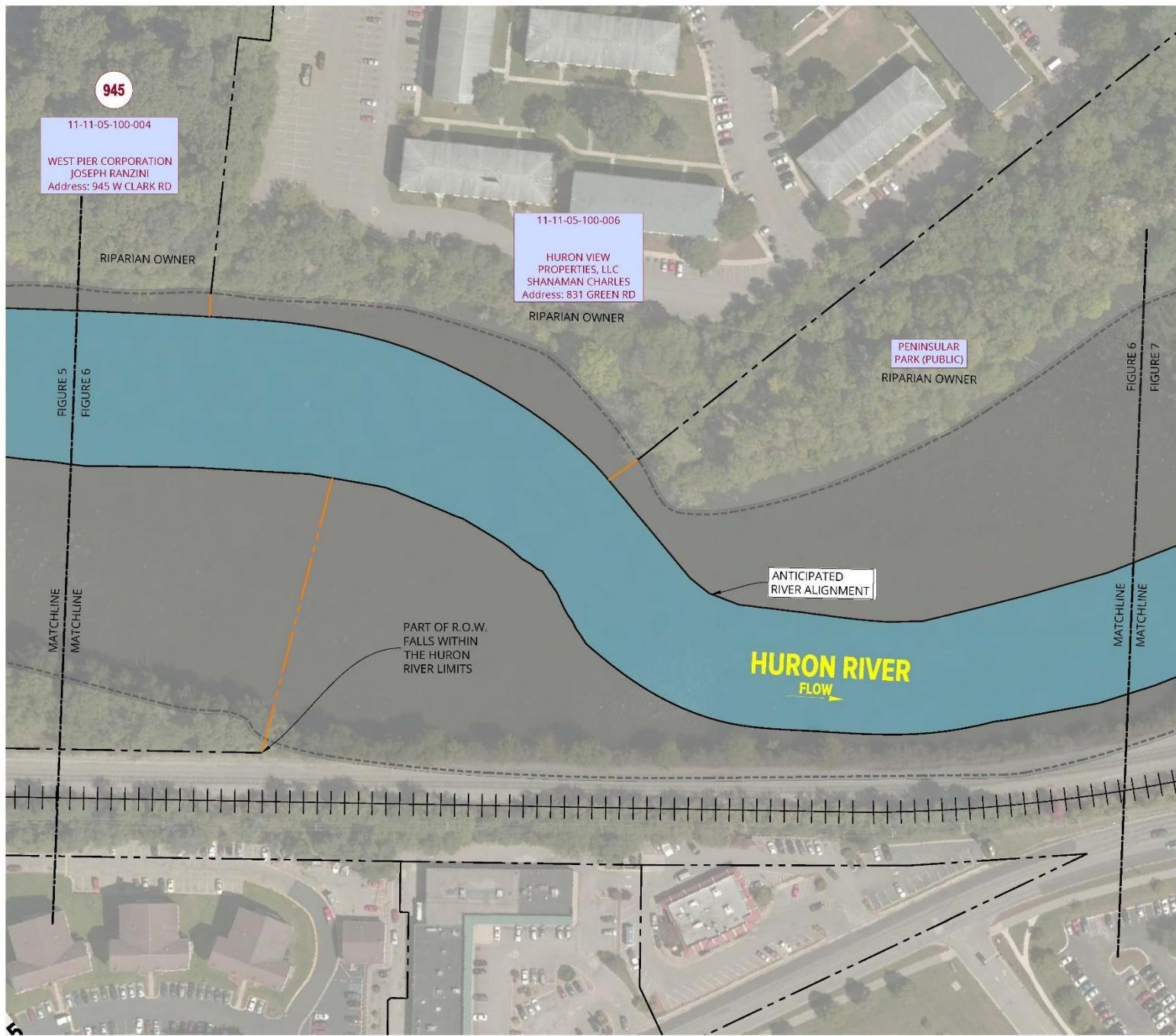
REFERENCES

FIGURE 3

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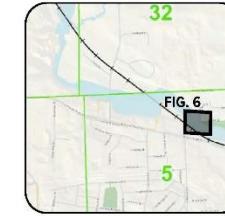


SME
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Orientation: North
Scale: 0' 50' 100'
GRAPHIC SCALE: 1" = 50'

Project
PENINSULAR PAPER DAM



Project Location
HURON RIVER YPSILANTI, MI

Sheet Name
RIPARIAN OWNERSHIP

Surveyor's Seal

Revisions			
REV	DATE ISSUED	DATE	BY
PT1	ANTICIPATED MATCHLINE	09-20-2018	JAS
PT2			
PT3			
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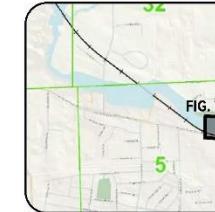
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The image shows a compass rose icon with the word "NORTH" in the center, indicating orientation. To its right is a horizontal scale bar with markings at 0', 50', and 100'. Below the scale bar is the text "GRAPHIC SCALE: 1'' = 50'".

LOCATION MAP  **PENINSULAR PAPER DAM**

NOT TO SCALE



KEY MAP RIPARIAN OWNERSHIP

NOT TO SCALE

LEGEN

This legend identifies six types of reference lines for river limits:

- ORIGINAL HURON RIVER LIMITS**: Represented by a thick grey line.
- ANTICIPATED HURON RIVER LIMITS**: Represented by a thick blue line.
- REFERS REFERENCE CALL TO OR A LINE EDGE OR WA BRI**: Represented by a dashed black line.
- SECTION LINE**: Represented by a solid green line.
- PROPOSED PROPERTY LINE**: Represented by a solid orange line.
- PROPERTY LINE**: Represented by a thick black line.
- NO REFERENCE TO WATERS EDGE**: Represented by a thin black line.

NOTES

1. THE DFTC/TD BIPARTITE OWNERSHIP BOUNDARIES ARE DERIVED FROM THE MOST RECENT RECORDED DEEDS.
 2. SOUTH EAST SECTION 35, T.75, R.17E
 3. NO STATEMENT OR REFERENCE TO WATERS EDGE IN THE RECORDED PLAT OR DEEDS.
 4. THE PARCEL LINES EXTENDED TO THE WAHS EDGE ARE APPROXIMATE AND NOT TO BE USED FOR SURVEY PURPOSES. LINES DO NOT REFLECT LOCAL ECONOMICS OR BIPARTITE RIGHTS WHICH ARE DISPLAYED FOR THEORETICAL PURPOSES.

Date

09-13-18

SME Project No.

079107.00

Project Manager:

JAS

Designer:

FRZ

CADD:

SRP

Checked By:

FRZ

Sheet No.

FIGURE 7

FIGURE 7

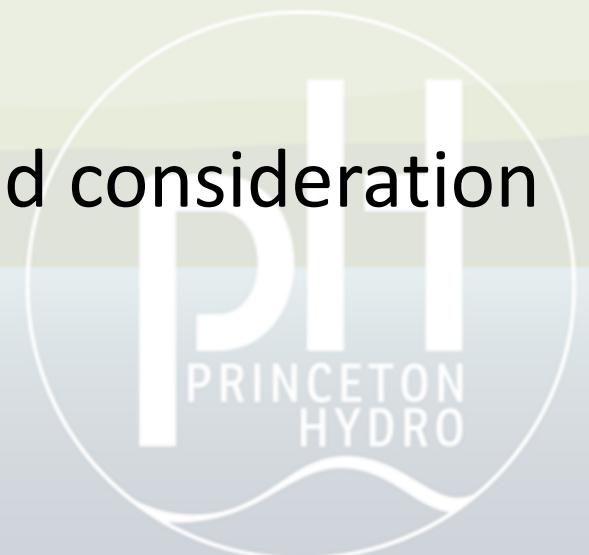
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2016

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



Photograph 3: View of Dam spillway

