



Planning for the Future:

Reuse Planning Report for the Cell House Property of the Chlor-Alkali Superfund Site

December 2008

prepared for
City of Berlin
Chlor-Alkali Reuse Planning Committee

funded by:
EPA Region 1
EPA Superfund Redevelopment Initiative

prepared by
E² Inc.

Acknowledgements

E² Inc. would like to thank the following people and organizations for their hard work in support of the Chlor-Alkali Site reuse planning process and for their valuable contributions to this report.

Reuse Planning Committee (RPC)

Ernie Allain, Berlin Department of Public Works

Terry Block, Citizens for a New Vision

Jack Crisp, North American Dismantling Corp. / Wiggin & Nourie, P.A.

Rick Cusson, Public Service of New Hampshire

Fran Cusson, Berlin Planning Board

Mike Galuszka, Androscoggin River Watershed Council

Kathleen Kelley, Androscoggin Valley Economic Recovery Corporation

Pamela Laflamme, City of Berlin

Don Mercier, Brookfield Power / Great Lakes Hydro America, LLC

George Pozzuto, Northern Forest Heritage Park

Stacia Roberge, Berlin Main Street Program

Lincoln Robertson, North Woods Rafting

Linda Upham-Bornstein, History Consultant

Laura Viger, Berlin Community Services Director

Resource Members

Drew Hoffman, New Hampshire Department of Environmental Services

Richard Pease, New Hampshire Department of Environmental Services

Darryl Luce, EPA Region 1

John Podgurski, EPA Region 1

Sarah White, EPA Region 1

Ronald Gonzalez, EPA Region 1

Table of Contents

Sections

I. Introduction	2
II. Overview	5
III. Land Use Analysis	10
IV. Community Future Land Use Goals	22
V. Conceptual Reuse Framework	27
VI. Conclusions	30

Figures

Fig. 1 - Location Map	4
Fig. 2 - Property Ownership	6
Fig. 3 - Existing Conditions	8
Fig. 4 - Androscoggin River	11
Fig. 5 - Circulation & Access	13
Fig. 6 - Trails & Open Space	15
Fig. 7 - Heritage Corridor	17
Fig. 8 - Industrial Land Uses	18
Fig. 9 - Commercial Land Use	19
Fig. 10 - Residential Land Uses	20
Fig. 11 - Hydroelectric Corridor	21
Fig. 12 - Land Use Suitability Matrix	24
Fig. 13 - Land Use Ranking Summary Table	25
Fig. 14 - Conceptual Reuse Framework	26

Appendices

Appendix A: Cell House Property Ownership Information
Appendix B: River-Front Redevelopment Case Study
Appendix C: Eco-Industrial Park Case Study
Appendix D: Value-Added Forest Products Case Study
Appendix E: Future Land Use and the Superfund Remedy Selection Process
Appendix F: Institutional Controls at Superfund Sites

Cover Photograph: View of the Cell House property looking south.

I. INTRODUCTION

The Chlor-Alkali Superfund Site is located in Berlin, New Hampshire (population 10,000). In 2005, the U.S. Environmental Protection Agency (EPA) listed the site on the National Priorities List of Superfund sites and is now in the initial stage of planning for the site's cleanup.

EPA is conducting a Remedial Investigation to identify the nature and extent of the site's contamination. Over the next five years EPA will select and implement a cleanup plan to ensure that the site remains protective of human health and the environment over the long-term. An important component of the cleanup process is the identification of reasonably anticipated future land uses for areas affected by the site's contamination.



View from the Cell House property looking south (Source: NHDES, 1999)

Today, planning for the site's future use is underway. With funding from EPA Region 1, the City of Berlin has been working with a community-based advisory group called the Chlor-Alkali Reuse Planning Committee (RPC) to identify a range of potential future land uses for the 4.6-acre Cell House property, the location of the former Chlor-Alkali facility within the Chlor-Alkali Superfund Site. Since December 2007, the RPC has undertaken a reuse planning process that includes the following activities:

- participation in four committee meetings;
- analysis of potential reuse alternatives for the site;
- development of a set of preferred land uses for the site; and
- creation of a reuse framework that can inform EPA's remedial process and Berlin planning initiatives.

This summary report presents the findings of the reuse planning process and outlines the RPC's future land use recommendations for the Cell House property. The document was prepared by consulting firm E² Inc. for the City of Berlin with funding, input and assistance from EPA. The RPC's findings are advisory and subject to approval by Berlin's Planning Board, and City Council. Upon approval by the City of Berlin, the report and RPC's recommendations will be considered along with other relevant information in EPA's determination of reasonably anticipated future land uses for the site.

The Chlor-Alkali Site Remedial Response Process

EPA evaluates all Superfund sites to determine what needs to be done to protect human health and the environment. The cleanup process, also known as the remedy selection process or the Superfund Remedial Response pipeline, for the Chlor-Alkali Site is outlined below.

Remedial Investigation (RI) – EPA is currently performing a Remedial Investigation (RI) at the site, which will clarify the nature and extent of the site's contamination. This information will then be used to assess potential human health and ecological risks at the site. EPA anticipates completing the RI in 2012.

Feasibility Study (FS) – EPA will use the findings of the RI to develop a set of remedial action objectives and evaluate remedial alternatives for the site. EPA expects that the FS will be completed in 2012.

Remedy Selection / Record of Decision (ROD) – Based on the evaluation of remedial alternatives, EPA will select a preferred alternative and present it to the public as the site's proposed cleanup plan. After public input is incorporated, EPA will select a final remedy for the site that will be documented in a Record of Decision (ROD). EPA anticipates completing the ROD in 2012.

Remedial Design (RD) – After the ROD, EPA will design the remedy and secure remedial action funding. EPA expects that the RD phase could be complete by 2013.

Remedial Action (RA) – The Remedial Action includes construction of the remedy. The Remedial Action could potentially be completed by 2016.

Post-Construction – After EPA has completed the Remedial Action, the site will potentially be ready for reuse, with certain future use restrictions. Operation and Maintenance activities necessary to help maintain the protectiveness of the site's remedy will likely continue after 2016.

Anticipated Time Line:
(approximate dates listed for future activities)

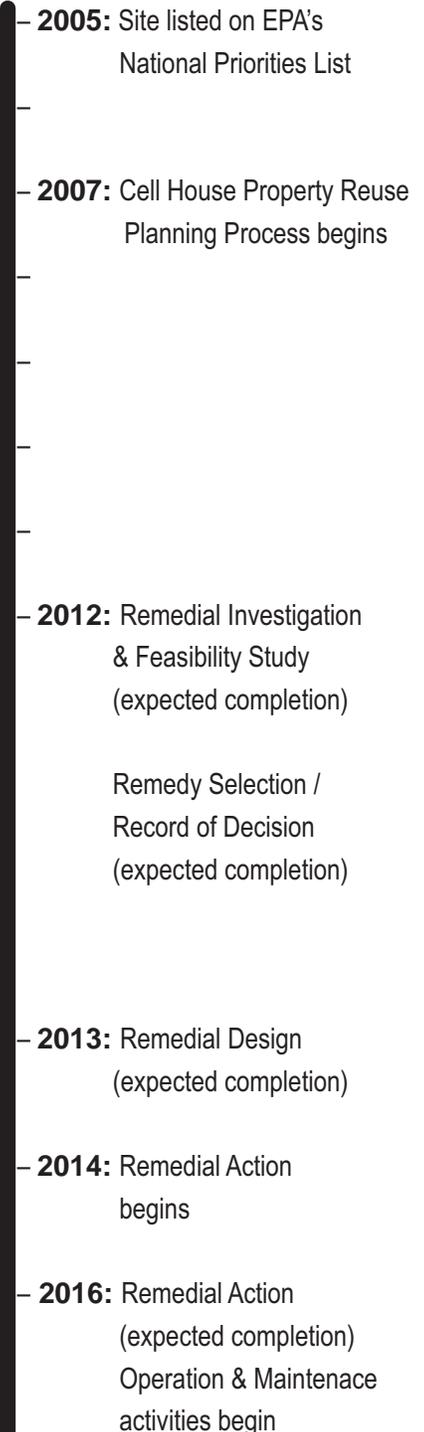
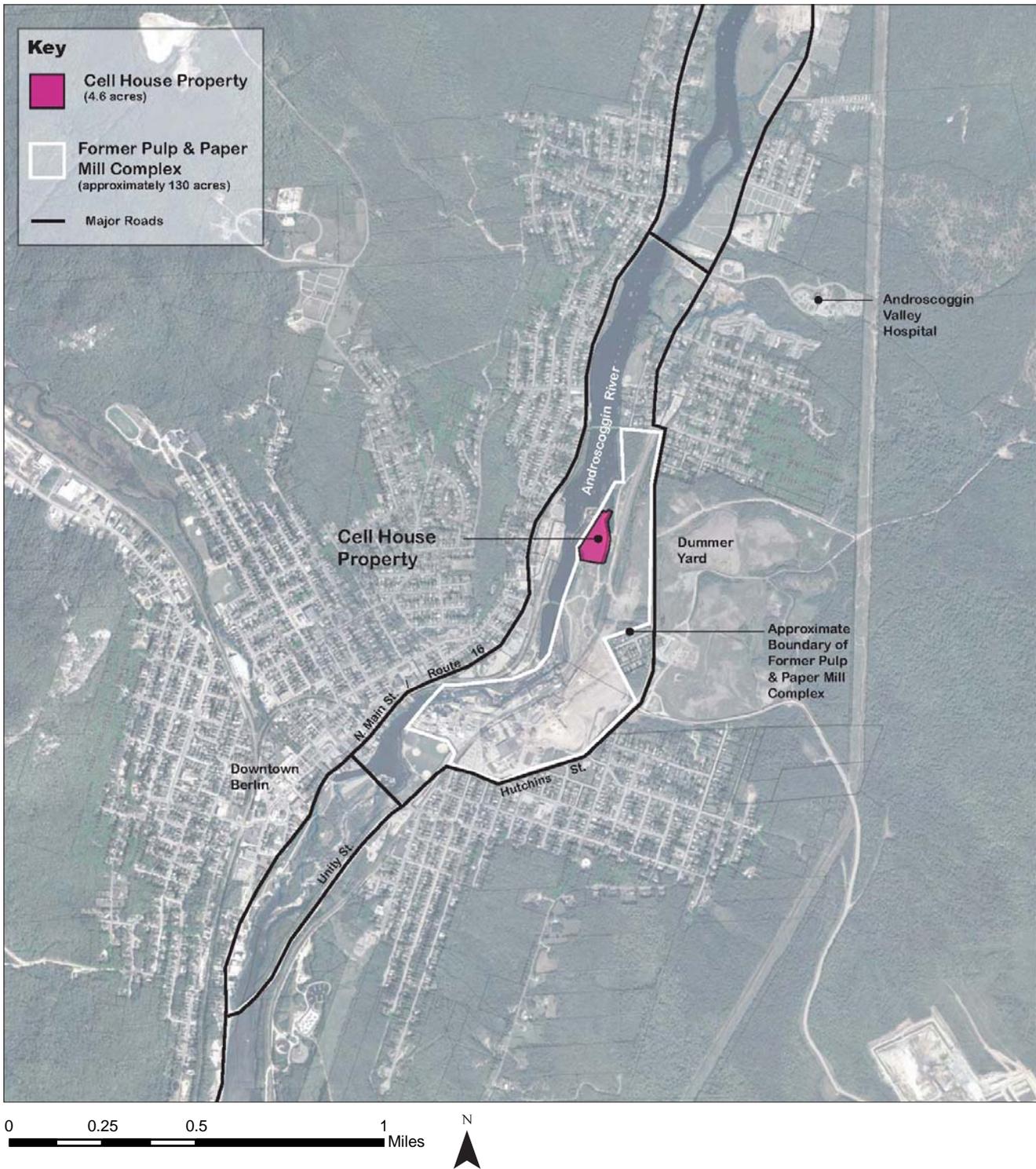


Figure 1.
Cell House Property Location Map



II. OVERVIEW

Location

The Cell House property is located at the northern end of the former pulp and paper mill complex and is bordered by the former paper mill property to the east and south (currently vacant) and by the Androscoggin River to the west. An active hydro-electric dam is located north of the site. The property is located off a private, gravel road south of a gated entry at the intersection of Bridge Street and Hutchins Street.

Site History

The Cell House property occupies an approximately 4.6-acre parcel on the east bank of the Androscoggin River in Berlin, NH. Former facility operations housed on the property were an integral component of Berlin's pulp and paper industry.

From the late 1800s to the 1960s, chlorine and other chemicals (e.g., caustic soda, hydrogen, chloroform) were produced using electrolytic cells in "cell houses" on the property. The chlorine, produced by this process known as the Chlor-Alkali process, was then used to manufacture paper. Improper disposal of residual wastes from the production of chlorine led to the contamination of site soils, ground water and adjacent river sediments.¹



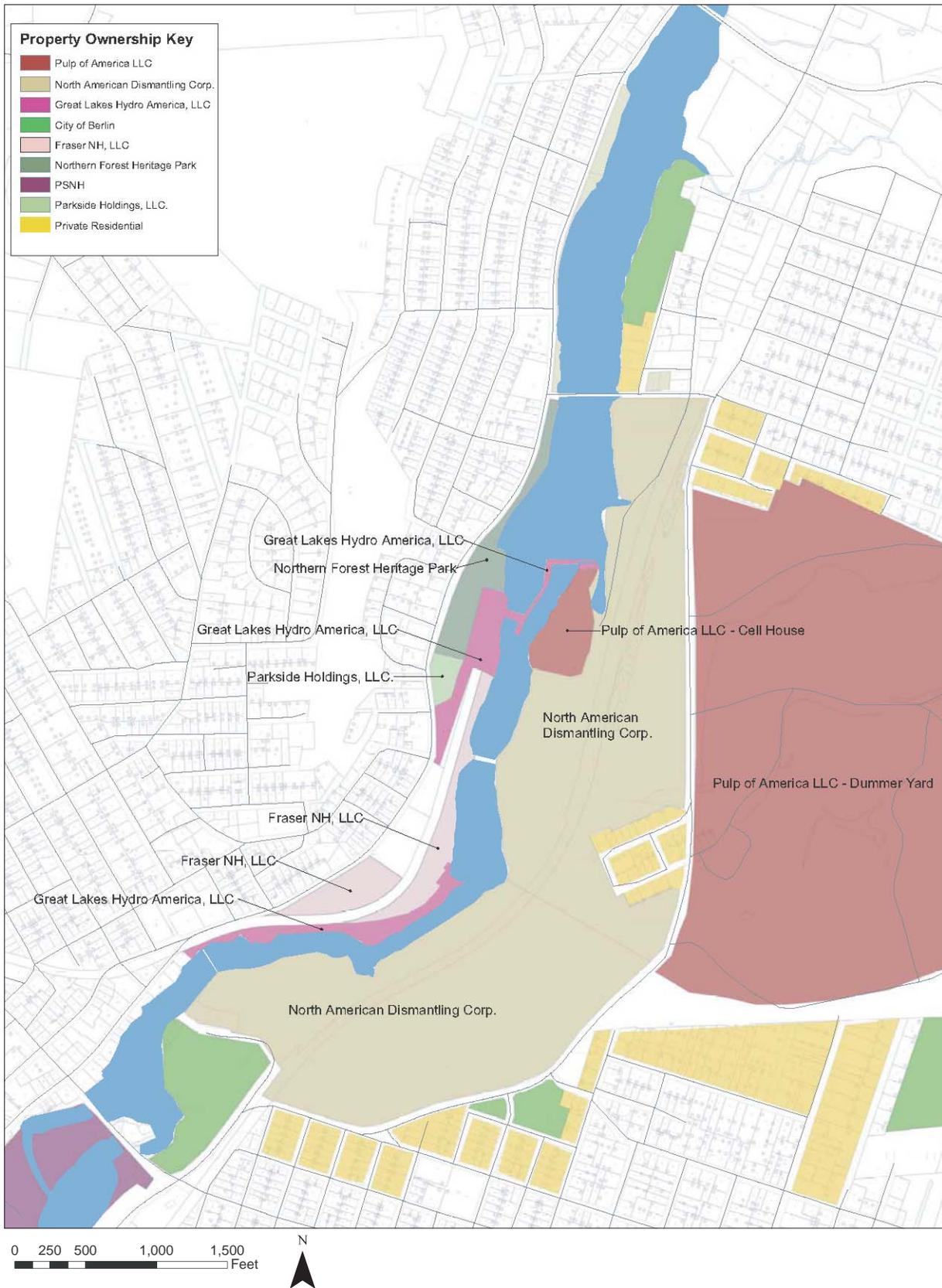
Cell House Property circa 1900. Cell houses are visible in the foreground. (Photo provided courtesy of NHDES. Source: Brown Company, Beaudouiss)



Cell House property in 1998 after closure of site operations. (Source: NH DES, 1999)

¹U.S. Environmental Protection Agency. Chlor-Alkali Facility Superfund Site - Community Update (February 2006).

Figure 2. Property Ownership



Ownership

The Cell House property is currently owned by Pulp of America LLC. The property was formerly part of the larger pulp mill complex (approximately 126 acres in total) but is now subdivided. In February 2002, the City of Berlin Planning Board approved a plan that subdivided the 4.6-acre Cell House Parcel (Tax Assessor's Map 128, Lot 262), from the larger pulp mill parcel (Tax Assessors Map 129, Lot 54).² In January 2008, the North American Dismantling Corporation (current owner of the adjacent pulp mill property) completed a minor lot line adjustment that created a northern 60-acre parcel and a southern 62-acre parcel (See Appendix A: Property Ownership Information).

Ownership History:

1852 – Berlin Mill Company owns the pulp mill property

1868 – William Brown purchases the pulp mill property

1893 – Brown establishes Burgess Sulfite Fiber Company at the pulp mill property

1917 – Company's name is changed to the Brown Company

1920 – Chlor alkali cell house structures built by the Brown Company

1980 – James River Paper Company purchases the pulp mill property

1995 – Crown Vantage Paper Company purchases pulp mill property

1999 – Pulp and Paper of America LLC purchases the pulp mill property

2001 – Pulp and Paper of America LLC and its subsidiaries file for reorganization under Chapter 11 Bankruptcy

Feb. 2002 – Berlin Planning Board approves minor subdivision creating the 4.6-acre Cell House property

May 2002 – Nexfor Fraser N.H., LLC purchases the pulp mill from the Pulp and Paper Company of America (the Cell House Property was not included in this transfer)

May 2002 – Pulp of America LLC (subsidiary of Pulp and Paper of America LLC) owns the 4.6-acre Cell House property

Oct. 2006 – North American Dismantling Corp. purchases 122-acre pulp mill property from Nexfor Fraser N.H., LLC

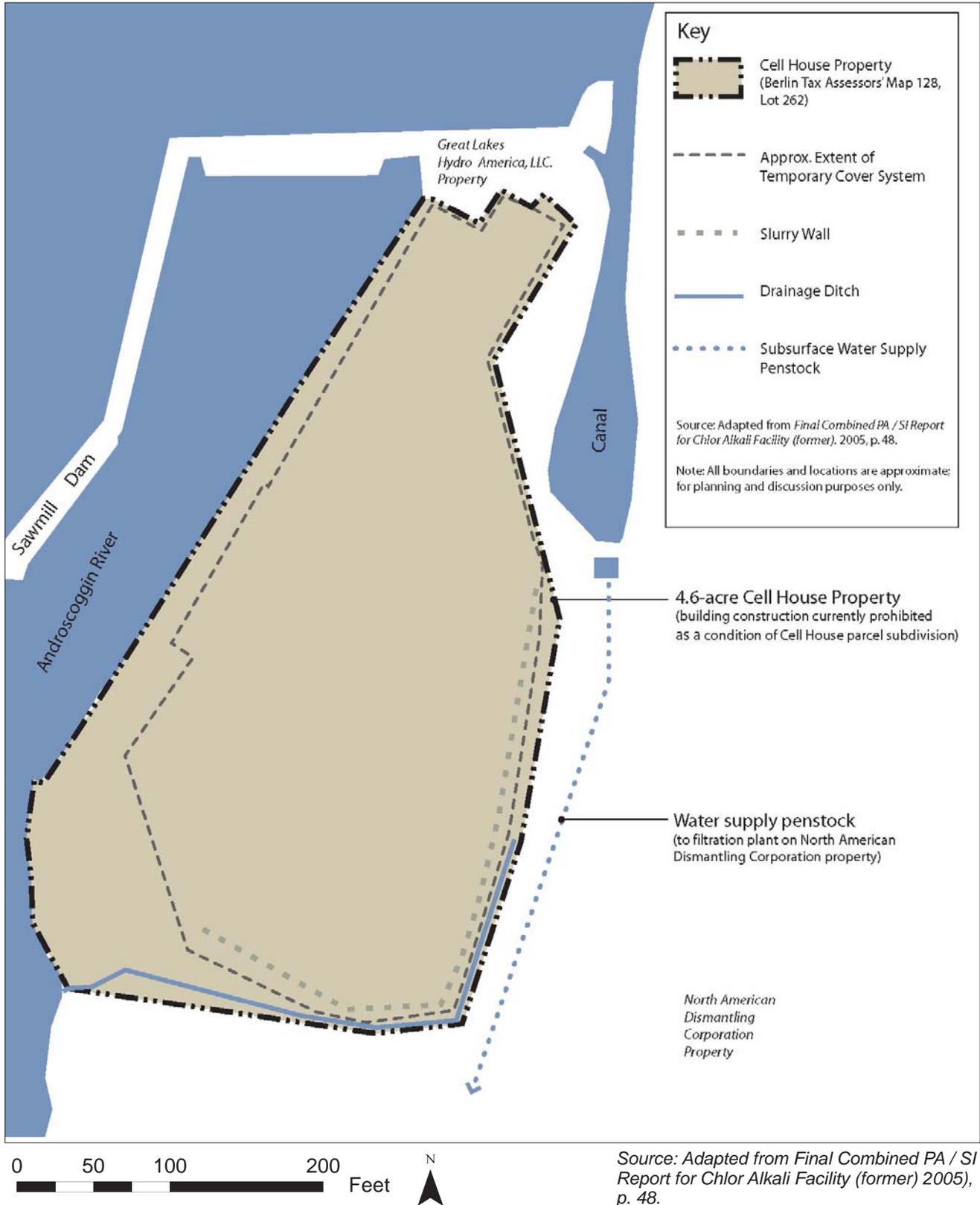
Jan. 2008 – North American Dismantling Corp. completes lot line adjustment creating a northern 60-acre parcel, and a southern 62-acre parcel

Zoning

The Cell House property is currently zoned Industrial Business, a designation that permits heavy and light industrial land uses. Conditions of Berlin Planning Board's 2002 approval of the Cell House parcel subdivision prohibit building construction on the property. These building restrictions may be modified in the future by the Berlin Planning Board, consistent with the site's final remedy and use restrictions determined by EPA. Surrounding zoning districts and additional land use considerations are discussed in greater detail in the report's land use analysis presented in Section 4.

² A detailed discussion regarding the ownership of the Cell House property is provided in Appendix A

Figure 3. Existing Conditions



Existing Site Conditions

Today, the Cell House property is vacant with sparse vegetation. Moderate terrain slopes westward toward a concrete retaining wall along the bank of the Androscoggin River.

Following the closure of facility operations in 1999, former owner Crown Vantage Paper Company demolished all cell house structures and established a temporary cover on a portion of the property. The cover system consists of 12 inches of common borrow, 6 inches of sand, a high density polyethylene (HDPE) layer, a drainage geocomposite, and 24 inches of bark. A drainage channel along the southern edge of the cover system and a slurry wall along southern and eastern edges were constructed to divert surface water and ground water away from potentially contaminated areas.³



Androscoggin River and Cell House property fenceline.



View of site looking north; the Cell House property's access road is visible along the eastern edge of the property.



View of capped area looking south; sparse vegetation and bark mulch are visible in the foreground.

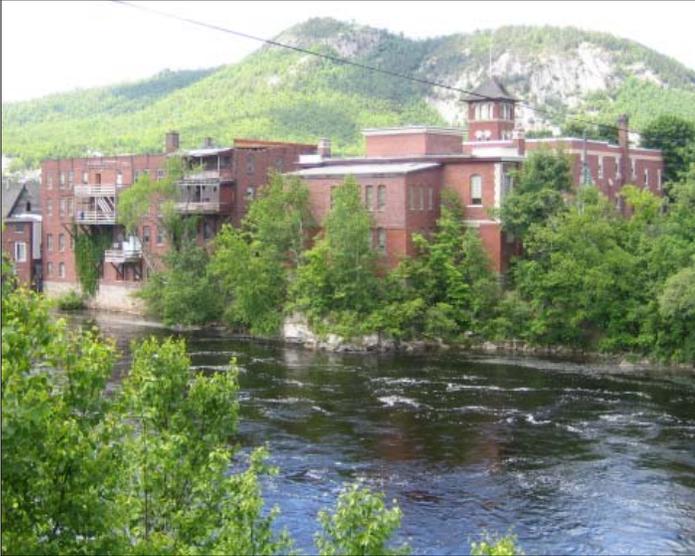


Canal to the east of the Cell House property.

³ U.S. EPA Region 1. 2005. HRS Documentation Record - Chlor-Alkali Facility. (p. 15)

III. Land Use Analysis

The maps in this section illustrate the surrounding land use context for the Cell House property. This land use analysis includes access and circulation, trails and open space, heritage elements, and zoning.



The Androscoggin River, which flows through downtown Berlin, has helped to shape the community's growth over time.

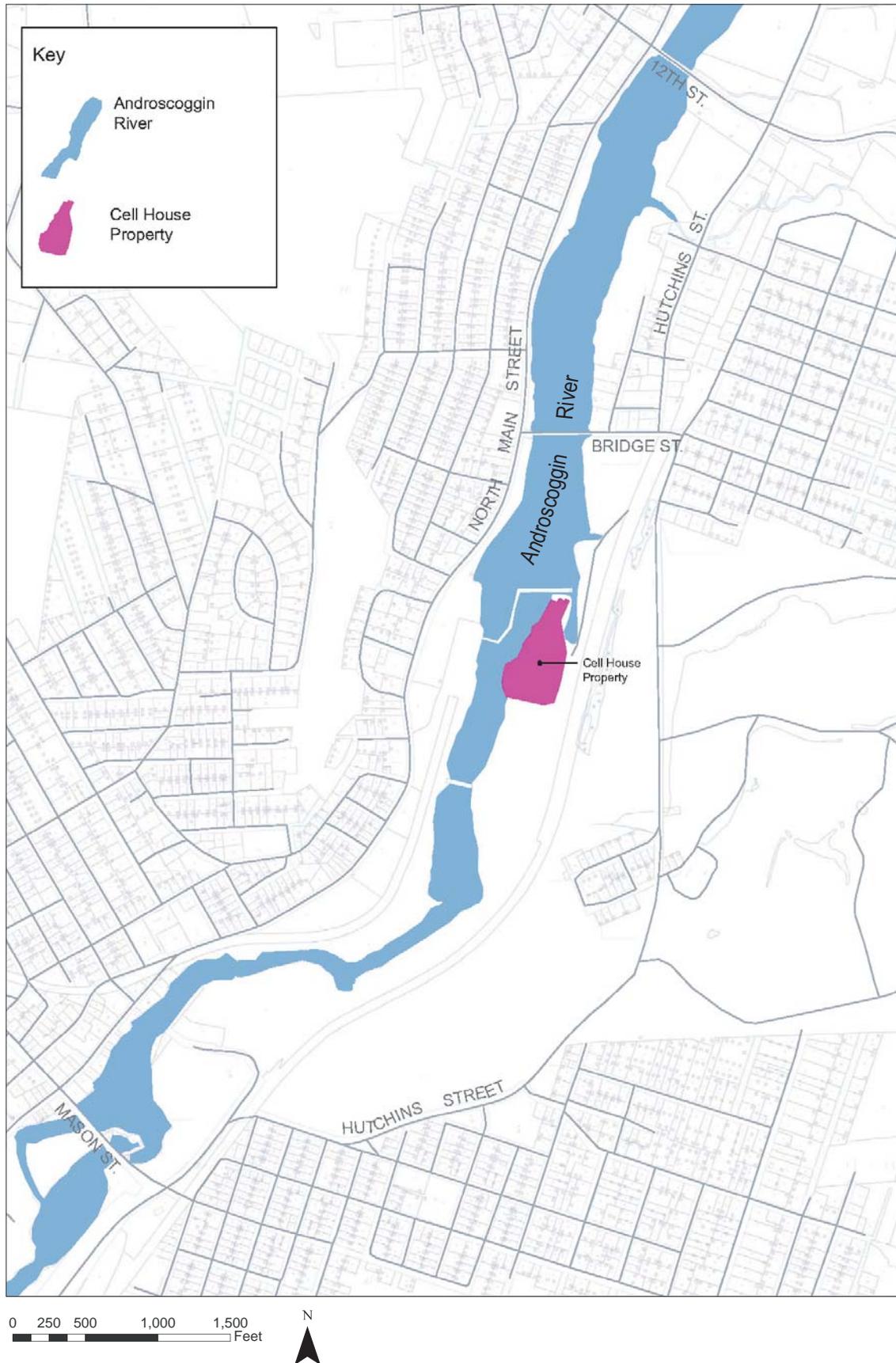
Androscoggin River

The Androscoggin River is an important natural resource and a defining local feature of Berlin. The river has historically been the economic industrial spine of the City, a resource for transportation and energy generation for the paper industry. Today, Berlin's hydroelectric stations continue to harness power from the river and contribute to the local tax base. As industrial businesses have declined, community members are recognizing the recreational and scenic value of the river, which could contribute to Berlin's economy and quality of life in the future. Area bridges offer striking views of the river and the surrounding mountains, while the dams divide the river flow into flat water and white water areas.



Views of the Androscoggin River and the White Mountains are increasingly recognized as valuable assets by the community.

Figure 4. Androscoggin River





The Cell House property's access is currently limited to a designated right-of-way across surrounding property owned by North American Dismantling Corporation.

Access & Circulation

The river separates the Cell House property from downtown Berlin, limiting east-west vehicular access. Major local circulation routes include the Mason and 12th Street bridges, connected by North Main Street on the west and Hutchins Street on the east. Currently, the property has no public road frontage. An access agreement with North American Dismantling Corporation permits the current property owner (Pulp of America LLC) and emergency vehicles to access the site, as needed, via a locked gate and designated right-of-way extending south from Bridge Street (shown as a pink dashed line on Figure 5).

The property's isolated location may deter certain retail uses that might be better suited to the downtown area or existing commercial corridors. Future uses of the property will likely require the negotiation of a permanent access agreement with adjacent landowners as well as access road improvements.

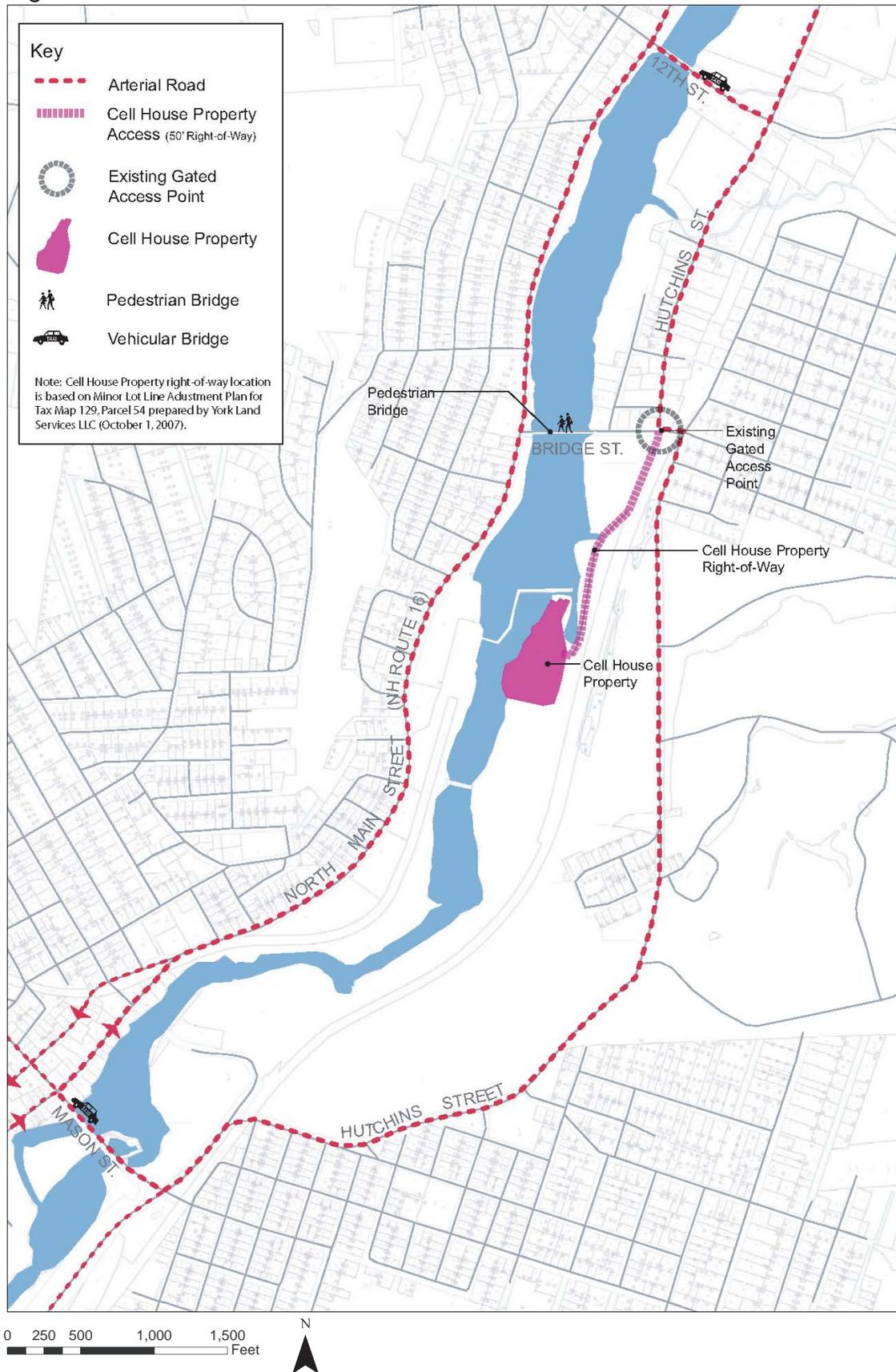


Existing road networks support commercial uses on the east and west sides of the river. There is no direct access to the property from downtown.



View south on North Main Street near Brown Elementary School.

Figure 5. Circulation & Access





Trails and Open Space

Berlin has a number of parks located along the Androscoggin River, including Community Field Central Park, Horne Field, the Northern Forest Heritage Park, and Tondreau Peninsula Park. However, riverfront access is limited between the parks. The riverfront location of the Cell House property offers an opportunity to increase public riverfront access and to build a cohesive greenway corridor linking the parks along the river with a network of trails and open space.

Existing trails provide access to open space in Tondreau Peninsula Park located east of downtown Berlin.



Ballfields at Community Field Central Park support recreation programs for community residents.

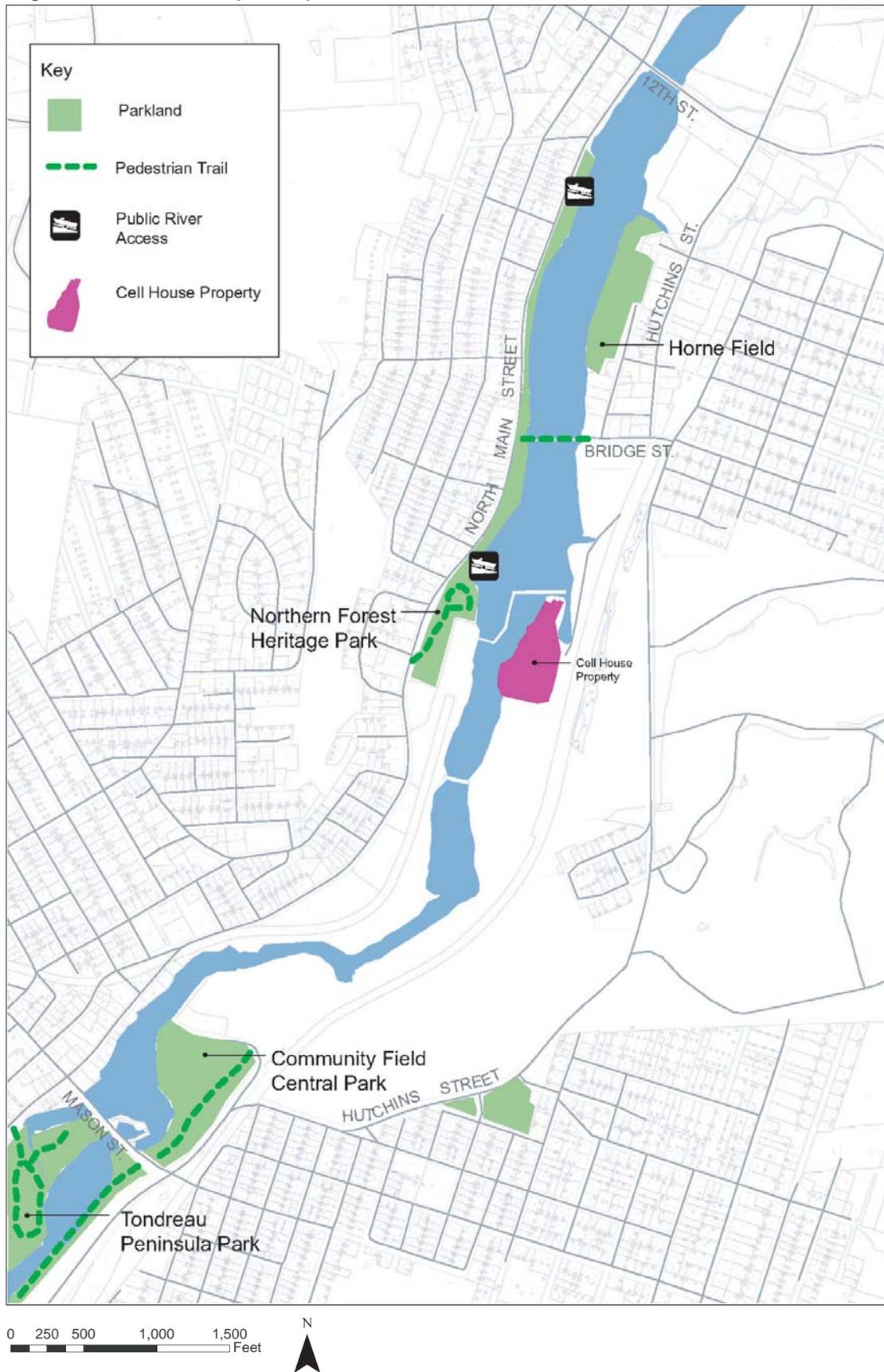


An amphitheater at the Northern Forest Heritage Park serves as a community gathering and event space.



The Androscoggin River is also a recreational resource for Berlin. A public boat ramp is located north of downtown on Route 16.

Figure 6. Trails & Open Space



Heritage Corridor

Berlin has a number of historic sites located along the Androscoggin River that could be linked to form a heritage corridor. The Cell House property is strategically located among several of Berlin's heritage sites, with views of the Northern Forest Heritage Park and the Brown Company buildings. Views of the river from the Cell House property include both the flat water stretches upstream with boom piers and the white water stretches downstream, which are subject to the stream flow requirements of hydroelectric stations. Future uses at the property could enhance the heritage corridor by providing interpretive exhibits and offering visual or physical access to nearby heritage sites.



Historic buildings, like the Brown Company research and development buildings pictured above, contribute to Berlin's rich cultural heritage.

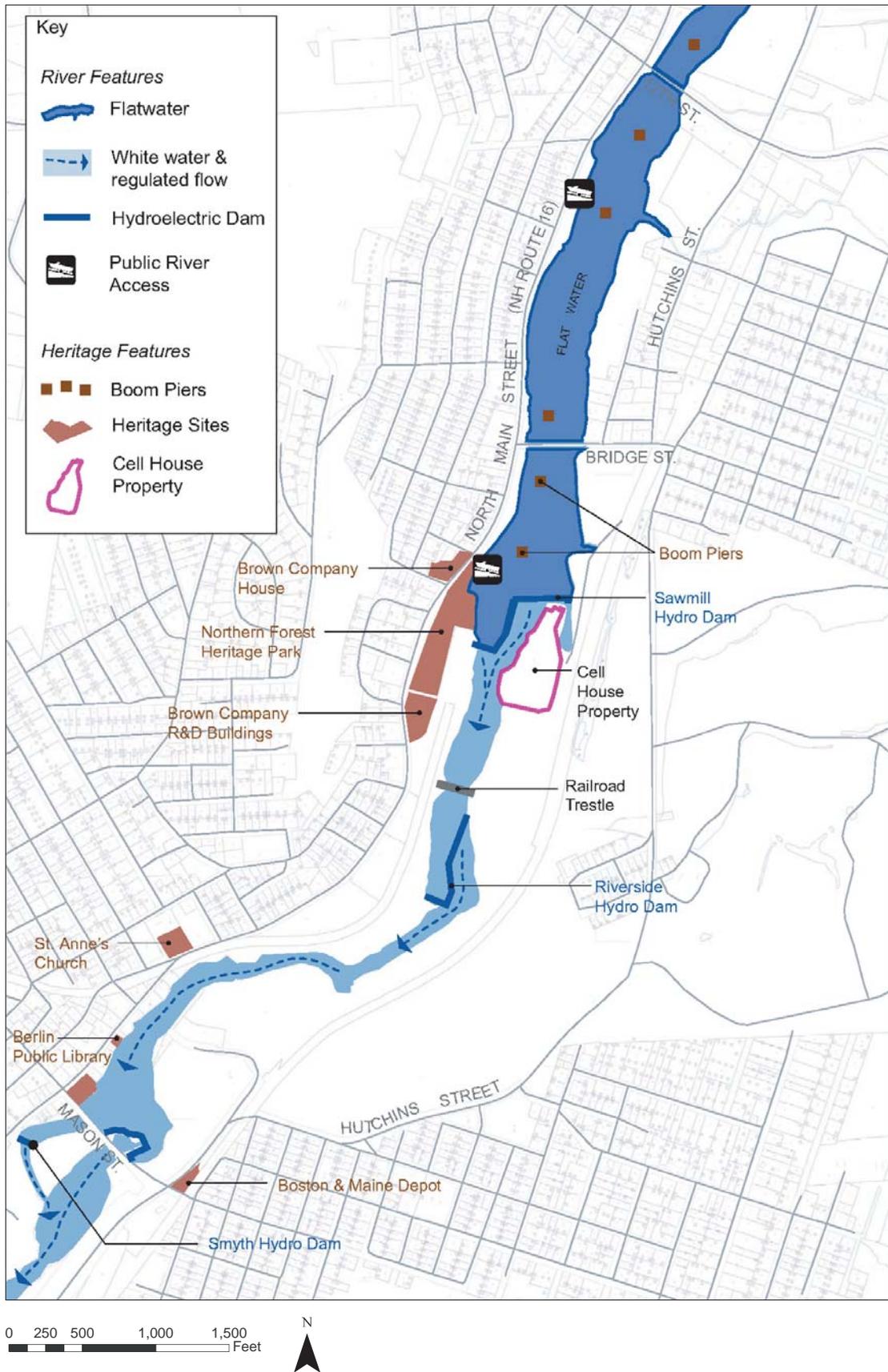


The Androscoggin River's character alternates between flat water and white water as it flows through Berlin. Views of the river from the Cell House property and surrounding areas provide opportunities to help tell the story of Berlin's growth and development.



The Northern Forest Heritage Park maintains exhibits and community gathering places that support heritage-based tourism. The development of additional interpretive exhibits along a larger heritage corridor are among the central goals of a heritage-based economic development strategy planned for the community.

Figure 7. Heritage Corridor



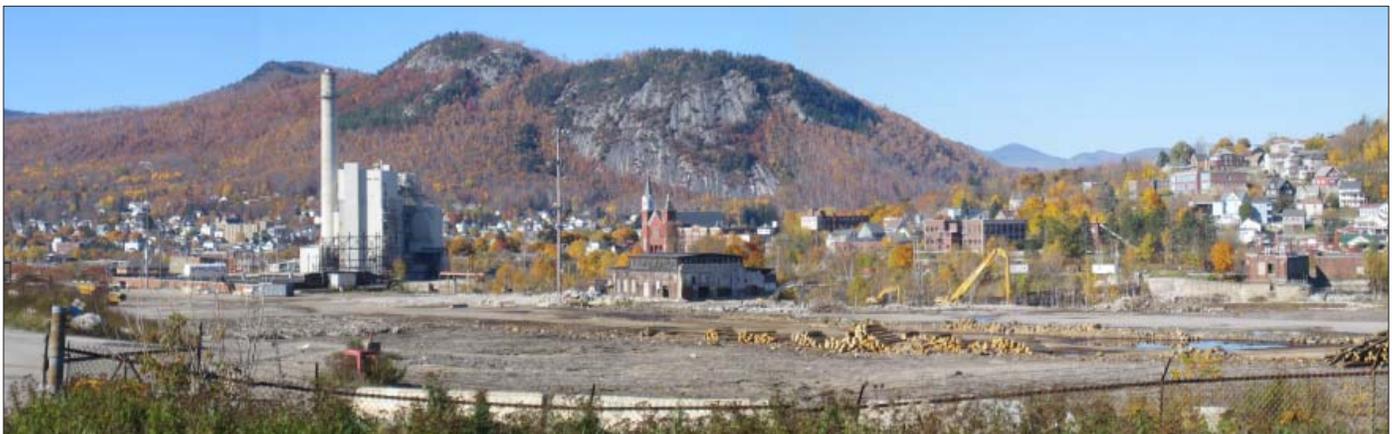
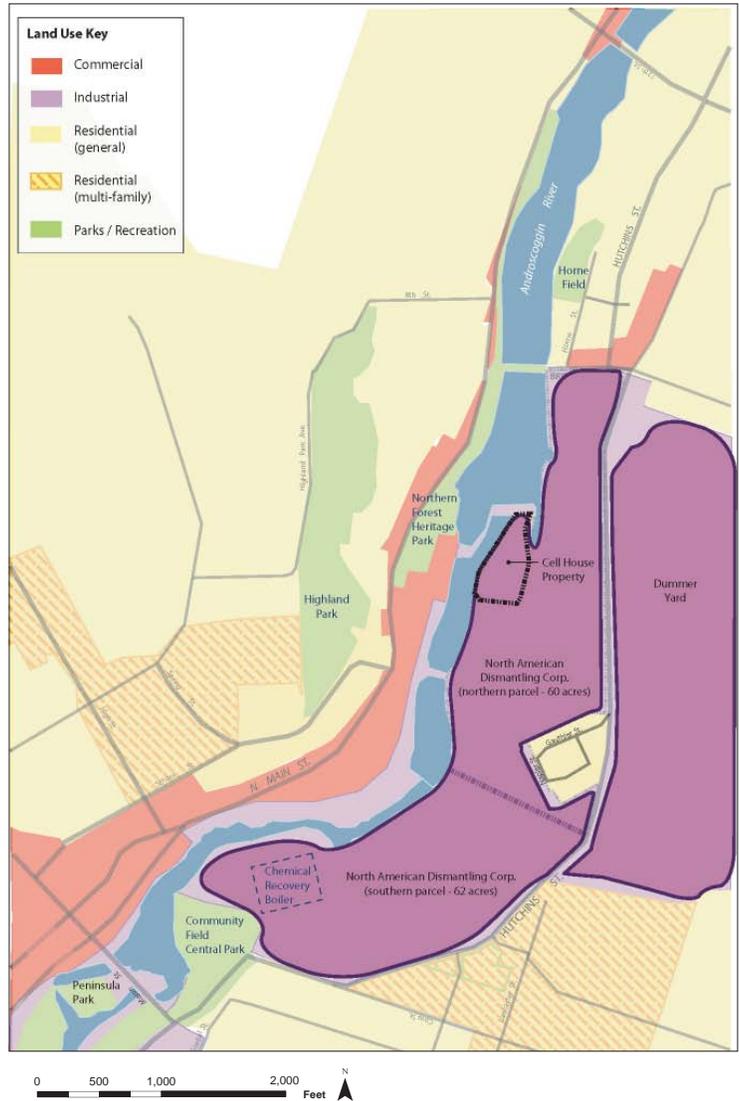
Industrial Land Uses

The Cell House property is part of an industrial use zone that includes large parcels in transition that are owned by the North American Dismantling Corporation and Pulp of America LLC.

Former industrial uses on the North American Dismantling properties are currently inactive. A plan is in place to convert the existing chemical recovery boiler on the southern 62-acre parcel into a biomass electrical generation plant. The landowner has not made public any plans for the reuse of the northern 60-acre parcel. The Pulp of America parcels, which include the Cell House property and Dummer Yard (an inactive landfill east of Hutchins Street), are vacant and tax delinquent, with no reuse plans in place.

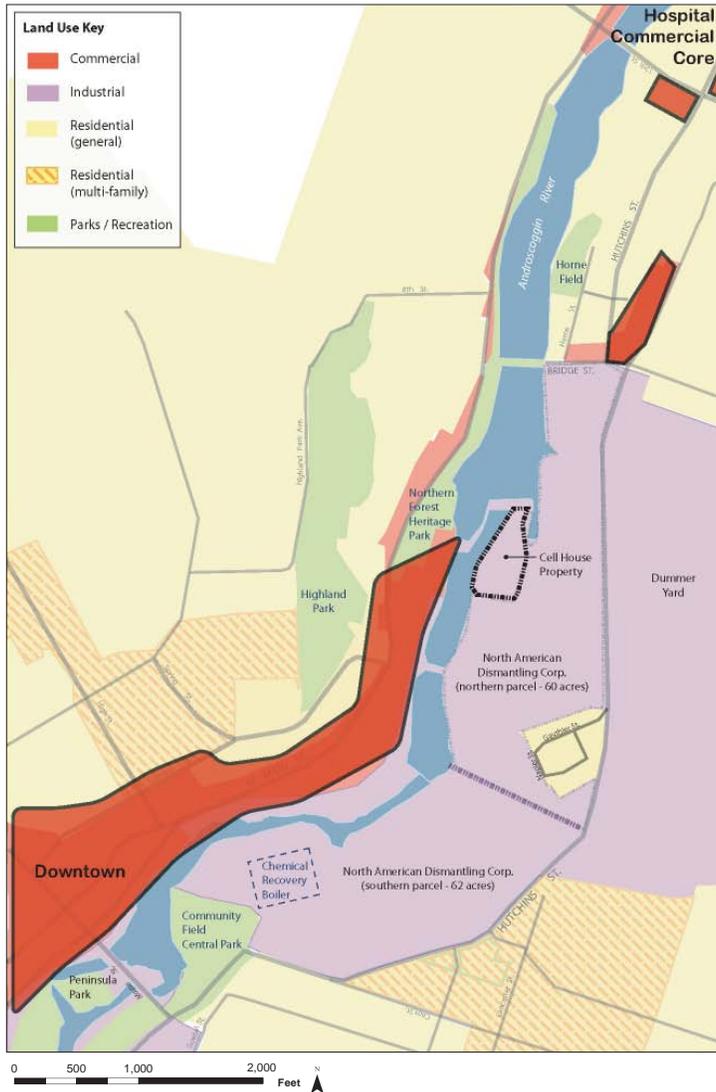
Since the Cell House property is located at the center of this larger former industrial area, the reuse of the surrounding North American Dismantling Corporation properties will have significant influence on the reuse of the Cell House property itself. It will be important to consider how potential Cell House property uses relate to future uses at adjacent properties.

Figure 8. Industrial Land Uses



The Cell House property is part of a larger industrial use zone. Pictured above is the adjacent 122-acre former pulp and paper mill property, currently owned by North American Dismantling Corporation.

Figure 9. Commercial Land Uses



Commercial Land Uses

Berlin’s primary commercial cores are located downtown, extending north and south on Main Street, and in the area east of the 12th Street Bridge to the north of the property. The downtown district is characterized by multi-story commercial blocks with retail services on the ground floor and office space on the upper levels. The City of Berlin is actively working to revitalize partially vacant commercial blocks through the Berlin Main Street Program and other ongoing economic revitalization initiatives. South of downtown, the Route 16 corridor consists primarily of roadside commercial services and retail shopping centers. The Androscoggin Valley Hospital and related professional offices comprise a smaller commercial core to the north of the property.

The Cell House property is physically isolated from the city’s commercial cores due to distance and access limitations. In order to avoid conflicts with existing commercial centers, future commercial uses at the property would need to compliment or enhance existing retail and professional uses in the city’s downtown core. The property’s proximity to the river, as well as its views of the Presidential Range and Berlin’s industrial infrastructure represent potential opportunities for recreation or heritage-based commercial uses.

The property’s limited accessibility and visibility from existing transportation networks and lack of infrastructure are key constraints that would need to be addressed in order for the property to be transitioned to commercial use.



Berlin’s Downtown commercial buildings host offices, shops, and restaurants. Berlin’s Main Street Program is working to support businesses and revitalize partially vacant buildings.

Residential Land Uses

Residential zoning districts are located south, west and north of the Cell House property. Due to a growing local surplus of housing units, as well as the property's access and infrastructure limitations, the site is not currently well-suited for residential uses. However, given its central location between multiple neighborhoods, the property could serve as a suitable location for neighborhood amenities, including community services and parks.

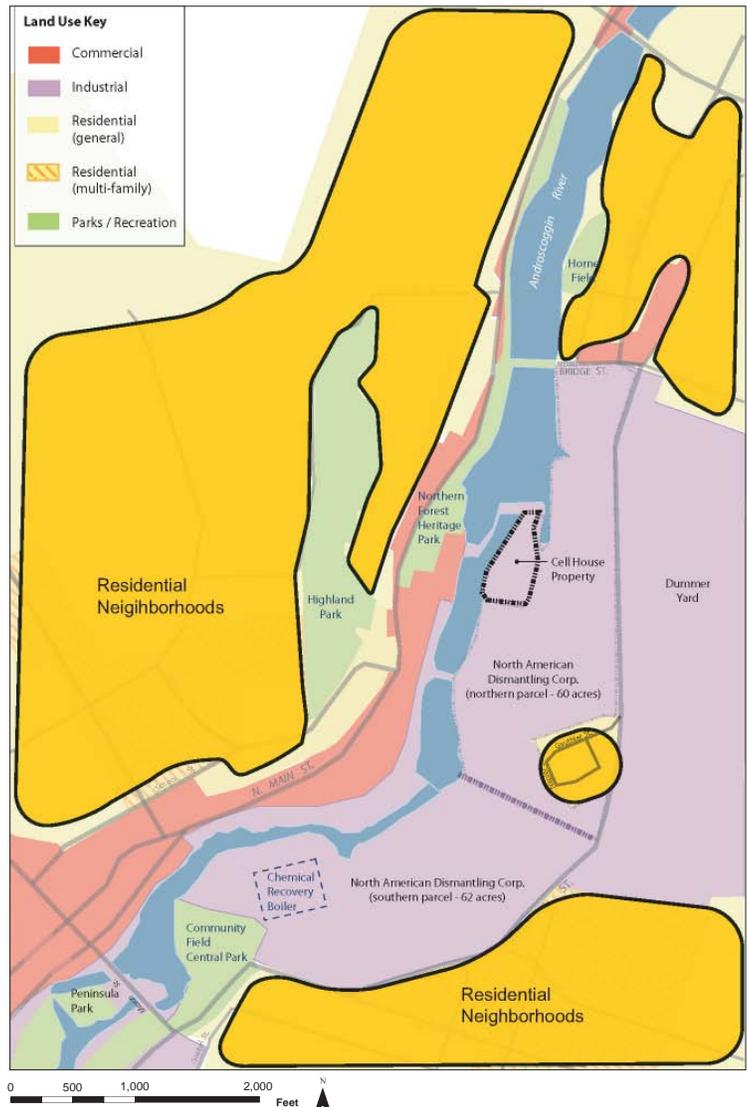


Residential land uses in Berlin are primarily located on hillsides on both the east and west sides of the Androscoggin River.



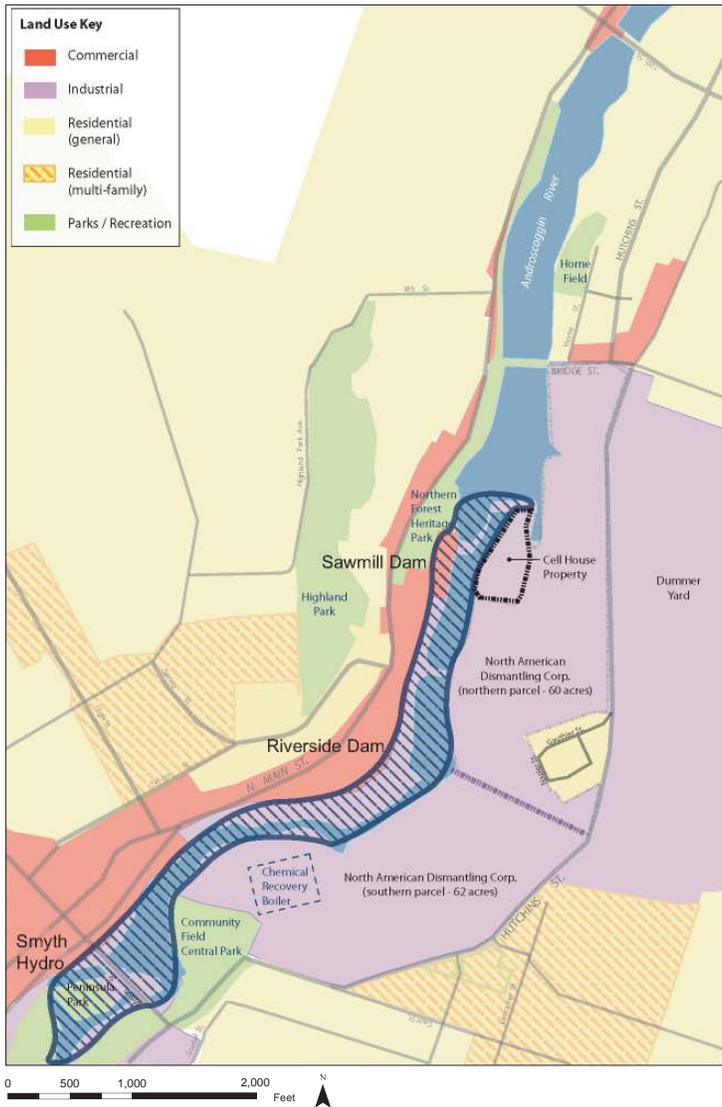
Single-family residential uses are located north of the property on Horne Street.

Figure 10. Residential Land Uses



Berlin currently has a housing surplus. The Cheshire Street neighborhood is pictured above.

Figure 11. Hydroelectric Corridor



Hydroelectric Corridor

The Androscoggin River adjacent to the Cell House property is part of a hydroelectric utility corridor that includes four generating stations: the Saw Mill Dam, the Riverside Dam, the Smith Hydro Dam, and the Cross Power Dam.* This portion of the river, although zoned for industrial uses, serves multiple community needs. Higher elevation areas along the corridor are accessible to the public (e.g., Tondreau Peninsula Park). However, the riverbed downstream from the Saw Mill Dam is not accessible to the public due to regular dam releases. The Cell House property abuts the Saw Mill Dam, owned by Brookfield Power; the utility company maintains an access easement through the property to reach the eastern edge of the dam. There is a need to coordinate future uses of the Cell House property with Brookfield Power or other future operators of the Saw Mill Dam. There is also an opportunity for future uses at the property to highlight the historical importance of the river and its dams for both log transportation and power production along the Androscoggin River. The hydroelectric corridor functions as an active industrial use zone and as a greenspace with views and opportunities for carefully managed access.

*Cross Power Dam is located further south on the Androscoggin River and is not included on the figure to the right.



The hydroelectric corridor offers views of Berlin's scenic resources as well as its industrial infrastructure.



Active hydroelectric dams, like the Saw Mill dam operated by Brookfield Power, rely on regulated stream flow for electricity generation.

IV. COMMUNITY FUTURE LAND USE GOALS

During the reuse planning process, the RPC developed a set of reuse goals for the Cell House property and evaluated future land use alternatives that consider the individual property as well as the broader context. This section of the report summarizes the RPC's evaluation process.

Committee Goals for Reuse Planning Process

At the outset of the reuse planning process, the RPC identified the following general goals for the process and the Cell House property's reuse.

- Consider the future use of the river.
- Determine uses that are complimentary to the surrounding property.
- Determine who will own the property.
- Determine how to add value to the property.
- Educate community on the process that the RPC is undertaking.
- Provide reuse recommendations that are grounded and realistic.
- Help inform a cleanup that can support a variety of uses.
- Outline considerations for implementation.
- Identify constraints for reuse.



RPC discussions included the identification of general goals for the reuse planning process.

RPC List of Potential Site Uses

During the January 22, 2008 meeting, the RPC identified the following preliminary list of potential uses for the Cell House property.

- Industrial (biomass cogeneration, transmission substation)
- Commercial (shops, restaurants)
- Office (office park, retreat center, hotel)
- Residential (senior housing, condos)
- Community Facilities (recreation center, hockey rink)
- Recreation / Open Space (sports fields, festival space)
- Heritage Corridor (museum, heritage exhibits)
- Trails (heritage corridor, wildlife viewing, walking & biking, forest management demonstration)
- River Access (boating, picnic space)



RPC members discussed potential site reuse opportunities during a January 2008 workshop.

Community Goals

As part of the City's ongoing Master Planning Process, Berlin residents shared goals for the reuse of the larger mill property at a visioning session held on March 5th, 2008. The following list summarizes the findings of the visioning session, including residents' general goals for the reuse of the larger mill property.

- Increase pedestrian connections.
- Enhance river access.
- Increase green space.
- Preserve / leverage mountain views.
- Enhance heritage corridor.
- Promote diversity of uses.
- Enhance vehicular connections.
- Create jobs.
- Compliment downtown core.

Future Land Use Suitability Evaluation

The RPC evaluated potential Cell House property uses based on the community goals for the larger mill site, as illustrated in Figure 12 below. The matrix includes the RPC’s preliminary list of Cell House property uses across the top and community goals for the larger mill site in the left column. A simple ranking system was used to evaluate the extent to which each of the potential uses for the Cell House property support broader community goals. Uses that were estimated to support the community goals were ranked as high suitability; uses that were estimated to compromise community goals were ranked as low suitability; and uses considered neutral or could vary based on design were ranked as medium suitability.

Using the Suitability Matrix as a reference, RPC members also individually ranked potential Cell House property uses. Each member cast four votes for the most preferred uses and two votes for least preferred uses. Figure 13 on the facing page includes a table that summarizes the individual voting results. RPC members’ voting results were divided regarding preferences for industrial and river access uses. However, the voting results indicate that residential use is not preferred for the site while commercial uses, trails, heritage corridor, and community amenities are preferred.

Figure 12. Land Use Suitability Matrix

		Land Uses								
		Industrial	Commercial	Residential	Office	Community Facilities	Recreation Space	Heritage Corridor	Trails	River Access
		biomass cogeneration opportunities, transmission substation	restaurants, shops	condos, senior housing	retreat center, office park	hockey rink, recreation center	sports fields, festival space	museum, exhibit space	heritage, wildlife, recreation	boating, picnic space
Community Goals	Increase pedestrian connections	L	M	M	H	H	H	H	H	H
	Enhance river access	L	M	M	M	H	H	H	H	H
	Increase green space	L	L	M	M	M	H	H	H	H
	Preserve mountain views	L	M	M	M	M	H	H	H	H
	Enhance heritage corridor	L	L	L	M	M	M	H	H	H
	Promote a diversity of uses	L	H	M	M	M	M	M	M	M
	Enhance vehicular connections	M	M	M	H	H	M	M	M	M
	Create jobs	M	H	L	M	M	L	M	L	L
	Compliment downtown core	L	M	H	H	H	M	H	H	M

Suitability Ranking	
High Suitability – supports goals	(Light Green)
Medium Suitability – neutral to goals	(Medium Green)
Low Suitability – does not support goals	(Dark Green)

Committee’s Future Land Use Recommendations

The RPC identified the following future land use recommendations for the Cell House property. These summary recommendations are based on the Suitability Matrix, individual member voting results, and subsequent RPC discussions and review.

- **Limit residential uses** – Residential uses are not desired at the Cell House property. Existing zoning does not permit residential uses.

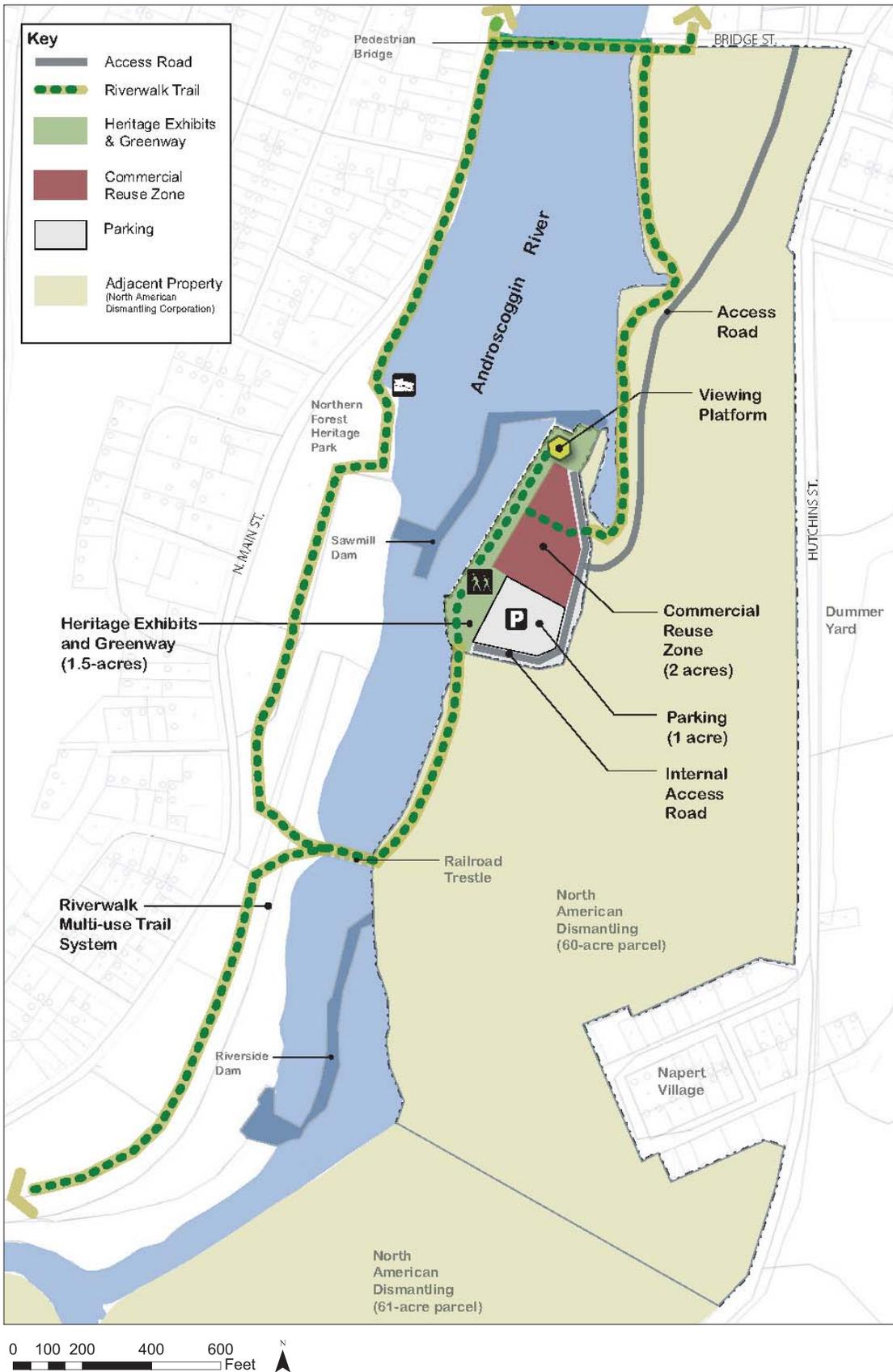
- **Support flexible commercial land uses** – Commercial uses that compliment existing downtown businesses as well as future uses on surrounding properties are most preferred. Existing zoning designations support both industrial and commercial uses.

- **Connect to a multi-use recreational trail system** – The property should be part of a trail system and associated green space that could support recreational activities like walking, biking, horseback riding, picnicking, and wildlife viewing. Recreational uses are permitted within existing zoning districts at the Cell House property.

Figure 13. Land Use Ranking Summary Table

Potential Cell House Property Uses	Votes for Most Preferred Uses	Votes for Least Preferred Uses
Industrial	5	6
Commercial	9	0
Residential	0	7
Office	2	0
Community Facilities	5	0
Recreation Space	1	0
Heritage Corridor	4	0
Trails	4	0
River Access	5	4

Figure 14. Cell House Property Reuse Framework



V. CELL HOUSE PROPERTY REUSE FRAMEWORK

This section outlines the Reuse Framework for the Cell House property. The Reuse Framework (Fig. 14 on the facing page) is not a site plan or a development proposal. It is a flexible concept plan that captures the reuse considerations identified during the reuse planning process.



Portions of the Cell House property could become part of a riverfront recreational trail that helps form a cohesive open space corridor in Berlin.

Trail and Recreational Corridor

The RPC envisions a multi-use river front trail for the property as part of a greenway that links city parks, heritage sites, and commercial destinations located on either side of the Androscoggin River. The proposed trail system would extend north from the Cell House property to the Bridge Street pedestrian crossing, cross the river, and extend south to the Northern Forest Heritage Park, Brown Company buildings, and the abandoned railroad crossing, which could be renovated as a pedestrian bridge that loops back to the Cell House property. This proposed pedestrian bridge could also connect the property to downtown, the Berlin public library, as well as Tondreau Peninsula Park located south of the Mason Street Bridge.

Implementation Considerations:

- **Trail Access Considerations:** The river trail envisioned for the area would require negotiating access agreements or right-of-way acquisition for multiple parcels and easements that are owned by: Pulp of America, LLC (Cell House property), North American Dismantling Corporation, the Atlantic and St. Lawrence Railroad, Great Lakes Hydro of America, Fraser NH, LLC, and the Northern Forest Heritage Park (NFHP). Some of this access may be secured as part of development review processes. Due to the number of parcels affected, securing access will require significant planning and organization by the City of Berlin and other appropriate parties.
- **Partnership Considerations:** The NFHP will be a critical partner in implementing the proposed trail system. NFHP owns significant river frontage along the west side of the river, and its organizational mission is well-suited to implementing such a trail system. The organization could potentially serve as a steward of the river trail proposal.
- **Remedial Design Considerations:** The existing concrete retaining wall on the Cell House property elevates the area proposed for the river trail above the Androscoggin River. The existing grade helps to provide opportunities for viewing, and also limits physical access to restricted areas downstream of the Saw Mill hydroelectric dam. During the Remedial Design phase of the site's cleanup, recreational trail layout would need to be coordinated with EPA's final remediation, grading, and riverbank stabilization plans for the Cell House property.

Heritage Corridor

Heritage corridor enhancements for the Cell House property could include a flexible space for recreation and community events, as well as a viewing platform and interpretive signage. A community event space would support regular festivals held at the NFHP and other locations throughout the City. An elevated platform would offer an observation point for viewing wildlife, Berlin's "Riverfire" events, the Presidential Range, the Androscoggin River, and the City's historic infrastructure.

Implementation Considerations:

- **Partnership Considerations:** Proposed heritage corridor elements would require a project partner that can coordinate implementation and physically maintain the community event space, signage, and viewing platform over the long-term. The NFHP could potentially serve as a partner in this effort.
- **Potential Funding Sources:** Adjacent landowner and hydroelectric dam operator Brookfield Power maintains a program for interpretive historical and educational exhibits at hydroelectric stations. This program could serve as a funding source for elements of the heritage corridor.
- **Remedial Design Considerations:** The viewing platform's location would need to be finalized in coordination with the Remedial Design phase of the cleanup for the Cell House property. Footing excavation requirements and the final grading of the property would likely influence the location of the platform.



The Northern Forest Heritage Park maintains an amphitheater for community events.



The northern portion of the Cell House property could be a suitable location for a viewing platform.



Interpretive exhibits at the Chlor-Alkali site could help to highlight the importance of the Androscoggin River in the evolution of Berlin's history and economy.

Light Commercial Reuse Zone

Commercial uses at the Cell House property would provide employment opportunities and serve as an amenity for nearby residents, river trail users, and visitors. Potential commercial uses for the property could include the activities outlined below.

- Artisan workshops
(glass blowing, wood working);
- Light commercial manufacturing to compliment surrounding site uses;
- Recreation rental and retail
(river outfitters, canoe and bicycle rental);
- Private recreation or community facilities
(hockey rink, indoor recreation center);
- Services for trail users
(coffee shop, snack bar); and
- Parking to support community events or surrounding future uses.



A flexible commercial reuse zone located in the eastern portions of the Cell House property could compliment future uses on surrounding properties.

Implementation Considerations:

- **Infrastructure Considerations:** Vehicular access roads and infrastructure (water, sewer, electric) improvements would be needed to support commercial uses at the Cell House property.
- **Building Construction & Remedial Design Considerations:** Commercial uses such as light manufacturing, workshops, or an indoor recreation center would require building construction. The potential for excavation and construction of building footings or foundations would likely need to be considered during the remedy selection and design phases of the site's cleanup.
- **Zoning Considerations:** The current Industrial/Business zoning designation would allow for the by-right development of artisan workshops, light manufacturing uses, and parking. Retail and rental shops or recreation facilities would require a special use permit. The proposed two-acre commercial reuse zone could accommodate an approximately 30,000 square-foot, one-story building, and a 5,000 square-foot accessory building. The Cell House property's current restriction on building construction would need to be modified in order to allow for the development of commercial facilities. Building height and layout could be designed to maintain views of the river and surrounding mountains, as well as public access to the riverfront and multi-use trail.

VI. CONCLUSIONS & NEXT STEPS

The project's future land use recommendations and Reuse Framework outline findings that can help inform EPA's assessment of potential human health risks, evaluation of cleanup alternatives, and remedial design parameters. The Reuse Framework also provides a roadmap for the City of Berlin that illustrates how the Cell House property could support economic development while also fitting within a cohesive recreation and heritage corridor along the Androscoggin River.

The City of Berlin has taken a critical step in the direction of revitalizing the river corridor through its support of the Reuse Planning Process. The RPC discussions and recommendations can serve as a starting point for efforts that extend beyond the boundaries of the Cell House property and support broader community revitalization goals. The following considerations and next steps can help the City to build on the RPC's efforts.

Androscoggin River Corridor Considerations:

The reuse framework outlines a potential trail system and heritage elements for the Androscoggin River corridor.

Next Steps:

- *Coordinate with Northern Forest Heritage Park to develop a strategy for securing access agreements and acquiring necessary easements for the proposed riverfront trail system.*
- *Integrate the history of the Cell House property and Saw Mill Dam into educational exhibits as part of on-going heritage corridor initiatives.*

Property Access Considerations:

The Cell House property's vehicular and pedestrian access will need to be negotiated with surrounding landowners. The property is currently accessible only to the current owner and the City of Berlin's emergency vehicles via an access agreement with the North American Dismantling Corporation. The 50-foot-wide access easement extends south from a gate at Bridge Street and Hutchins Street to the eastern edge of the Cell House property. North American Dismantling Corporation owns the access road and maintains a locked gate that prevents public access to the property. Easements for a public road as well as pedestrian trails would need to be secured in order to support the uses outlined in the Reuse Framework.

Next Steps:

- *Negotiate (via development review or other appropriate mechanisms) a public right of way that allows street improvements and permanent, public access to the Cell House property. The City may want to reconsider 1) the access location to allow for more direct access to the property and maintain viable parcel configurations for the surrounding property, and 2) the access width to allow for a pedestrian or multi-use trail along with vehicular access to the property.*

Property Ownership Considerations:

The Reuse Framework outlines the need for a steward of the Cell House property who can coordinate with EPA on an ongoing basis, secure resources for implementation, develop partnerships, resolve legal issues, and serve as a champion for the community's goals. In 2002, a bankruptcy order authorized Pulp of America LLC to abandon the 4.6-acre Cell House property.⁴ The property is currently tax-delinquent, and its future ownership is uncertain. The lack of a viable landowner and steward of the property is a challenge that will also need to be addressed in order to transition the parcel to commercial or recreational uses.

Next Steps:

- *Consider options for facilitating the transfer of the Cell House property's ownership to an entity that could help steer the property into reuse.*

Institutional Controls Considerations:

Institutional controls (ICs) are non-engineered instruments such as administrative or legal controls that minimize the potential for human exposure to contamination by limiting land or resource use. ICs are generally used in conjunction with, rather than in lieu of, engineering measures such as waste treatment or containment. As EPA evaluates potential remedies for the Chlor-Alkali site, the selection of ICs will need to consider that commercial uses outlined in the Cell House property's reuse framework would likely require excavation for building foundations or footings. As a condition of the Cell House property's subdivision in 2002, the Berlin Planning Commission established a restriction preventing development or building construction on the property. These conditions would likely need to be modified in order to allow for the property's commercial reuse.

Next Steps:

- *Consider modifying the restriction on building construction currently in place at the Cell House property to allow for remedial response activities and reuse after the remedial action is complete.*
- *Coordinate with EPA to ensure City imposed restrictions are consistent with ICs planned as part of the site's remedy (ICs could potentially be determined during the remedy selection phase of the site's cleanup in 2012).*

⁴ See Appendix A: Cell House Property Ownership Information



For more information, please contact:

E² Inc.
921 2nd Street, S.E.
Charlottesville, VA 22902
T: 434.975.6700 - F: 434.975.6701
www.e2inc.com

Appendices

A. Cell House Property Ownership Information

B. Riverfront Redevelopment Case Study

C. Eco-Industrial Parks Case Study

D. Value-Added Forest Products Case Study

E. Future Land Use and the Superfund Remedy Selection Process

F. Institutional Controls at Superfund Sites

Appendix A.

Cell House Property Ownership Information¹

The 4.6 acre Cell House property was formerly part of the larger pulp mill parcel but is now subdivided. In 1999, Crown Paper Co., Crown Vantage, New Hampshire Electric, Inc., and Berlin Mills Railway, Inc., (collectively "Crown") entered into an agreement to sell substantially all of the assets of its integrated pulp and paper mills located in Berlin and Gorham, New Hampshire and related hydroelectric generating facilities and landfill to American Tissue Holdings Inc. and Pulp & Paper of America LLC. In connection with this agreement, on June 23, 1999, Crown conveyed the larger pulp mill property to Pulp of America LLC (see quitclaim deed recorded in Book 0920, Page 0413 of the Coos County Registry of Deeds). While Pulp of America LLC appeared to be the record owner of the larger pulp mill property, Pulp & Paper of America LLC has also held itself out to environmental regulators (and possibly others) as the owner of the property (see, e.g., Site Specific Application dated August 18, 1999, submitted by Pulp & Paper of America LLC to New Hampshire DES in connection with the capping of the Cell House Site). According to a prospectus filed with the Securities and Exchange Commission by American Tissue Inc., Pulp of America LLC is a wholly-owned subsidiary of Pulp & Paper of America LLC, which in turn is a wholly-owned subsidiary of American Tissue Inc. Pulp & Paper of America LLC and Pulp of America LLC share the same principal business address.

On September 10, 2001, American Tissue Inc., Pulp of America LLC, Pulp & Paper of America LLC, and a number of other related entities filed a voluntary petition for bankruptcy under Chapter 11 in the United States Bankruptcy Court for the District of Delaware. In re: American Tissue Inc., et al., Case No. 01-10370 (RB). On February 23, 2002, the City of Berlin Planning Board approved a plan that subdivided the Cell House Parcel (Tax Assessor's Map 128, Lot 262) from the larger pulp mill parcel (Map 129, Lot 54). See Coos County Registry of Deeds, Book 0989, Page 0660. On May 20, 2002, the Bankruptcy Court issued an Order authorizing the debtors, including Pulp of America, to abandon three parcels of property, including the "Cell House Site." On May 29, 2002, in accordance with a May 9, 2002, Order of the Bankruptcy Court, Pulp of America LLC (as Debtor-in-Possession) conveyed much of the pulp mill property it received from Crown (but specifically excepting the three abandoned parcels) to Fraser N.H. LLC. See Coos County Registry of Deeds, Book 996, page 374. The Bankruptcy Court Order authorizing the Cell House property's abandonment, along with Pulp of America LLC's sale of surrounding property to Fraser N.H. LLC lead to the current understanding that the Cell House property has been abandoned.

¹ Property research for Appendix A: Cell House Property Ownership Information provided by EPA Region 1

Appendix B.
Riverfront Redevelopment Case Study

Riverfront Redevelopment



Overview

Many, communities located along rivers have historically used the riverfront to support industrial and transportation economies. As these economies have changed, communities are redeveloping these formerly industrial riverfronts as vibrant destinations that include retail stores, housing, parks, and trails. This information sheet describes two riverfront redevelopment examples and outlines some considerations for evaluating suitable riverfront community uses.

Considerations for Evaluating Suitable Riverfront Redevelopment Uses

Riverfront redevelopment projects require creativity, flexibility, partnership building, resources, and careful consideration of the community's riverfront history and its future plans and priorities. It is important to review community plans and identify local and regional land use trends, which can help establish realistic expectations for the project. A riverfront location may help attract new businesses or residents, but larger-scale redevelopment projects need to build on significant private-sector demand for new stores, residences, and other land uses in the region in order to move forward. For this reason, local governments are often important leaders in riverfront redevelopment projects, locating or expanding public uses and community amenities in the riverfront area, providing redevelopment incentives, building community support, and positioning vacant or underutilized properties for redevelopment.



In addition to market factors and public sector leadership, the area's physical characteristics – topography, infrastructure, access, unique features – and existing land uses are critically important considerations in riverfront redevelopment projects. Examples of unique features include historic buildings and landscape features or natural amenities like rare wildlife habitat and river views. Based on these considerations and a review of successful riverfront redevelopment projects around the country, it becomes clear that certain land uses are well-suited for riverfront redevelopment projects.

River-based Parks and Recreation

Areas located immediately adjacent to rivers are often well suited for recreational land uses such as boat launches or fishing piers that allow people to interact with the water, or for natural areas, often referred to as riverbank or riparian areas. These places serve as wildlife habitat and environmental education resources and can be beautiful to visit. Riparian areas also provide a host of other benefits, reducing storm water flows, preventing soil erosion, and filtering water. Riverfront areas can link well with recreational land uses such as walking trails and bike paths, often called riverways, which can be easily adapted to steep slopes and changing terrain. Low-lying floodplain areas can provide opportunities for sports fields, picnic areas, parks, and storm water management.

Contact:

E² Inc. - Vermont Office

Matt Robbie,
Project Manager

101 Staniford Road
Burlington, VT
05408

802.540.0243
mrobbie@e2inc.com
www.e2inc.com

Adaptive Reuse: An Effective Tool for Industrial Revitalization

Further back from the riverfront, redevelopment efforts often focus on adaptive reuse opportunities. Adaptive reuse refers to the conversion of an old building or landscape into a new use, while preserving all or key portions of the building or a landscape's historic features. Conversion can include the modification of a building's interior and exterior, or the construction of new building or landscape additions. Common types of adaptive reuse include the transformation of former warehouse or factory buildings into commercial retail stores, office space, and condominiums. Adaptive reuse provides a powerful tool for communities to preserve and celebrate local history, while also providing opportunities for new facilities and economic development.

Downtown Whitewater Park Sparks Community Revitalization

Salida, Colorado: Arkansas River Whitewater Park

Known as the "Heart of the Rockies," Salida, Colorado is a small city (pop. 5,500) located about 150 miles south of Denver. Surrounded by natural beauty, the community is also located along the Arkansas River and its world-class whitewater. Since 1949, the First in Boating on the Arkansas (FIBArk) boat races have taken place each summer in Salida, attracting kayakers and canoeists from around the world. Historically, however, most festival activities took place outside of downtown Salida; the downtown corridor was one of the least attractive and most inaccessible sections of the river.

In 2000, a community coalition created the Arkansas River Whitewater Park and Greenway project to restore this neglected corridor and reintegrate the river into downtown Salida. The coalition created a multi-year plan to develop a whitewater park and extend a network of community parks and trails along the banks of the river.



Kayaker competing in the Arkansas River Whitewater Park at the 2007 FIBArk boat race (photo courtesy of Todd O'Brien).

Whitewater parks provide a recreation attraction by placing rocks strategically in a riverbed to create waves, eddy lines, and currents to enhance a river's boating qualities. Whitewater parks are increasingly common across the United States, and enable boaters to practice their sport in an accessible area with a concentration of quality whitewater features in a relatively short stretch of river.



Construction of a current deflector upstream of the Salida boat ramp (photo courtesy of the Arkansas River Trust).

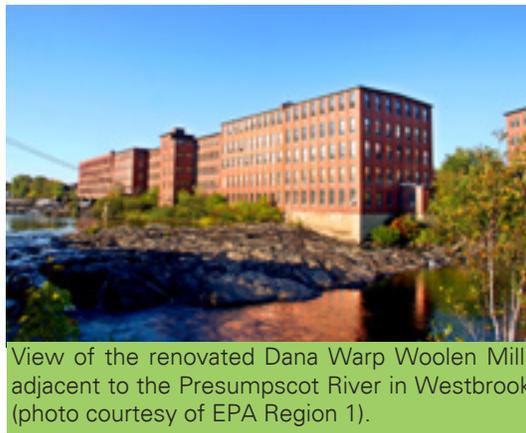
Designing and constructing the Arkansas River Whitewater Park cost \$250,000 and included substantial debris removal, riverbank restoration, installation of in-stream features (primarily rocks) to enhance the river's whitewater qualities, and construction of a downtown river walk with access points for boaters and fishermen. Arkansas River Whitewater Park first served as a venue for FIBArk events in 2003.

Today, the Arkansas River Whitewater Park is a year-round recreational attraction and a key venue for annual FIBArk events. The park is also a backbone of the community's economic development efforts. The community estimates that the park's development and installation costs were recovered within two years due to increased economic activity in the town. Future plans call for the upstream and downstream extension of the river walk and the creation of additional whitewater park features. Michael Harvey, Executive Director of the Arkansas River Trust advises anyone who wants to build a river park in their town, "Get organized, get motivated, and draw your inspiration from your passion for the river."

City Revitalizes Downtown with Creative Funding for Industrial Riverfront Renovation

Westbrook, Maine: Presumpscot River Redevelopment Project

For over two hundred years, the Presumpscot River in Westbrook, Maine (pop. 16,100) sustained the city's paper, shoe, and woolen mill economy. However, as the industrial economy shifted in recent decades, the town suffered job and business losses. In 2000, the City of Westbrook adopted a strategy to revitalize the downtown by renovating the industrial riverfront. The eight-part riverfront redevelopment project includes the renovation



View of the renovated Dana Warp Woolen Mill, adjacent to the Presumpscot River in Westbrook (photo courtesy of EPA Region 1).

Resources

- the **Arkansas River Trust** (www.arkrivertrust.org)
- **FIBArk** (www.fibark.com/History.asp#top)
- the **American Whitewater organization** (www.americanwhitewater.org/content/Wiki/stewardship:whitewater_parks#section)
- The **American Rivers organization** provides riverfront revitalization case studies online (www.americanrivers.org/site/PageServer?pagename=AMR_riverfronts).

Resources

- **EPA Region 1 Brownfield Success Story** (www.epa.gov/newengland/brownfields/success/westbrookRiverwalk.htm)
- **City of Westbrook, Maine** website (www.westbrookmaine.com)

of a century-old manufacturing mill and storage buildings, construction of several new office buildings, and development of a riverfront boardwalk, walking trails, and a bike path that will link the community with neighboring Portland.

With the assistance of city incentives, a local developer renovated the former Dana Warp Woolen Mill as mixed use commercial office and artist studio space, with more than 40 businesses now located in the building. This renovation preserves the historic riverfront character while serving as a catalyst for new economic activity and civic improvements. New construction adjacent to the renovation includes a new five-story office building, a 550-space parking garage, a new condominium complex, and a new medical office building. Community partnerships have formed to construct affordable housing, infrastructure improvements, and parks and trails. The riverfront now serves as a hub of mixed use activity as well as a recreational destination.

The City of Westbrook adopted a number of creative policy and funding options to make this vision a reality. Many of these tools, outlined below, are applicable to similar industrial redevelopment projects in riverfront communities:

- the formation of public and private-sector partnerships
- the provision of matching funds to access state and federal grant and loan resources
- an updated economic development strategy for the City
- updated planning and zoning tools
- the use of a \$250,000 EPA Brownfields Assessment Demonstration grant to assess the contamination status of several riverfront properties
- the establishment of two tax incremental financing districts for the office building and the garage to help defray development and lease costs
- the leveraging of \$1 million in federal highway funds and \$250,000 in economic incentives to defray the cost of the garage's construction, which has 100 spaces reserved for public use

Additional Resources

- Available **riverfront redevelopment resources** include *Remaking the Urban Waterfront*, published by the Urban Land Institute (2004), and *Ecological Riverfront Design*, published by the APA Planning Advisory Service (2004).



Construction of a new, nine-unit affordable housing condominium project in Westbrook's Frenchtown neighborhood in 2004 (photo courtesy of PROP).

Appendix C.
Eco-Industrial Parks Case Study

Eco-Industrial Parks

Overview

Communities are beginning to seek cost-effective ways to reduce the environmental impacts of industrial development. One innovative approach is the development of “eco-industrial parks.” An eco-industrial park is a group of businesses clustered in a single location working collectively to reduce or eliminate waste associated with their industrial processes (e.g., heat, steam, carbon dioxide, and various chemical and material byproducts). By exchanging services between businesses in the park or community, tenants are able to generate savings by improving efficiency and reducing operating costs. Often, one core industrial business, such as a power plant or processing company, serves as an anchor tenant that attracts other businesses interested in utilizing or sharing their waste products. Combined heat and power plants commonly sell or distribute excess heat energy to other business to supplement heating needs.

Eco-Industrial Development Benefits

- Increased cost savings for participating businesses
- Increased job growth associated with new business development
- New job training opportunities
- Increased community development opportunities, including business revitalization, brownfields redevelopment, and attracting new businesses
- Improved energy efficiency and reduced pollution and waste production
- A healthier community and environment

Eco-Industrial Development Challenges

- Increased risk associated with longer returns on initial investment
- Ensuring that the cost of waste material sources is less than the cost of new materials
- Ensuring a balance in the quality and amount of exchanged materials between partnered businesses



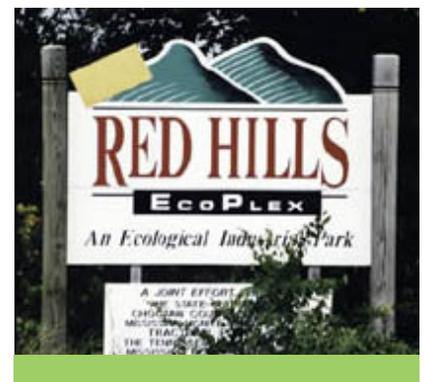
Contact:

E² Inc. - Vermont Office

Matt Robbie,
Project Manager

101 Staniford Road
Burlington, VT
05408

802.540.0243
mrobbie@e2inc.com
www.e2inc.com



Madison, Maine: Backyard Farms Greenhouse

In Madison, Maine, innovative tomato farming is underway at a 25-acre greenhouse complex, supplying vine-ripened tomatoes to consumers in the northeast year-round. The Backyard Farms enterprise “Backyard Beauties” showcases what could be a new agricultural model for the north country that extends the traditional growing season, creates new jobs, and satisfies consumer demand in the growing market for fresh, locally grown produce.

Backyard Beauties is capitalizing on a growing market for fresh local produce. The company supplies its produce to both small and large regional retailers, including Hannaford supermarkets, which until now have had to rely on over-seas growers for year-round fresh tomato shipments. Nationally, demand for fresh tomatoes has risen 37 percent since the early 1990s, and Backyard Farms believes that consumers throughout the northeast will continue to demand the fresh home-grown produce. The company plans to expand operations beyond its existing capacity to include one or two more greenhouses that will be used to grow hydroponic cucumbers, peppers, eggplant, and culinary herbs.

The Greenhouse Complex

One of the largest greenhouse complexes of its kind in the nation, Backyard Beauties’ \$25 million operation provides:

- One million square feet of greenhouse space;
- Capacity to grow 240,000 plants, yielding approximately one million tomatoes per week, year-round; and
- A fresh, local tomato supply for supermarkets and restaurants throughout the northeast (produce is packed and shipped one day after harvesting).



Backyard Farms grows vine-ripened tomatoes in a state-of-the-art 25-acre green house in Madison, Maine.

Employment and Economic Benefits for the Region

Backyard Farms' investments in the Madison greenhouse operations have created multiple economic benefits for the region:

- The greenhouse employs 90 workers year round (future expansion plans could require 250 employees).
- For every three jobs created at the greenhouse, one additional job has been created regionally (Backyard Farms has used local companies for trucking, human resources and payroll, banking services, and construction and general contracting).

Year-Round Growing in the Northeast

While the northern New England climate may not seem a logical choice for a year-round greenhouse, as Backyard Beauties' co-founder Paul Sellow explains, "It's much easier to heat a green house than it is to cool a green house." Due to the following production efficiencies, Backyard Beauties is able to grow, harvest, and supply fresh tomatoes year round:

- Low-cost electricity supplied by municipally owned utility, Madison Electric Works is used to power 11,000 grow lights that maintain consistent light throughout the year.
- Native bees pollinate the tomato plants.
- High-efficiency propane boilers are used to heat the greenhouses in winter months, and thermal blankets cover plants to limit heat loss.
- Heated gutters funnel rainwater to support year-round plant growth, creating a low-cost, environmentally sustainable irrigation system.
- Produce is shipped directly to retailers, eliminating the need for storage and refrigeration.



Resources

- **Backyard Beauties**
(www.backyardbeauties.com)
- Harkavy, J. Washington Post (February 1, 2007). **25-acre Greenhouse Thrives in Maine.**
(www.washingtonpost.com/wp-dyn/content/article/2007/02/01/AR2007020100419.html)

Londonderry, New Hampshire: Ecological Industrial Park

The Town of Londonderry, New Hampshire is also using the principles of industrial ecology to orchestrate economic development, improve environmental performance and limit commercial sprawl in the southern part of the state.

The idea for the Londonderry Eco-Industrial Park (EIP) was first formed when a plastic recycling company approached organic yogurt producer Stonyfield Farms about locating a facility on property adjacent to its Londonderry plant and reusing Stonyfield Farms' grey water for rinsing plastic. The Town of Londonderry initiated a larger effort to establish an EIP on 100 acres of publicly-owned land adjacent to Stonyfield Farms.



The Londonderry Eco-Industrial Park features a natural gas-fired power plant that supplies electricity and heat to Stonyfield Farms organic dairy and a neighboring plastic recycling company.

Resources

- Smart Growth Network. 2000. **Stonyfield Londonderry Eco-Industrial Park** (www.smartgrowth.org/casestudies/ecoin_stonyfield.html)
- Center for Sustainable Resource Processing. 2006. **Londonderry Eco-Industrial Park, New Hampshire, USA** (www.csrp.com.au/database/usa/lond)
- Lowitt, P. C. 1998. **Sustainable Development with a Local Focus: Sustainable Londonderry.** (design.asu.edu/apa/proceedings98/Lowitt/lowitt.html)

In order to establish the EIP, the Town of Londonderry took the following actions:

- Established a vision statement. “The Eco-Park recognizes as its primary function developing systems and processes which minimize the impact of industry and business on the environment, improve the economic performance of the member companies and strengthen the local economy. Through modeling the Park’s industrial systems on natural ecosystems, decreased environmental impact will be realized.”
- Developed a set of key principles to guide the park’s development, which include: sharing a common mission through long-term partnerships, accountability, striving for continuous improvement and innovation, land stewardship, serving the local community, and serving one another.
- Created a set of covenants and a governance structure for the EIP. Covenants require that all tenants of the EIP develop an environmental management system, track resource use, set environmental performance goals, and perform third-party ecological audits.

Since the Londonderry EIP was established in 1996, a 720-megawatt natural gas-powered generating plant has located in the EIP, providing power to Stonyfield Farms and the plastic recycling facility. A medical supply company, software development company, and car rental facilities have also located in the EIP.

Londonderry’s efforts illustrate how industrial ecology’s principles can be applied to help cooperating industries improve environmental performance and create a competitive advantage.

Cleveland, Ohio: Waste = Revenue Roundtable

The Cuyahoga River, which runs through Cleveland, Ohio, is a heavily industrialized and polluted waterway. Today, a public-private partnership is underway to revitalize the Cuyahoga Valley. This effort, known as the Cuyahoga Valley Initiative (CVI), is pursuing a multi-pronged approach to revitalization with the goal of making the Cuyahoga Valley once again an economic force, an environmental treasure, and a unifying element for the region.

Turning Waste into Revenue

One of the primary components of initiative is the private sector-driven “Waste = Revenue” Roundtable, which is helping to reduce the valley’s waste streams and create a competitive advantage for the region based on resource sharing. Since 2006, eight Cuyahoga Valley companies have worked with industrial ecologists to create a network of business opportunities from waste or by-products.

The Waste = Revenue Roundtable is based on a simple concept: wastes from one industrial process could become food (and therefore, revenue) for another industry.

Typically the value of waste is ignored. Ignoring the value of waste leads to:

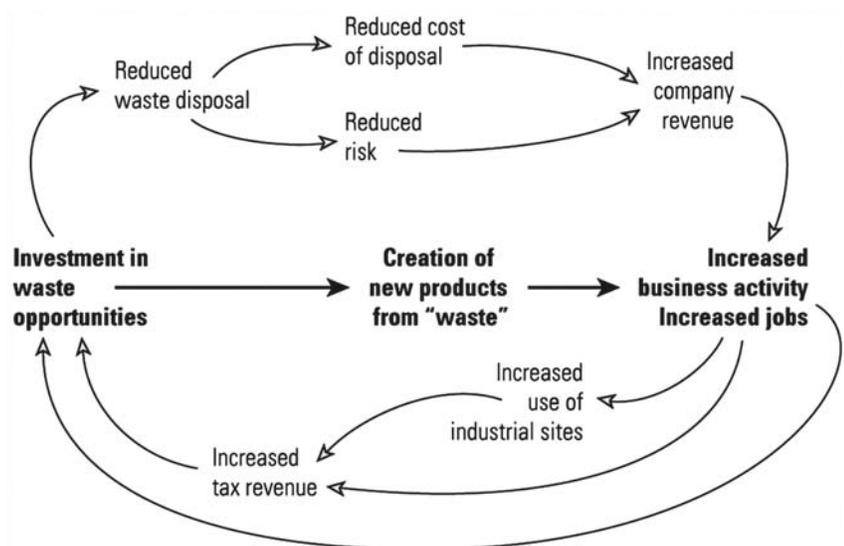
- improper disposal practices;
- significant environmental impacts on air, water, and soil; and
- ultimately, the devaluation of human health.

Realizing the value of reusing waste, however, can lead to:

- reduced disposal costs;
- new revenues from selling wastes; and
- reduced raw material costs.

Resources

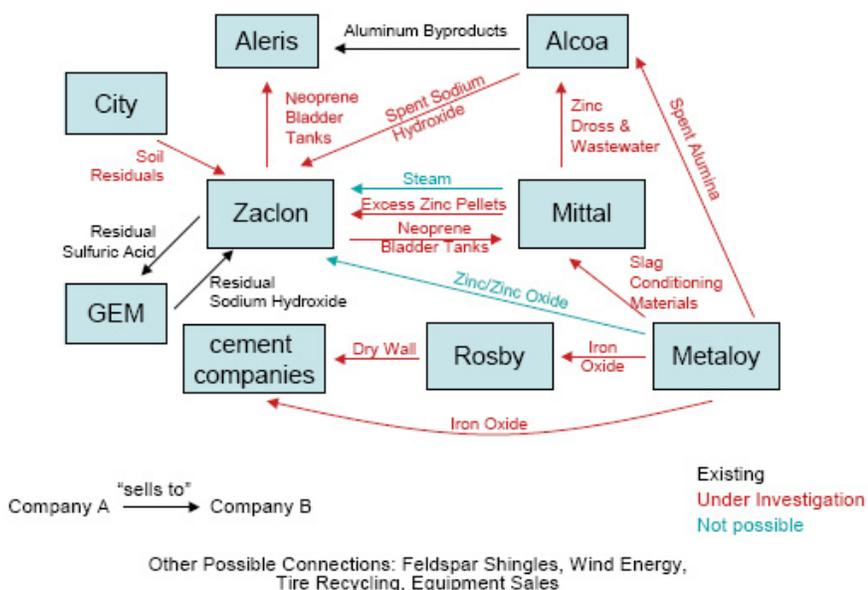
- Rocky Mountain Institute. 2006. **Waste = Revenue Roundtable – Cleveland, Ohio: Advancing the Regeneration of the Cuyahoga Valley.** (www.rmi.org/images/PDFs/Communities/ER06-05_RegenCuyahoga.pdf)
- Rocky Mountain Institute. **Whole System Design and Natural Capitalism.** (old.rmi.org/images/other/EconRenew/SDC_WholeSystemThink.pdf)



This flow diagram highlights the ways in which realizing the value of waste can help to create multiple benefits. (Source: Rocky Mountain Institute, Whole System Design and Natural Capitalism).

Participating businesses in the Roundtable in Cleveland include Alcoa, Mittal, Zalcon, Aleris, Alumintech, Rosby, and Metaloy; the City of Cleveland has also joined the network. While many of the business leaders involved in the Roundtable were aware of the benefits of reusing waste materials, few were aware of the processes and materials that were generated at neighboring industries. Roundtable discussions provided a venue for business leaders to share waste products they could sell and materials they needed. To date, more than twenty waste reuse projects have been discussed.

Diagram: Waste = Revenue Connections in the Valley



This diagram, one of the key outcomes of the Roundtable, highlights possible revenue-generating waste reuse partnerships. (Source: Rocky Mountain Institute)

While the Cuyahoga Valley Initiative's Waste = Revenue Roundtable is still in the early stages, this initiative shows how large, complex manufacturing businesses can work together to share resources. The Roundtable discussions have helped regional businesses to build trust and to generate new partnerships for economic growth and environmental sustainability.



Members of the Roundtable have begun a dialogue to identify opportunities to transform waste streams into revenues.

Appendix D.
Value-Added Forest Products Case Study

Adding Value to Forest Products Manufacturing

– a Strategy for Expanding the Return on Community Resources

Overview

Building on a community's existing strengths and core characteristics can be a successful economic revitalization strategy. Communities with an historic lumber base can build on existing strengths of lumber resources, technology and expertise by expanding value-added forest products manufacturing. "Value-added" refers to the increased economic value of wood as it proceeds from raw material through primary manufacturing, secondary manufacturing, and beyond.



Value-added wood products most commonly refer to "secondary processing" products, those products with the added labor value, such as furniture, flooring, or specialized paneling. Economic development efforts focus on secondary processing instead of primary production (lumber, plywood) to retain and expand jobs in rural areas and small towns. Value-added secondary wood processing provides several economic benefits including:

- increasing profitability through higher margins;
- creating higher "multiplier" effects as more money circulates in the local economy;
- increasing prices to make up for lost profits when raw material costs rise;
- increasing sales price by creating a unique product or meeting a unique market demand;
- increasing employees, which leads to more jobs; and
- potentially building additional mills to complete the process, which leads to more community jobs.

Innovative Forest Products Initiatives

Many communities are reaping more from their regional natural assets through innovative value-added forest product initiatives. Just a few examples include:

- Harvesting hardwoods, predominantly white oak, for wine barrel construction in Oregon, Minnesota, Missouri, Pennsylvania, and Virginia.
- Collecting and cultivating special or "non-timber" forest products) on a small-scale including: 1) edibles (pecans, persimmons, black walnuts, mushrooms); 2) medicinal and dietary supplements; 3) decorative or floral products; 4) specialty wood products; and 5) native wild plants.
- Collecting and marketing pine straw from long-needle pine trees as mulch for commercial and residential landscaping projects.

Contact:

E² Inc. - Vermont Office

Matt Robbie,
Project Manager

101 Staniford Road
Burlington, VT
05408

802.540.0243
mrobbie@e2inc.com
www.e2inc.com

- Building custom furniture through “integrated furniture operations” or “niche producers” that harvest, process, manufacture, and assemble furniture from oak, cherry, poplar, maple, pine, and other trees.
- Crafting custom-made wood moldings, millwork, and flooring from certified sustainable timber sources.
- Marketing wood products with greater durability, strength, and termite-, moisture-, and decay-resistance.
- Marketing woody biomass, including whole trees, limbs, tops, needles, and other woody parts, wood and wood wastes, residues, and municipal wood wastes, as a fuel and energy source. This biomass could also be marketed as lubricants, chemicals, methane, compost, building materials, paper, or other products.
- Processing non-traditional timber resources such as small-diameter roundwood for building construction, decking, and other purposes.
- Marketing woods such as mesquite, alder, apple, cherry, pecan, and hickory as natural flavor enhancers (referred to as cooking wood, smoke wood, and flavorwood) in the food sauces and for grill cooking in homes and restaurants.
- Recycling sawdust as firelogs, particleboard, and as an energy resource.



Common Principles in Value-Added Forest Product Initiatives

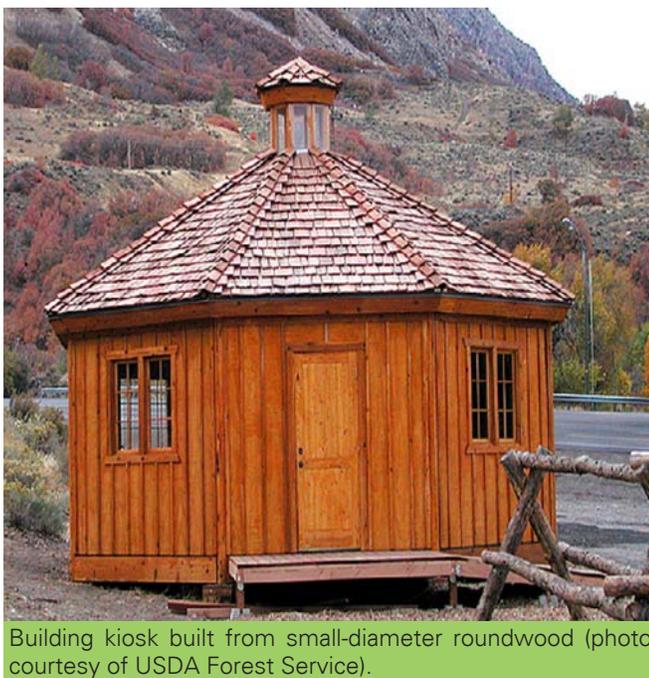
Value-added forest product initiatives are regionally based on timber characteristics, the location and needs of markets, and community skills and cultures. However, two common principles in most of these forest product developments are sustainable forestry and economic diversity.

Sustainable Forestry

Sustainable forestry manages forest resources to meet long-term market needs while also maintaining the biodiversity and other ecosystem services of forested landscapes. Sustainable forestry's primary goal is to restore, enhance, and sustain a full range of forest values, including economic, social, and ecological values. Sustainable forest practices are often a good fit with value-added forest product initiatives, as both recognize the importance of, and rely on, diverse forest ecosystem components that are renewably managed over the long-term. Certified sustainable wood products can also command higher prices and significant demand in the marketplace.

Economic Diversity

Traditional lumber-based communities are recognizing the strength of a diversified economy. Value-added forest products contribute to a broader, forest-based economic strategy that can include timber harvesting, recreation- and heritage-based tourism, traditional skills and crafts, energy production, and specialty “non-timber” forest products such as herbs and shiitake mushrooms, which can be found and cultivated in forest settings. Value-added forest product initiatives can often link with these related efforts to find new markets, generate publicity, and attract employees and resources.



Resources

- **Middle Peninsula Planning District Commission**
– Opportunities for Sustainable Natural Resource-Based Development in the Dragon Run Watershed (www.mppdc.com/dragon)
- **National Community Forest Center, Northern Forest Region** (www.ncfcnfr.net)
- **The Northern Forest Alliance** (www.northernforestalliance.org)
- **USDA Forest Service, Northeastern Area** (www.na.fs.fed.us)
- **USDA Forest Service, Non-Timber Forest Products** (www.sfp.forestprod.vt.edu)

Appendix E

Future Land Use and the Superfund Remedy Selection Process

Future Land Use Considerations in the Superfund Remedial Response Process

Overview

EPA evaluates all Superfund sites to determine what needs to be done to protect human health and the environment. This evaluation process is known as the remedy selection process or the Superfund Remedial Response pipeline. It includes five main stages.

1 Remedial Investigation / Feasibility Study (RI/FS)

The Chlor-Alkali Facility Superfund Site (Chlor-Alkali site) was listed on the National Priorities List (NPL) in 2005. The NPL is EPA's list of highest priority Superfund sites. After a site is listed on the NPL, EPA evaluates site conditions and potential remedial options. Field sampling data are collected to assess human health and ecological risks, and a range of remedial action options are developed to cleanup the site. The RI/FS stage in the remedial response pipeline can take anywhere from three to five years to complete depending on the complexity of the site.

First, a Remedial Investigation is conducted, which collects and analyses environmental site data, identifies key site contaminants (called Contaminants of Concern or COCs), and determines the nature and extent of a site's contamination. During the Remedial Investigation, EPA also establishes baseline human health risks and conducts ecological risk assessments to characterize the current and potential threats to human health and the environment. As EPA develops human health risk assessments, it will evaluate the reasonably anticipated future land uses (RAFLUs) for a site (e.g., residential, commercial, industrial, or recreational land uses, or a combination of land uses). The development of accurate and realistic RAFLUs can help EPA to evaluate the potential exposures for various populations at the site in the future. The results of the Remedial Investigation are summarized in a report.

Using the results of the Remedial Investigation, EPA conducts a Feasibility Study to establish remedial action objectives (cleanup goals), and to develop and evaluate a range of alternative remedial actions to address a site's contamination. Remedial alternatives are developed to address sources of contamination and all contaminated media at the site (e.g., soil, ground water). They can include various treatment technologies, on-site engineering controls, or both. Remedial alternatives are initially evaluated based on their overall effectiveness at addressing risks, the ability to implement the remedy at the site, and the estimated cost to both implement and maintain the remedy. A more detailed analysis of the best alternatives is then conducted using standard criteria as described below. RAFLUs can inform EPA's development and evaluation of potential remedial actions.

The Remedy Selection Process includes five main stages:

- remedial investigation/feasibility study
- remedy selection
- remedial design
- remedial action
- post construction

Contact:

E² Inc. - Vermont Office

Matt Robbie,
Project Manager

101 Staniford Road
Burlington, VT
05408

802.540.0243
mrobbie@e2inc.com
www.e2inc.com

Future Land Use Considerations in the RI/FS Stage

Community-based reuse assessments like the Chlor-Alkali Site Reuse Planning Process that are undertaken during the RI/FS stage provide an opportunity for community reuse goals to inform risk assessments, remedial action objectives, and the development and evaluation of remedial action alternatives for a site. Reuse discussions during the RI/FS stage can help communities, property owners, and local governments to develop realistic expectations for a site's reuse. Although they do not drive the process, community reuse goals are an important consideration during the RI/FS stage. The RI/FS stage is an optimal time for reuse and remedy considerations to intersect.

2 Remedy Selection

After the RI/FS is complete, the formal process of selecting a site's remedy begins. In this stage, cleanup levels for site COCs are finalized, and a site's final remedy is selected and described in document called a Record of Decision (ROD).

EPA has several general expectations for the selection of site remedies: principal threat wastes (can include liquids, areas contaminated with high concentrations of toxic compounds, and highly mobile materials) will be treated or removed; low-level wastes will be contained through the use of engineering controls; institutional controls will be developed to help maintain the protectiveness of engineering controls; ground water will be restored to beneficial use when practicable; and sites will be able to be returned to productive use.

During the remedy selection process, EPA conducts a detailed analysis of the remedial action alternatives identified in the Feasibility Study. There are nine criteria against which each remedial action alternative is weighed:

- Protection of Human Health
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs, which are state and federal cleanup standards)
- Long-term Effectiveness
- Reduction of Toxicity, Mobility or Volume through Treatment
- Short-term Effectiveness
- Implementability
- Cost (Capital and Operation and Maintenance)
- State Acceptance
- Community Acceptance



After remedial alternatives are weighed against the nine criteria, EPA selects a preferred alternative that is made available in a Proposed Plan for public comment. After public comments have been received and incorporated, EPA makes a final remedy selection when it issues the ROD. A site's ROD describes the remedy selected for a site, including relevant cleanup goals, reasonably anticipated future land uses, and remedial response costs.

Future Land Use Considerations in the Remedy Selection Stage

Future land use considerations are taken into account in three of the nine remedy selection criteria. First, under the protection of human health criterion, EPA uses its evaluation of RAFLU to establish remedial goals and to select remedies that will allow for those uses whenever possible. Second, collaboration among EPA, communities, and site stakeholders in the evaluation of future uses establishes realistic expectations for how a site can be used after cleanup, which helps to ensure that a site's remedy meets the long-term effectiveness criterion. Third, consideration of future land use also plays a central role in addressing the community acceptance criterion. It has been demonstrated at many Superfund sites that, when EPA works closely with communities and site stakeholders to determine a site's RAFLU, a high degree of community acceptance of the remedy is likely.

3 Remedial Design

Following issuance of the ROD, a site's remedy is designed and tested during the Remedial Design (RD) stage. Plans and specifications for a remedy's implementation are developed, the extent of a site's contamination is verified through confirmation sampling, and remedial technologies may be tested for effectiveness.

Future Land Use Considerations in the Remedial Design Stage

Community reuse goals that clarify how a site may be used in the future can influence the design of a site's remedy. Coordination between local governments, property owners, and EPA can help return a site to use as soon as possible by ensuring that reuse and remedial plans are compatible. Reuse plans can be refined to identify more specific site uses at this stage. For example, the location of buildings, utilities, parking areas, recreation areas, and other site amenities can be planned in greater detail.

4 Remedial Action

The implementation and construction of a site's remedy is completed during the Remedial Action (RA) stage. During construction, contaminated media are remediated to selected cleanup levels using the treatment, containment technologies, or both as described in the ROD. Institutional controls, such as land use restrictions, are needed to help maintain the protectiveness of remedies where waste remains in place above levels that would support unrestricted future use and unlimited exposure.



Future Land Use Considerations in the Remedial Action Stage

Once the RA stage begins, there may be opportunities to coordinate the timing of remedial and reuse plans. A site reuse plan that includes multiple phases of redevelopment can potentially help to shape the timing of remedial activities.

5 Post-Construction

After site remedies have been constructed, the post-construction phase of the remedial response pipeline begins. Post-construction activities at Superfund sites include operation and maintenance (O&M), long-term response activities (e.g., ground water remediation and monitoring), implementation of institutional controls (ICs), Five-Year Reviews, and site reuse.

Future Land Use Considerations for Post-Construction Activities

Post-construction activities are critical to maintaining the protectiveness of site remedies and frequently require the participation of parties other than EPA. Site owners, state and local governments, and responsible parties may all play a role in a site's long-term stewardship.

The implementation of ICs typically requires a high level of collaboration among multiple parties. ICs are non-engineered components of site remedies that limit the potential for human exposure to contamination at sites where waste remains in place at levels that do not allow for unrestricted future use and unlimited exposure. ICs limit land and resource use by producing information that helps modify or guide human behavior at a site. Examples of ICs include zoning restrictions, building or excavation permits, well drilling prohibitions, and easements and covenants restricting certain types of activities (e.g., residential land uses). While EPA is responsible for implementing ICs, land use restrictions such as zoning restrictions, and easements or covenants can only be established by local governments and property owners.

Five-Year Reviews, which are statutory site review requirements for sites where waste remains in place at levels that do not allow for unrestricted future use and unlimited exposure, require an evaluation of the compatibility of site uses and remedies. During a Five-Review, a site's remedy is evaluated to ensure that it remains protective of human health and environment based on current and potential future uses.

Superfund Remedial Response Process - Potential Timeline for the Chlor-Alkali Site

EPA evaluates all Superfund sites to determine what needs to be done to protect human health and the environment. There are five main stages to EPA's remedial response process; each stage provides an opportunity to incorporate future land use considerations. The diagram below illustrates a potential timeline for the Chlor-Alkali site's remedial response process and identifies key future land use considerations for each stage of the process.

2008	2009	2010	2011	2012	2013
<p>1 Remedial Investigation / Feasibility Study (RI/FS)</p> <p>Site conditions are evaluated. Data are collected to assess human health and ecological risks. A range of remedial action options are developed for a site's cleanup.</p>	<p>2 Remedy Selection / Record of Decision</p> <p>Cleanup levels are identified and a site's remedy is selected and documented in a Record of Decision (ROD).</p> <p>During the remedy selection process, a detailed analysis of remedial action alternatives are weighed against nine criteria.</p>	<p>3 Remedial Design (RD)</p> <p>Plans and specifications for a site's remedy are developed, the extent of contamination is confirmed through field sampling, and remedial technologies are tested for effectiveness.</p>	<p>4 Remedial Action (RA)</p> <p>Funding for site remediation is secured and construction of a site's remedy begins.</p> <p>Contaminated media are remediated to selected cleanup levels using remedial technologies described in the ROD.</p>	<p>5 Post Construction →</p> <p>Post-construction activities include:</p> <ul style="list-style-type: none"> - operation and maintenance - long-term response actions - institutional controls (ICs) - Five-Year Reviews - site reuse 	
<p>Future Land Use Considerations:</p> <p>Community reuse goals can help to inform risk assessments and remedial action alternatives.</p> <p>Reuse discussions can help to build realistic community expectations for a site's reuse.</p> <p>This stage is an optimal time for reuse and remedy considerations to intersect.</p>	<p>Future Land Use Considerations:</p> <p>Future land use considerations are taken into account within three of the nine remedy selection criteria:</p> <ul style="list-style-type: none"> - overall protection of human health and the environment - the long-term effectiveness of site remedies - a community's acceptance of the Agency's cleanup plans 	<p>Future Land Use Considerations:</p> <p>Coordination between local governments, property owners, and EPA can help return a site to use as soon as possible by ensuring that reuse and remedial plans are compatible.</p> <p>Reuse plans can be refined to identify more specific site uses at this stage.</p>	<p>Future Land Use Considerations:</p> <p>Timing of remedial construction and reuse plans can be coordinated.</p> <p>Phasing of site's redevelopment can help to shape the timing of remedial activities.</p>	<p>Future Land Use Considerations:</p> <p>Site owners, state and local governments, and responsible parties may all play a role in a site's long-term stewardship.</p> <p>Implementation of ICs requires collaboration among multiple parties. Many ICs can only be implemented by local governments or private property owners.</p> <p>Site can be returned to use.</p>	

Appendix F

Institutional Controls at Superfund Sites

Institutional Controls at Superfund Sites

What It Means when Contamination Is Left On-Site

At many Superfund sites at least some contamination will remain at the site when complete removal is not practical, feasible, or consistent with the cleanup goals. This is sometimes referred to as “waste in place.” When this occurs, EPA frequently requires both engineering controls and institutional controls to minimize the potential for human exposure or ecological impacts.

Engineering controls consist of physical barriers and other structures that are often constructed to isolate or contain remaining contamination. A common example is a protective cover system or “cap,” which can be designed to prevent direct contact with the contaminants and limit migration of contaminants through volatilization into the air or leaching into soils or ground water.

ICs serve to compliment the engineering controls or, in limited cases, can be used in lieu of engineering controls.



(Above) Construction of cap at the Camilla Wood Preserving Site in Camilla, Georgia.

What Are Institutional Controls?

Institutional controls (ICs) are administrative and legal tools commonly used at Superfund sites to minimize the chance that people and the environment will be exposed to contamination and to prevent damage to remedy components. ICs can help restrict site access, limit future land uses and certain activities such as soil excavation, and educate the public and potential users about site risks.

When Are ICs Used?

ICs may be implemented after contamination is first identified, while cleanup is underway, and whenever contamination will remain on site as part of a remedy. ICs must remain in place until cleanup goals are achieved or they are no longer needed.

Why Are ICs Important for Local Government and Communities?

ICs are an integral part of the cleanup:

Complete cleanup of a Superfund site is not always possible because of the complexity of a site’s contamination, cleanup costs, and limitations of cleanup technology. In these instances, ICs can play a key role in returning sites to safe and productive use by delineating which uses or activities can safely be permitted.

ICs and future site Uses:

Consideration of ICs presents an opportunity for local governments, site owners, residents, and other key parties to anticipate future use of the site and provide input on ICs that permit desired future uses to the extent possible.

IC selection and implementation:

Local governments and property owners may be directly involved in IC implementation. As a result, it is important to communicate with EPA local preferences and concerns about possible ICs while EPA is considering potential remedies for a site.

Types of ICs

Governmental controls:

Land use restrictions administered by state or local government through zoning ordinances, regulations, or permits.

Proprietary controls:

Restrictions grounded in private property law, such as restrictive covenants, or easements, that restrict specific uses of a property.

Enforcement tools:

Orders authorized by a judge or EPA, such as consent decrees or unilateral administrative orders, that compel parties to initiate certain activities, such as placing a restrictive covenant on a property.

Informational devices:

Documents, such as deed notices, or public advisories that convey information about contamination remaining on a Superfund site.

Examples of ICs in Use at Superfund Sites

Zoning

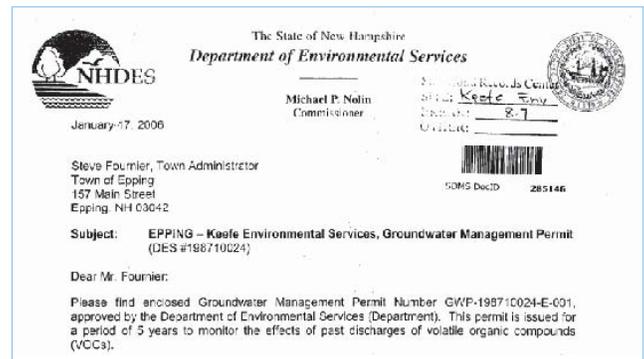
The City of Cedartown, Georgia, enacted an IC for the Cedartown Municipal Landfill Superfund site by amending its zoning ordinance and classifying the site as a “Special Use (Restricted) District.” This zoning classification prohibits any improvements on the site that would allow for human occupation; it also prohibits water well use for any purpose.

Covenants

Under conditions of a federal consent decree, the City of Ionia, Michigan, enacted an environmental restrictive covenant which serves as an IC for the Ionia City Landfill Superfund site. The covenant limits site uses to commercial and industrial only, and prohibits digging or the use of any ground water wells on the site.

Permits

A ground water management permit issued by the New Hampshire Department of Environmental Services to the Town of Epping serves as an IC for the Keefe Environmental Services Superfund Site by restricting ground water use in the area around the site.



A ground water permit issued by the State of New Hampshire is being used to support the remedial strategy for the Keefe Environmental Services Superfund site.

Opportunities for Improving IC Effectiveness

- Communicate local concerns and preferences regarding various types of ICs.
- Pursue IC strategies that reflect the specific characteristics and circumstances surrounding each site.
- Consider use of overlapping ICs or multiple ICs to improve chances that specific site protectiveness goals are met.
- Support the selection of ICs that will help ensure protectiveness of the site remedy and accommodate the anticipated future use of the site.
- Encourage cleanup agencies to carefully specify expectations and responsibilities for monitoring and enforcement of all ICs included as part of a remedial strategy.
- Perform routine monitoring to ensure that all IC components are functioning as intended and supporting remedial or related goals. Contact appropriate officials if you identify activity that appears inconsistent with site restrictions.

For more information, please contact:

E² Inc.
Matt Robbie,
Project Manager
802.540.0243
mrobbie@e2inc.com
www.e2inc.com

For more information, please contact:

E² Inc.

921 2nd Street, S.E.

Charlottesville, VA 22902

T: 434.975.6700 - F: 434.975.6701

www.e2inc.com

