

**SUMMARY**  
**SEASONAL SWIM DOCK ALTERNATIVES ANALYSIS**

Connecticut River at Dartmouth College

MMI #4459-01

January 21, 2011

**Introduction**

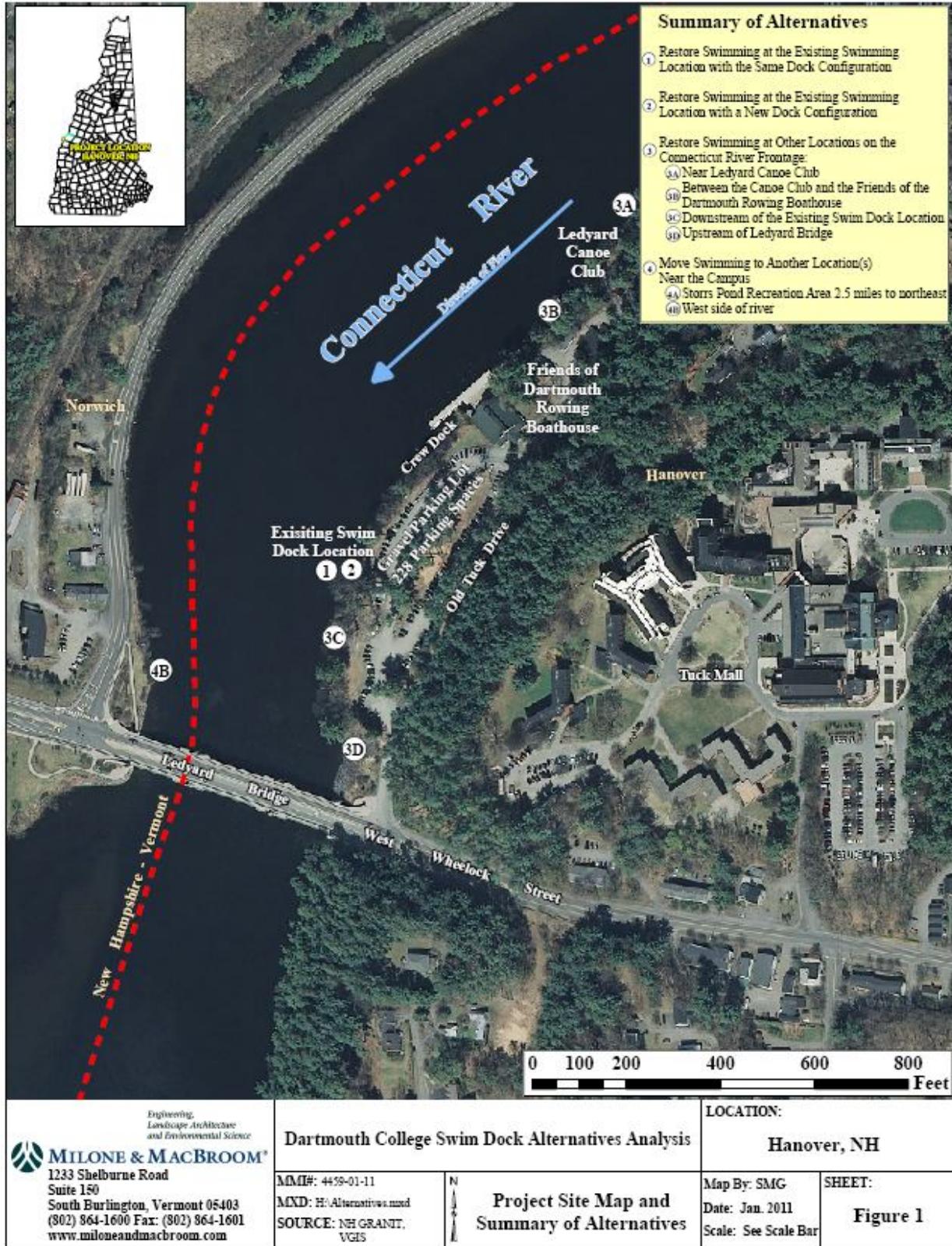
On June 23, 2010, the Dartmouth College student swim dock area located on the Connecticut River was closed due to concerns for swimmer safety. The site-specific conditions of concern include excessively deep water (18 to 25 feet), a rapid drop in depth moving away from the riverbank, high turbidity leading to low visibility (one to two feet), varying flow velocity due to changes in hydroelectric operations at Wilder Dam and storm events, and submerged debris. All of these factors reduce swimming safety and complicate lifeguard rescue should it be needed.

An alternatives analysis has been performed to evaluate ways to reduce swimming risks working toward the ultimate goal of reopening a safer swim dock in summer 2011. The alternatives included: (1) Restore swimming at the existing swim dock location with the same dock configuration; (2) Restore swimming at the existing swimming location with new dock configurations; (3) Restore swimming at another location on the Connecticut River frontage; and (4) Move swimming to another location near the campus (Figure 1). Each of these options was evaluated and presented in a report dated January 21, 2011 (see summary of findings in Table 1). Among the features evaluated were slope, water clarity, river hydraulics, floating and submerged debris, modified dock configurations, structural components, multiple site uses, land availability, site access, permitting requirements, and operational considerations. This document summarizes the preferred alternative.

**The Preferred Alternative**

The preferred alternative selected by the project team is to move the swimming dock approximately 200 feet downstream of the existing swim dock location and install the existing dock. This location is just downstream of the apex of a meander bend in the river channel and appears to be locally sheltered from flows and winds as the main current pulls off of the east bank toward the center of the channel (Figure 2). This sheltered setting has a bit more sediment buildup on the bed than other areas and is likely to have less large woody debris moving downriver than closer to the main current.

Although the existing riverbank is steep at this location, there is ample space to create an angled approach trail with a gentler grade to improve access. A tiered approach could be established to integrate the trail and river, reduce the slope of the existing gangway to access the docks, and establish Americans With Disabilities Act (ADA) facilities. The proposed location generally provides more space and access opportunities than the existing swim dock location.



**Table 1: Summary of Alternatives Analysis.**

SWIMMING SAFETY OBJECTIVES →												
ID	ALTERNATIVES ↓	Shallower water	Gentler channel bottom side slope	Less turbidity	Weaker currents	Less debris	Improved swimmer access	Improved lifeguard access	Ease of maintenance	Relative implementation cost	Relative permitting complexity	Notes
1	Restore Swimming at the Former Swimming Location with the Same Dock Configuration								√√	Low	Low	Only way to improve swimming safety here is to improve monitoring and operations. Real-time monitoring for flow, temperature, turbidity, and E. Coli recommended for all alternatives.
2A	Restore Swimming at the Former Swimming Location with a Rectangular Dock with an Enclosed Inner Swim Area				√	√√	√√√		√	Moderate	Moderate	Bottom anchors likely needed with shore attachment bars. Fencing to block debris not recommended as it will be prone to clogging.
2B	Restore Swimming at the Former Swimming Location with a U-Stepped Dock with a Partially Enclosed Swim Area				√	√√			√√	Low to Moderate	Moderate	Opening on river side will ease maintenance, allow lifeguard boat/board access, and reduce cost.
2C	Restore Swimming at the Former Swimming Location with a Linear Dock Along Shore with Retractable Ends Perpendicular to Shore				√	√√	√√		√√	Low	Low to Moderate	Retractable arms would be extended when dock open and swimming safer. Retracting arms when dock closed and current higher could reduce anchoring needs.
3A	Restore Swimming on the Connecticut River Frontage Near Ledyard Canoe Club									n/a	n/a	Not considered as currents reported to be stronger in this location than at former swim dock. Similar if not more risk with less access.
3B	Restore Swimming on the Connecticut River Frontage Between the Canoe Club and the Friends of the Dartmouth Rowing Boat House	√								n/a	n/a	Not considered as located in an area with high crew boat traffic. Swimming risk is higher in this location.
3C	Restore Swimming on the Connecticut River Frontage Downstream of the Former Swim Dock Location	√			√	√	√√√	√√	√√√	Moderate	Moderate	Minor benefits with this more sheltered swimming location exist. Additional space is available to create a safer access with ADA access. Monitoring and improved signage are recommended.
3D	Restore Swimming on the Connecticut River Frontage Immediately Upstream of Ledyard Bridge	√	√		√	√	√√	√	√√	Moderate	Moderate	Not desired given proximity to stormwater outfall, Ledyard Bridge, and debris field upstream of bridge.
4	Move swimming to non-Connecticut River location(s) near the campus	√√√	√√√	√√√	√√√	√√√	√√√	√√√	n/a	Low	n/a	Although this alternative virtually eliminates swimming risks, it is socially not desired due to the need to travel and required planning and time.

**Key**

- Objective not met at all.
- Alternative anticipated to have little benefit towards meeting objective.
- Alternative anticipated to create improvements that substantially meet objective.
- Alternative anticipated to have major benefits and fully meet objective.



**Figure 2: Upstream view of the preferred new swimming location that is approximately 175 feet downstream of the existing swim dock location. This area is more sheltered from the main current as it is downstream of the meander apex, and the main current is in the center of the channel (to the left side of the photograph).**

The following list highlights the recommendations for the student swim dock area.

- Move the existing swimming dock 200 feet downstream into the more sheltered location.
- Establish a monitoring station along the riverfront area in the vicinity of the swim docks to track water velocity, temperature, turbidity, and *E. Coli*. Thresholds for dock closure should be initially set and refined once the monitoring station is functioning.
- Install improved signage to display dock closures, monitoring results, and the primary risks that exist with swimming at the Dartmouth riverfront.
- Reconfigure the dock access to reduce the slope of the trail and gangway and create a safer approach to the swimming area.
- Establish a protocol for regular monitoring for and removal of debris in the swimming area.
- Improve the anchoring mechanism for the rope designating the swimming area so it is not swept downstream during high flows.

The preferred alternative has the following advantages over the existing swim dock location.

- A sheltered setting creates a weaker water current for longer periods of time.
- Less debris is likely to float downriver and travel through the swim area.
- There is a slightly lower water depth and gentler channel bottom slope in the swimming area.
- There is a slightly less steep riverbank and more space in the area to improve access.
- It is easier for college patrol officers to monitor from the existing parking lot and Ledyard Bridge.

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