

(Source: National Agricultural Imagery Program 2008)

Figure 3-11b. Filley Park Pond Habitat Improvement Concept

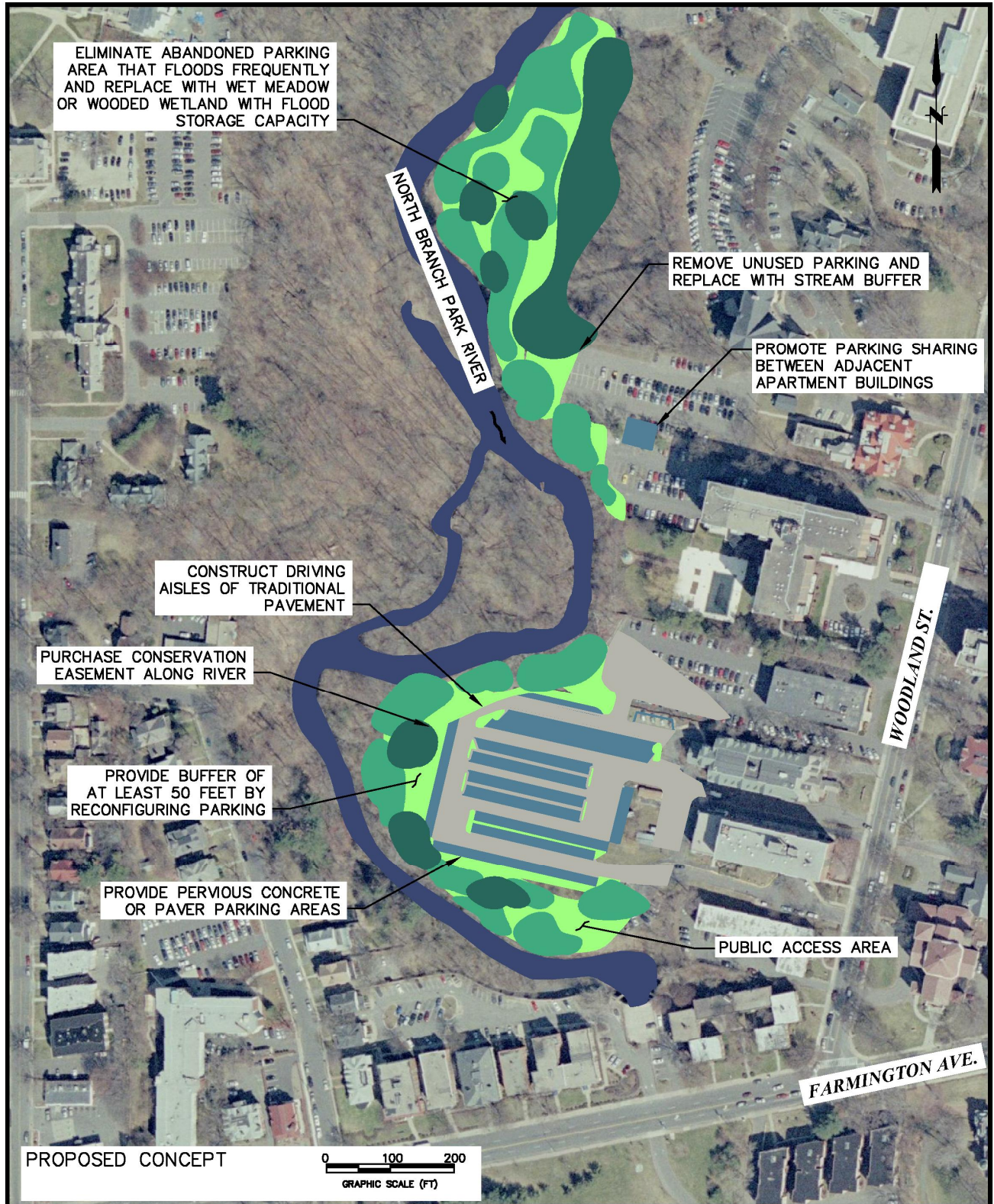




(Source: Metropolitan District Commission 2008; Photo Source: U.S. Geological Survey, 2008)

Figure 3-12a. Lower North Branch Park River – Existing Conditions





(Photo Source: U.S. Geological Survey, 2008)

Figure 3-12b. Lower North Branch Park River – Riparian Reforestation Concept



- Plant lawn and grass areas along the river with native shrubs and trees to improve habitat and stream shading, primarily along the east bank where lawn and parking dominate the riparian area. Adjacent to parking lots, seek a minimum riparian buffer of 30 feet of native trees and shrubs, plus 10 to 15 feet of native, mowable, low-growing grasses adjacent to parking areas for snow removal, stormwater management, and as a transition zone between parking lots and forested riparian areas.

3.3.9 Wash Brook Bank Erosion Repair

Significant bank erosion has occurred along Wash Brook near the intersection of Bloomfield Avenue (Route 189) and Cottage Grove Road (Route 218) in Bloomfield. This reach of Wash Brook is migrating laterally, with severe bank erosion at two locations. The upstream location, located on the right bank approximately 300 yards downstream of Cottage Grove Road, may soon undermine Bloomfield Avenue if erosion continues. The bank at the other location, approximately 280 yards downstream on the left bank, has been armored with concrete and gabion baskets, and debris dumping is present nearby.

Wash Brook Bank Erosion Repair	
Objectives:	Bank stabilization Infrastructure protection Sediment load reduction
Estimated Cost:	\$170,000 - \$360,000
Responsible Entities:	CTDOT Town of Bloomfield
Timeline:	Immediate

Stream restoration techniques are proposed to address the ongoing bank erosion in these two areas. Potential restoration efforts to address the problem would require coordination between the Town of Bloomfield, the Connecticut Department of Transportation, and private property owners. The proposed stream restoration concepts (*Figure 3-13a through Figure 3-13d*) include the following elements:

- Obtain property easements to:
 - Ensure construction and future maintenance access to the project sites.
 - Prevent landowners from removing or otherwise impacting management measures in the future.
- Implement stream restoration measures at the upstream location, which may include:
 - Redirective techniques, such as a transverse vane or stream barbs to direct stream energy away from the eroding bank (stream barbs are shown in the concept sketch). The purpose of the proposed redirective techniques is to transfer the stream energy at the outer bank of the river toward the center of the river or the opposite bank.
 - Stabilize the roadway embankment. An engineered structure such as a retaining wall or gabion wall may be necessary since little area is available between the river and the edge of the roadway and because there will be very little tolerance for further migration of the stream channel following construction. The toe of the wall will also need to be protected against scour and ice damage. Additionally, these techniques should be extended beyond the eroded area, especially downstream, to avoid impacting the residences that abut the river.
 - Increase the riparian buffer width on the opposite bank, since redirecting stream energy could cause stream migration in the opposite direction over time.

No structures or infrastructure are present, so migration in this direction could be tolerated. Enhanced riparian vegetation could also reduce further migration of the stream channel and provide wildlife habitat benefits.

- Downstream location:
 - Remove dumped landscaping debris and trash
 - Consider implementing redirective techniques when additional stabilization becomes necessary in the future

3.3.10 University of Hartford Dam Removal

A dam on the University of Hartford campus serves as the first obstruction upstream of the North Branch Park River conduit entrance. The dam is an earth embankment structure with a campus roadway along its crest. The river is conveyed through the dam via eight large corrugated metal pipes.

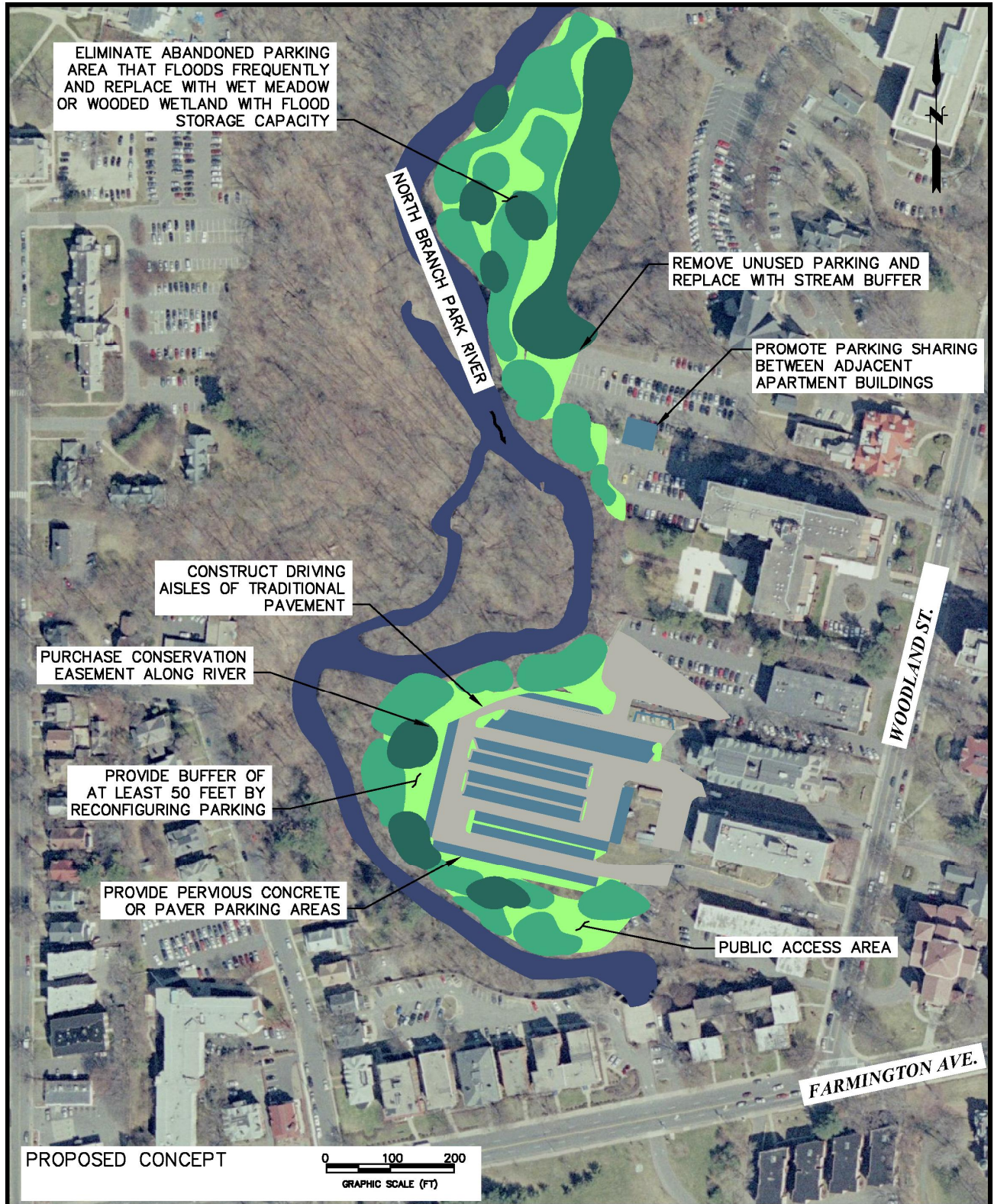
University of Hartford Dam Removal	
Objectives:	Fish passage Riparian buffer restoration
Estimated Cost:	\$2,000,000 - \$4,000,000
Responsible Entity:	University of Hartford
Timeline:	2 to 5 years

The pond today, has very little open water due to the accumulation of river sediment over the past half a century. The dam has reached its useful design life and is now beginning to fail. It was designed in the 1950s using a technology that was prevalent at the time. The main spillway and drain pipes through the dam are composed of corrugated metal pipe or CMP. CMPs have been observed to have a useful design life of approximately 50 years. They fail by corrosion of the metal and therefore loss of structural integrity. The piping in the dam is beginning to fail due to corrosion.

According to the CTDEP Fisheries Division, the dam also prevents passage of resident (non-migratory) fish, including trout that are present, as well as migratory eel that can pass through the conduit from the Connecticut River. Several large parking lots are also located along the right bank of the river for much of its length upstream of the impoundment.

The University of Hartford is currently considering options for repair, replacement or removal of the dam, with the goal of ensuring a reliable structure with a minimum 50-year design life. An opportunity exists to reinforce the University's relationship to the river in a positive way by reducing flood potential and improving the ecological health of the river. A dam removal option that includes river and riparian corridor restoration could enhance ecological conditions along the North Branch Park River, including restoration of fish passage to upstream areas of the river and its major tributaries.

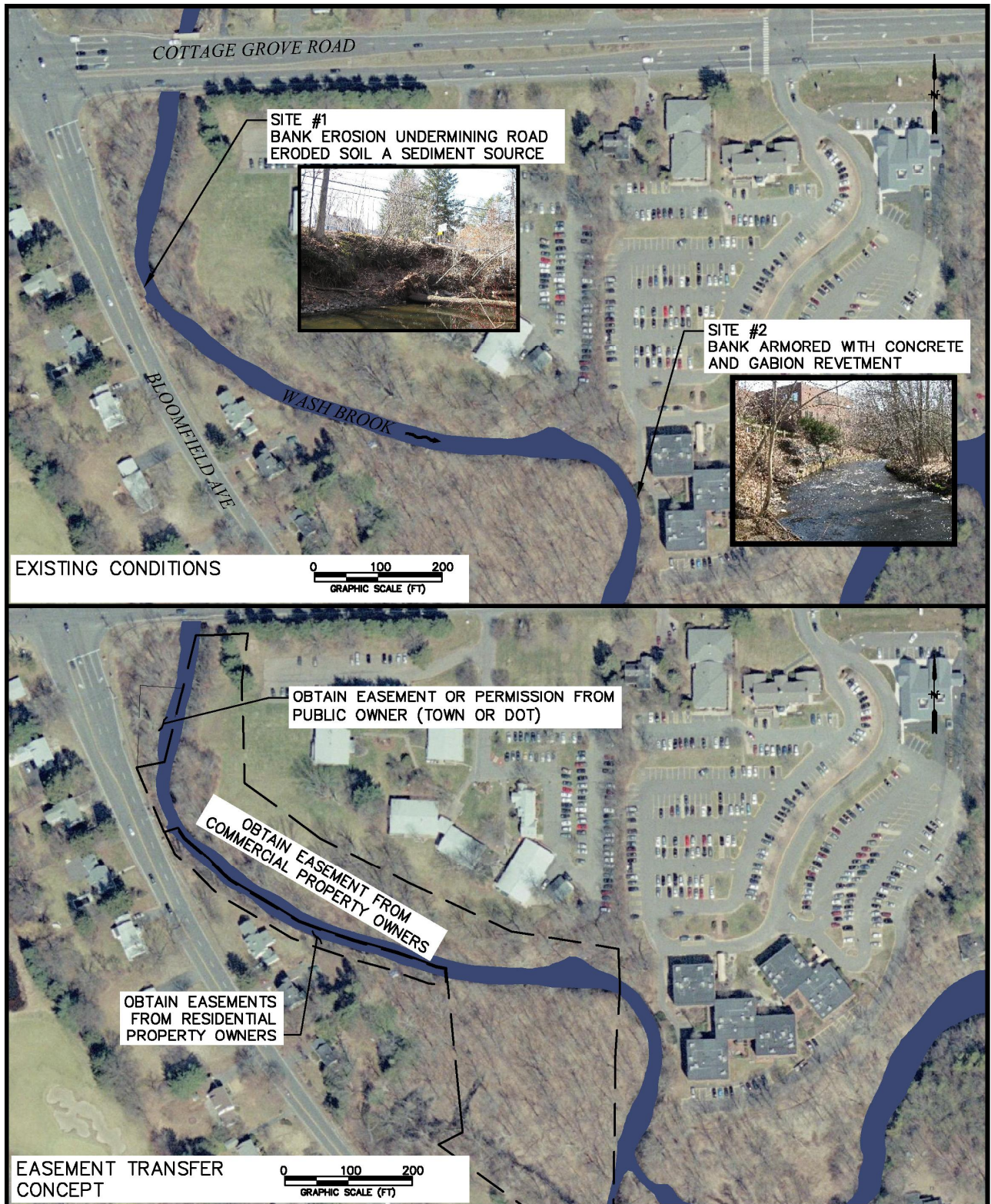
Dam removal provides other advantages as well. The riparian buffer through the campus is impacted by encroachments from campus development. Removing the dam and accumulated sediment would decrease the elevation of the water surface of the river through a portion of the campus, resulting in a narrower stream channel. The exposed bank area provides additional, undeveloped land that can be planted with native trees and shrubs to restore and enhance the riparian buffer.



(Photo Source: U.S. Geological Survey, 2008)

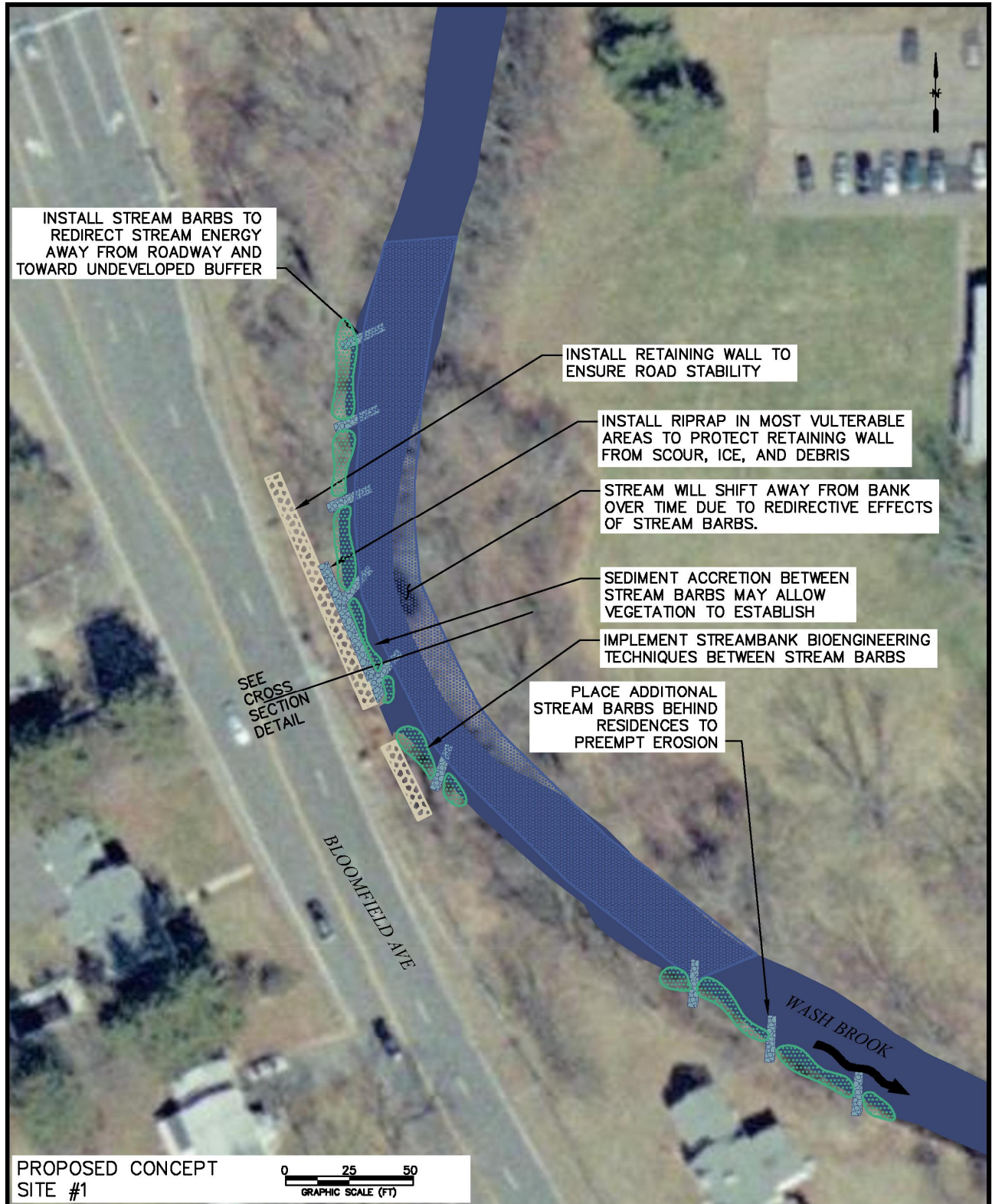
Figure 3-12b. Lower North Branch Park River – Riparian Reforestation Concept





(Source: Metropolitan District Commission 2008; Photo Source: U.S. Geological Survey, 2008)

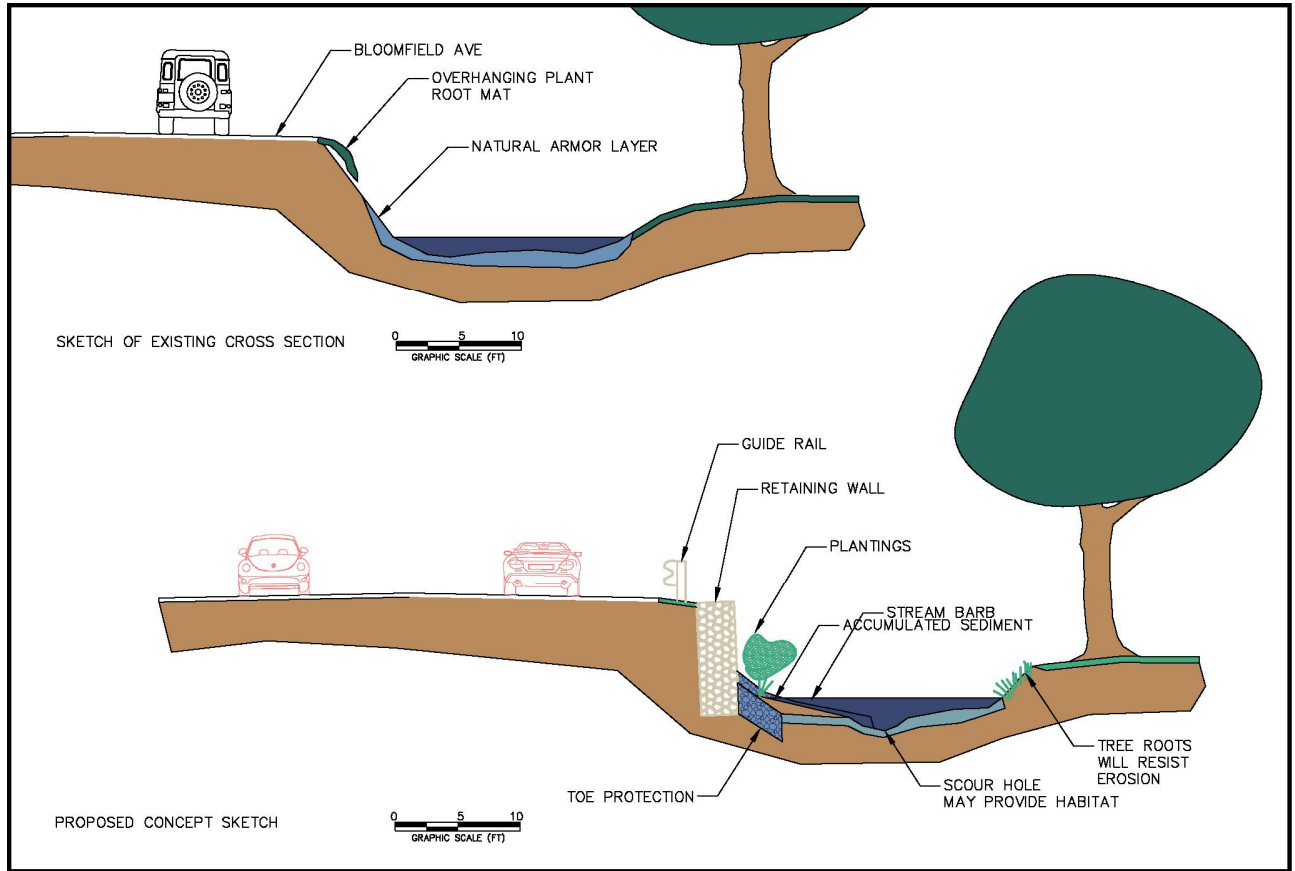
Figure 3-13a. Wash Brook Bank Erosion – Existing Conditions Plan and Easement Transfer Concept



(Photo Source: U.S. Geological Survey, 2008)

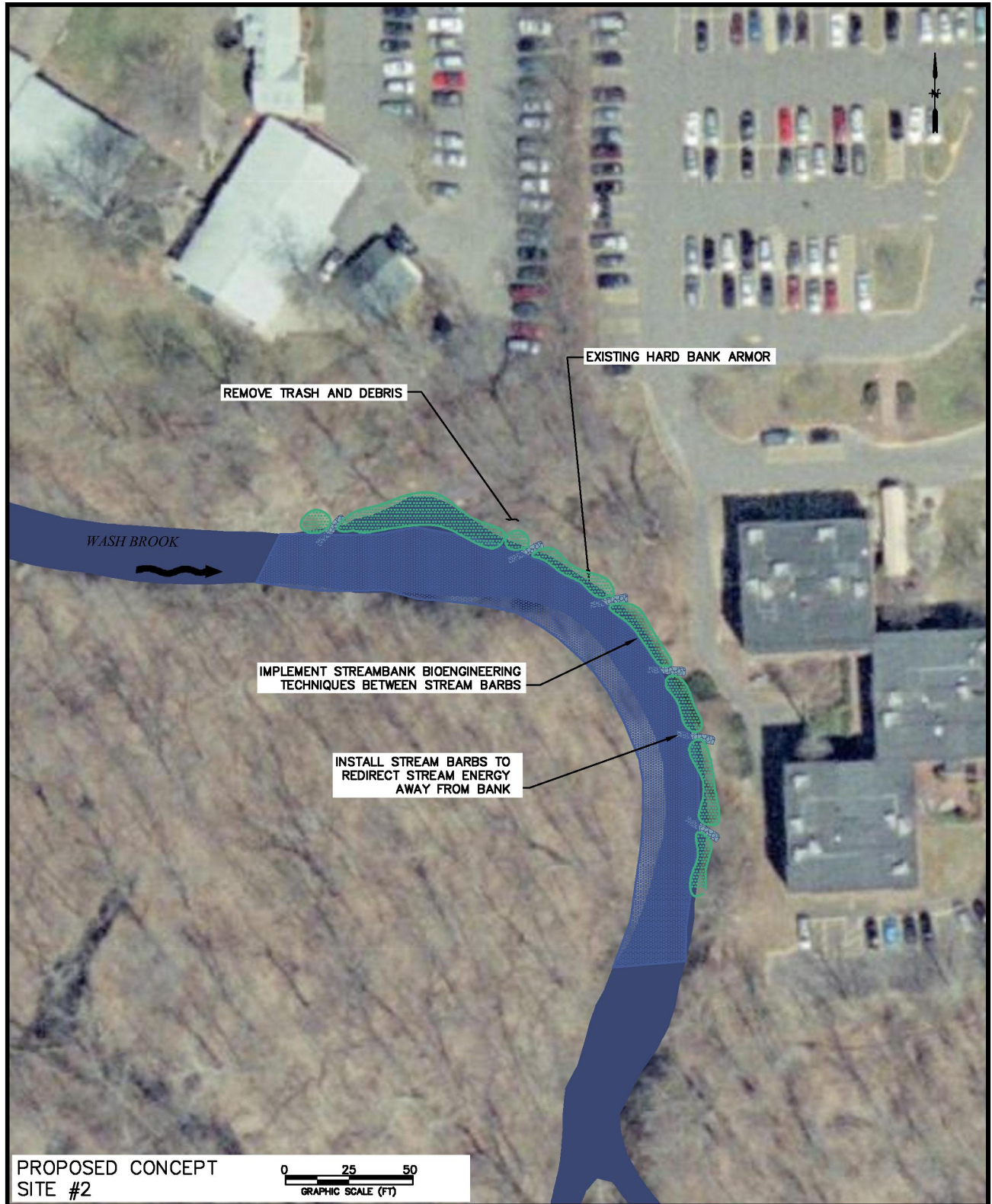
Figure 3-13b. Wash Brook Bank Erosion Site #1 Bank Stabilization Concept





(Source: Visual observations recorded in field, 2010)

Figure 3-13c. Wash Brook Bank Erosion Site #1 Bank Stabilization Concept Existing Conditions and Proposed Concept Cross Sections



(Photo Source: U.S. Geological Survey, 2008)

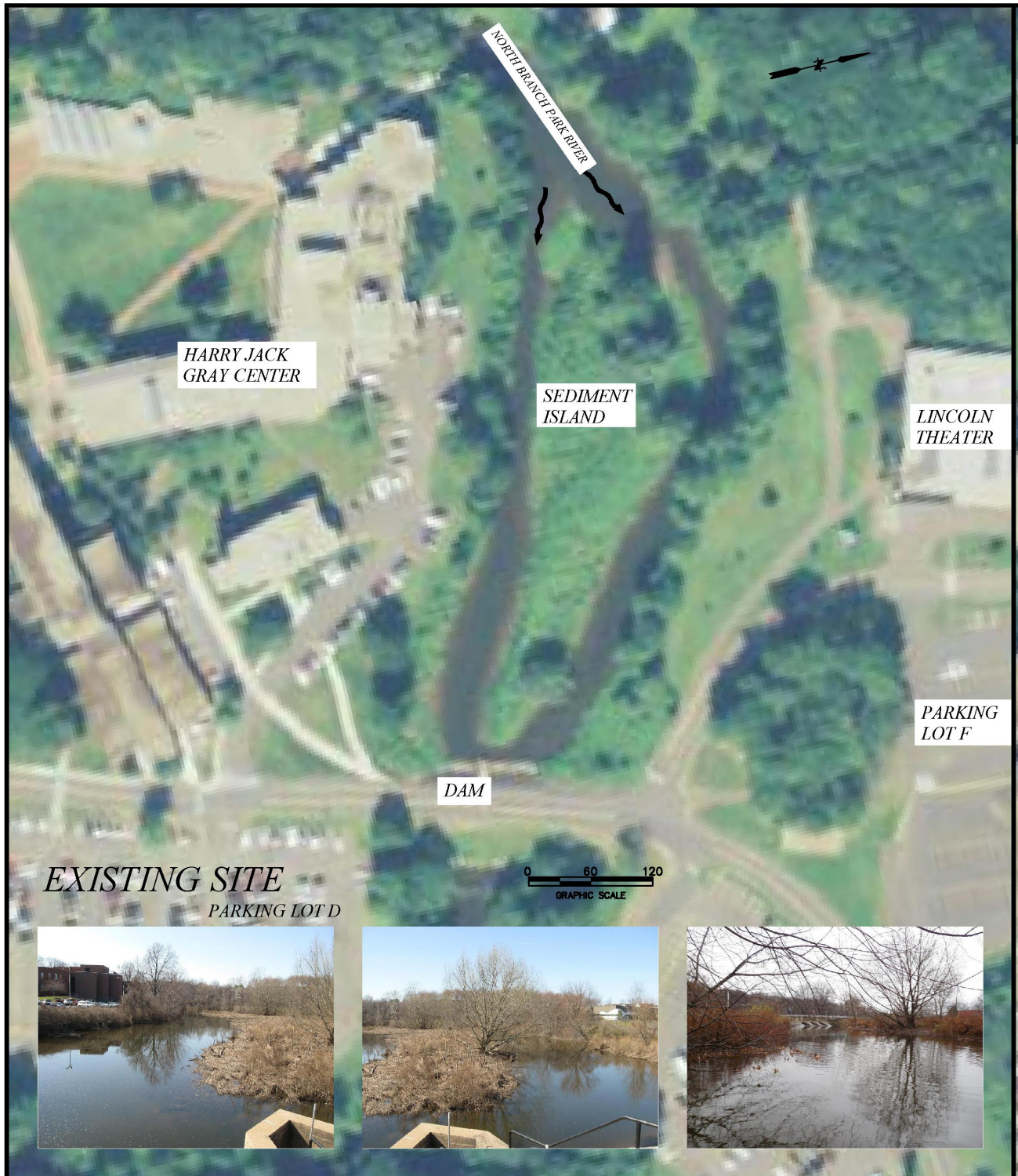
Figure 3-13d. Wash Brook Bank Erosion Site #2 Bank Stabilization Concept



Removal of the University of Hartford dam poses several challenges, including sediment management, potential flooding impacts, vehicle traffic and pedestrian access, and provisions for existing utility lines. Of these, sediment management is perhaps the most significant issue. The pond is full of sediment that will move downstream if the dam is removed. The sediment therefore needs to be managed appropriately depending on the degree of contamination in the sediment.

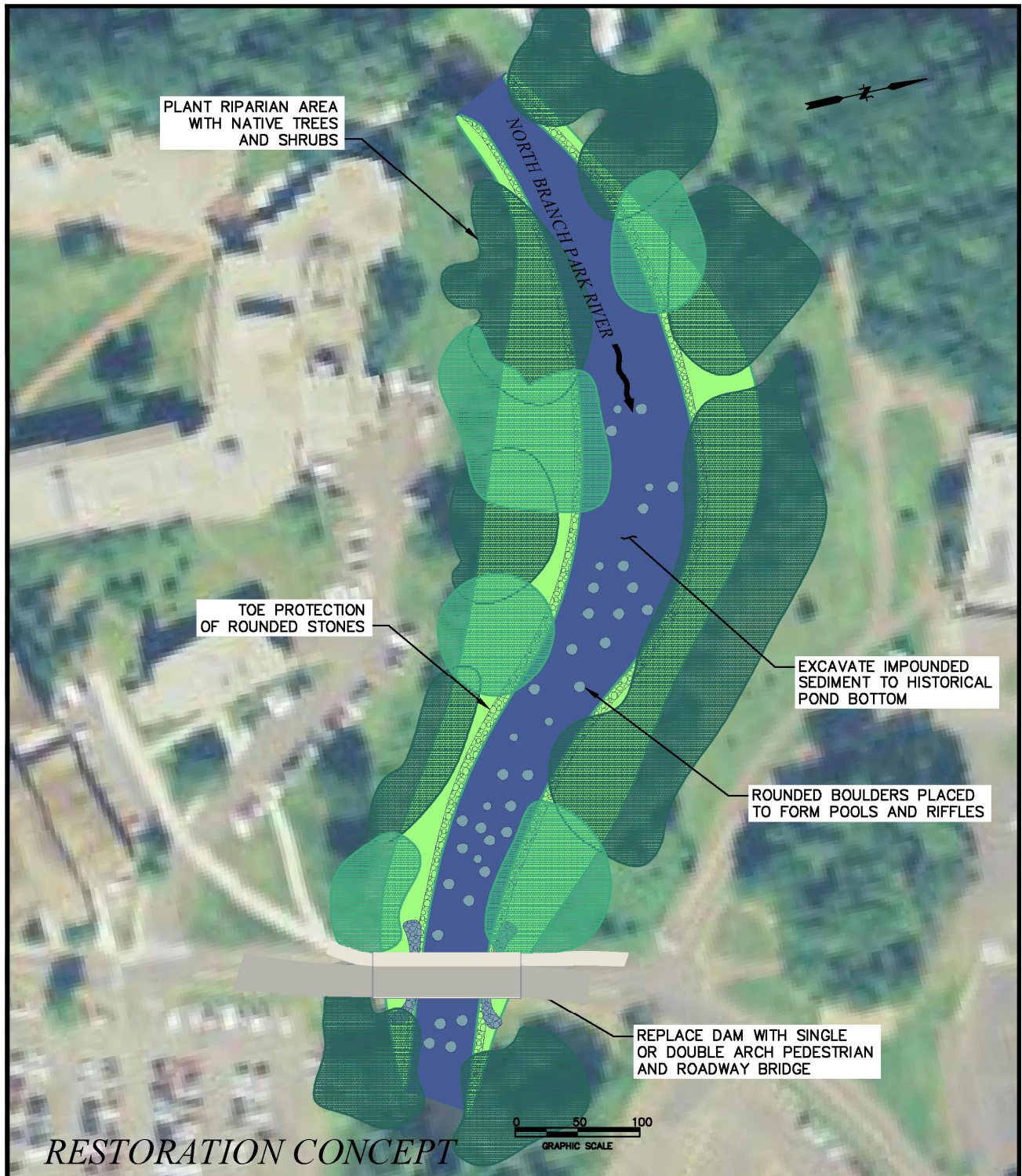
Figure 3-14a and Figure 3-14b illustrate design concepts that would serve river restoration and ecological goals for the project. Concepts that should be considered include:

- Stream Restoration Improvements
 - Rather than repair the dam, remove it, along with the accumulated sediment.
 - If the dam is to remain in-place, modify at least one of the culverts that pass through the dam, to provide passage to resident fish and migratory eel.
 - If the dam is removed but the sediment is managed in-place rather than through removal, facilitate fish and eel passage around, over, or through the obstruction.
 - Remove or rebury an exposed conduit running across the stream
 - Consider supplementing or replacing hard armor along the stream banks with stream bank bioengineering where movement of the stream might be tolerable.
- Riparian Buffer Improvement
 - If the dam and sediment are removed, plant the exposed banks with native trees and shrubs to increase the riparian buffer width.
 - Plant grass areas along river with native shrubs and trees to improve habitat and stream shading. Adjacent to parking lots, seek a minimum riparian buffer of 30 feet of native trees and shrubs, plus 10 to 15 feet of native, mowable, low-growing grasses adjacent to parking areas for snow removal, stormwater management, and as a transition zone between parking lots and forested riparian areas.
 - When parking lots are resurfaced or repaved, reconfigure parking areas away from the river, providing potential areas for riparian buffer reforestation. There are several areas along the river where additional stream buffer can be provided without loss of parking through minor lot reconfiguration.
- Public Access
 - Provide a greenway along the river to encourage access, such as that included in a proposal for the University's Master Plan Update. The greenway trail should be routed to avoid disturbing ecologically sensitive areas of the river corridor including wetlands, floodplains, sensitive wildlife areas and existing or planned open space.
 - Incorporate LID and other sensitive design elements into the greenway trail design including maintaining and/or restoring native riparian vegetation along the stream bank, appropriate setbacks/buffers for wetlands and streams, designated access points to the river to maintain as much natural riparian habitat as possible, use of permeable pavement or other materials to reduce runoff, and use of other LID techniques.



(Source: National Agricultural Imagery Program 2008)

Figure 3-14a. University of Hartford Dam – Existing Conditions



(Source: National Agricultural Imagery Program 2008)

Figure 3-14b. University of Hartford Dam Removal Concept

3.3.11 Upper North Branch Park River

The upper reaches of the North Branch Park River suffer from culverting, stream bank erosion, uncontrolled stormwater discharges, and impacted riparian buffers. The downstream reach in this portion of the river, located across Mark Twain Drive from the University High School of Science and Engineering (designated as reach NBPR-11 in the watershed field inventories), is severely degraded, likely by high velocity flows discharging from a culverted reach that passes below Weaver High School and associated athletic fields along Granby Street. Immediately downstream of the culvert discharge, the river is contained within a concrete channel. Immediately upstream of the culvert entrance, the City of Hartford recently removed riparian vegetation and increased the channel capacity to reduce flooding around the culvert entrance.

The current degraded conditions in this area provide opportunities for significant improvements from future restoration efforts. The following restoration activities are recommended for this area (note that design sketches and costs were not developed for these concepts due to the broad scope of the potential improvements and the preliminary nature of these recommendations):

- Stream Daylighting
 - Remove the concrete lining of the channel downstream from the culvert discharge.
 - Daylight the stream through the culverted section to the extent feasible. Daylighting of the entire length of stream channel to improve flood capacity and restore aquatic and riparian habitat would only be feasible as part of major capital improvements to Weaver High School.
 - Replace the culvert below Mark Twain Drive to improve stream continuity. During the stream inventories performed as part of the baseline watershed assessment, it appeared that the culvert may prevent passage of some aquatic organisms.
- Culvert Velocity Dissipation
 - Provide energy dissipation for discharges from the culverted reach to reduce flow velocities at reach NBPR-11, assuming that complete daylighting of the stream is not feasible.
- Riparian Restoration
 - The downstream portion of reach NBPR-19 is severely impacted by recent disturbance and would benefit from riparian restoration.
 - Reach NBPR-11 is severely impacted by trash, invasive species, bank erosion, and downcutting. This reach could benefit from trash cleanup, invasive species removal, and bank stabilization.
- Stormwater Improvements
 - A housing development discharges stormwater to the upstream portion of reach NBPR-19, and several stormwater outfalls discharge to the culverted reach of the river near its upstream end. Stormwater retrofits should be considered for these stormwater discharges to provide treatment and detention.