Montgomery County Outdoor Classroom and Learning Landscape Conceptual Master Plan

Prepared by

Community Design Assistance Center

Prepared for the Montgomery County Public School System and

the Christiansburg-Montgomery Izaak Walton League Chapter

June 2010

Project Team

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Acknowledgements

Chris Barbour	Senior Conservation Specialist, Skyline Soil and Water Conservation District
Ed Brooks	Library Assistant, GIS, Virginia Tech
Danielle Courtois	Environmental Scientist, Blue Ridge Office - U.S. Army Corps of Engineers
Patricia Gaudreau	Science, Health, Physical Education and Drivers Education Supervisor, Montgomery County School System (MCPS)
Andrew McCoy	Assistant Professor, Building Construction, Virginia Tech
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Spencer Winfry	Fish Commissioner, Izaak Walton League, Christiansburg-Montgomery Chapter

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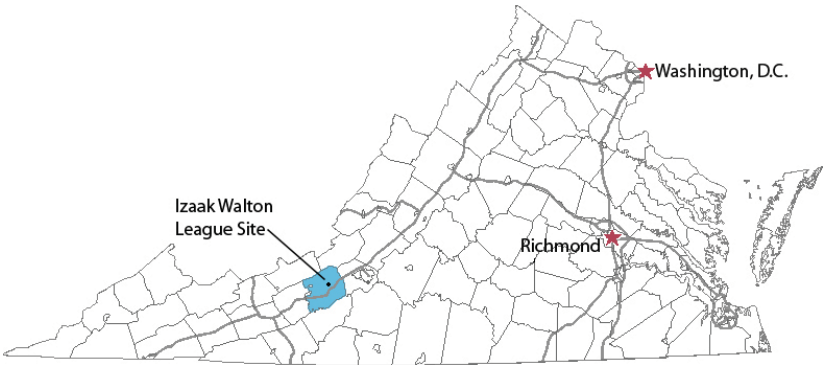
Project Description

Christiansburg-Montgomery Izaak Walton League Meeting House.



State context map showing Montgomery County and the approximate location of the Christiansburg-Montgomery Izaak Walton League site.

The Izaak Walton League (IWL) is a national organization "formed in 1922 to save outdoor America for future generations. The League's founders, who were avid anglers, chose to name the organization after Izaak Walton, the 17th century author of The Compleat Angler, one of the most famous books on fishing. The IWL is one of the earliest conservation organizations to set an aggressive course to defend wild America by changing public policy. Almost every major, successful conservation program that America has in place today can be traced directly to a League activity or initiative.

Throughout more than 270 communities, IWL chapters advance the mission of the organization - restoring watersheds, reducing air pollution, fighting litter, protecting wildlife habitat and open spaces, and instilling conservation ethics in outdoor recreationists." (http://www.iwla.org/index.php?id=9).

In line with this mission, the Christiansburg-Montgomery Chapter of the IWL has initiated a partnership with the Montgomery County Public School System (MCPS) to utilize portions of their site as a county-wide outdoor classroom. The site's central location in the county as well as its existing resources and opportunities make it an excellent site for watershed education. Here county teachers can engage their students in hands-on learning opportunities and instill a love of and appreciation for the natural environment, particularly watersheds and fishing. Some key site attributes include a spring, a fish run, two ponds, a stream, a wetland area, and a small trail system. Site habitat areas include wetland, meadow, stream, spring, pond, and wooded hillslope. Areas of study/interest that could be addressed on the site include (but are not limited to):

- Watersheds
- Water Quality
- Weather
- Plant Identification
- Geology
- Soils
- Robotics
- Geocaching

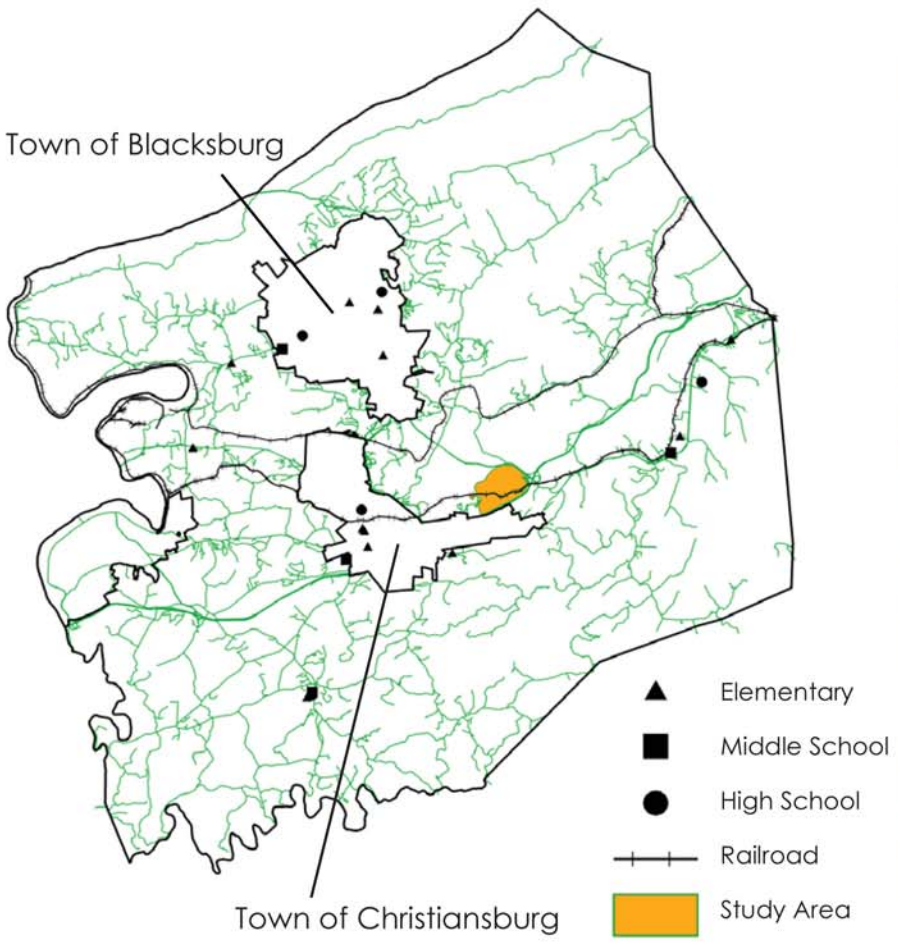
Upper pond stocked with trout at the Christiansburg-Montgomery Izaak Walton League site.

The Community Design Assistance Center, an outreach Center in the College of Architecture and Urban Studies, was asked to assist Montgomery County Public Schools in preparing a conceptual site master plan for the site. The conceptual master plan looks to enhance safe and ADA accessible access to site resources and develop additional learning opportunities on site as well. Support facilities and structures such as ADA restrooms, adequate bus turn-arounds, parking, and storage are also addressed.

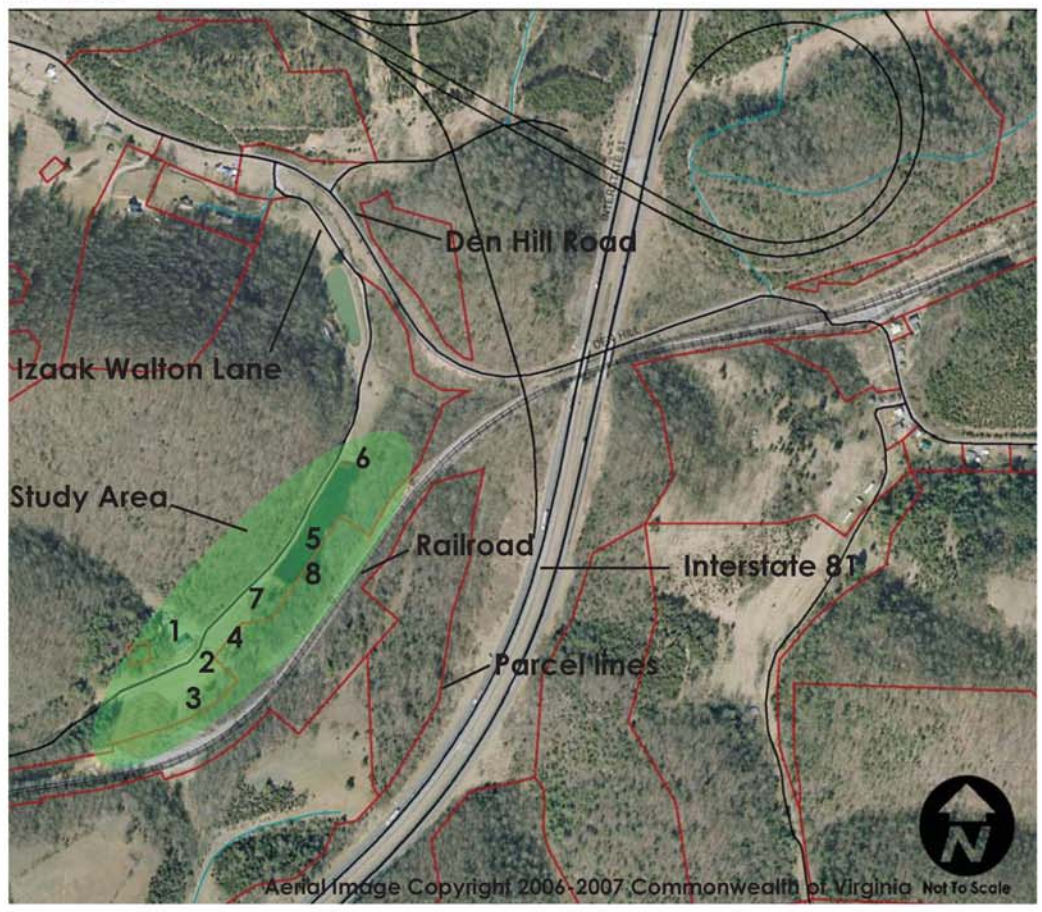
Montgomery County Outdoor Classroom & Learning Landscape

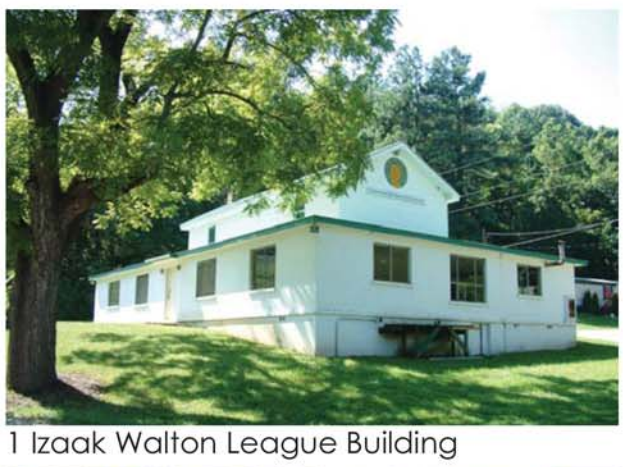
Contextual Analysis and Photo Inventory

Distribution of Montgomery Public Schools



Context




1 Izaak Walton League Building


2 Shelter and Open Field


3 Spring


4 Fishery


5 Pond


6 Stream


7 Wetland


8 Trail

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College of Architecture and Urban Studies
Virginia Polytechnic Institute and State University

Design Process

Chris Barbour (left), Spencer Winfry (center), and CDAC team members (right) discuss site hydrology.

CDAC team member Yining Xu (right) presents initial analysis information to Patricia Gaudreau (left).

The CDAC design team began their role in the outdoor classroom project in September 2009 with an initial site visit and meeting with Patricia Gaudreau, Montgomery County Public Schools Science, Health, Physical Education, and Driver's Education Coordinator and IWL elected officers Dr. Thomas Sitz (IWL President) and Spencer Winfry (IWL Secretary). During this initial meeting, those assembled discussed the vision and long-term goals for the new partnership between IWL and Montgomery County Schools, utilizing the IWL site as an outdoor classroom. Design parameters were discussed with the CDAC design team and some site history was shared.

The CDAC team returned in September to conduct a site inventory and analysis, photographing the site and taking field notes. The CDAC team also met on site with Chris Barbour of the Skyline Soil and Water Conservation District to discuss wildlife, habitat, and improving access to the spring head.

Preliminary conceptual design alternatives were prepared for the site and presented in early November at the Montgomery County School Systems Field Day at Christiansburg High School. The CDAC team was able to garner some feedback from county teachers related to the proposed concepts.

Following this meeting, the CDAC team met with representatives from the US Army Corps of Engineers and the Virginia Department of Environmental Quality to discuss opportunities to enhance the wetland on site. After this meeting, the CDAC team presented the preliminary design concepts to the Izaak Walton League at their November monthly meeting.

Based on feedback from Montgomery County teachers, the client team, general members of the Izaak Walton League, and state agency staff, the CDAC team refined the conceptual alternatives into a final conceptual master plan. This plan was presented March 4th, 2010. This short supporting report was prepared to document the design process and describe the proposed conceptual design concepts for the outdoor classroom.

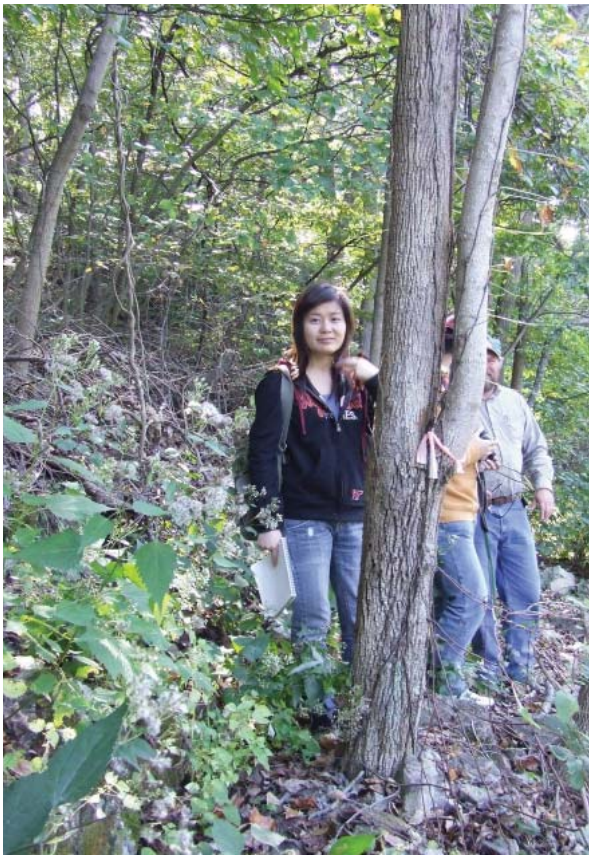
Site Inventory & Analysis

CDAC design team member Daniel Ling investigates the existing wetland.

CDAC team members look at the spring on site with Chris Barbour (left), of the Skyline Soil and Water Conservation District.

The CDAC design team made several site visits to examine the existing conditions of the site and identify opportunities for design enhancement or improvement. As a part of the site analysis process, the CDAC team met with agency experts to discuss issues related to karst topography, the spring, and wetlands. The CDAC team prepared a series of inventory and analysis drawings that addressed elements such as existing site features, topography, drainage patterns, land type (habitat), and views to enhance or screen. Information from the inventory and analysis drawings aided the CDAC design team in the formation of preliminary conceptual designs for the site. Site images depicting different qualities and site educational opportunities can be found on pages 5 and 6. A composite drawing of the inventory and analysis, with accompanying narratives, can be found on the pages 7 through 9.

CDAC team member Daniel Ling watches water as it exits the trout pond and enters the stream bed on the northern portion of IWL property.



CDAC team member Yining Xu (center) explores the narrow, wooded trail adjacent to the trout pond.

Stream bed and riparian vegetation on the northern portion of IWL property.

View of the trout pond looking north (toward Den Hill Road).

View of the hillslope where the existing wooded trail lies.

View of the trout pond looking toward the wetland area (south).

The stream flows through the eastern edge of the wetland before entering the trout pond.

Existing covered shelter and horseshoe pits.

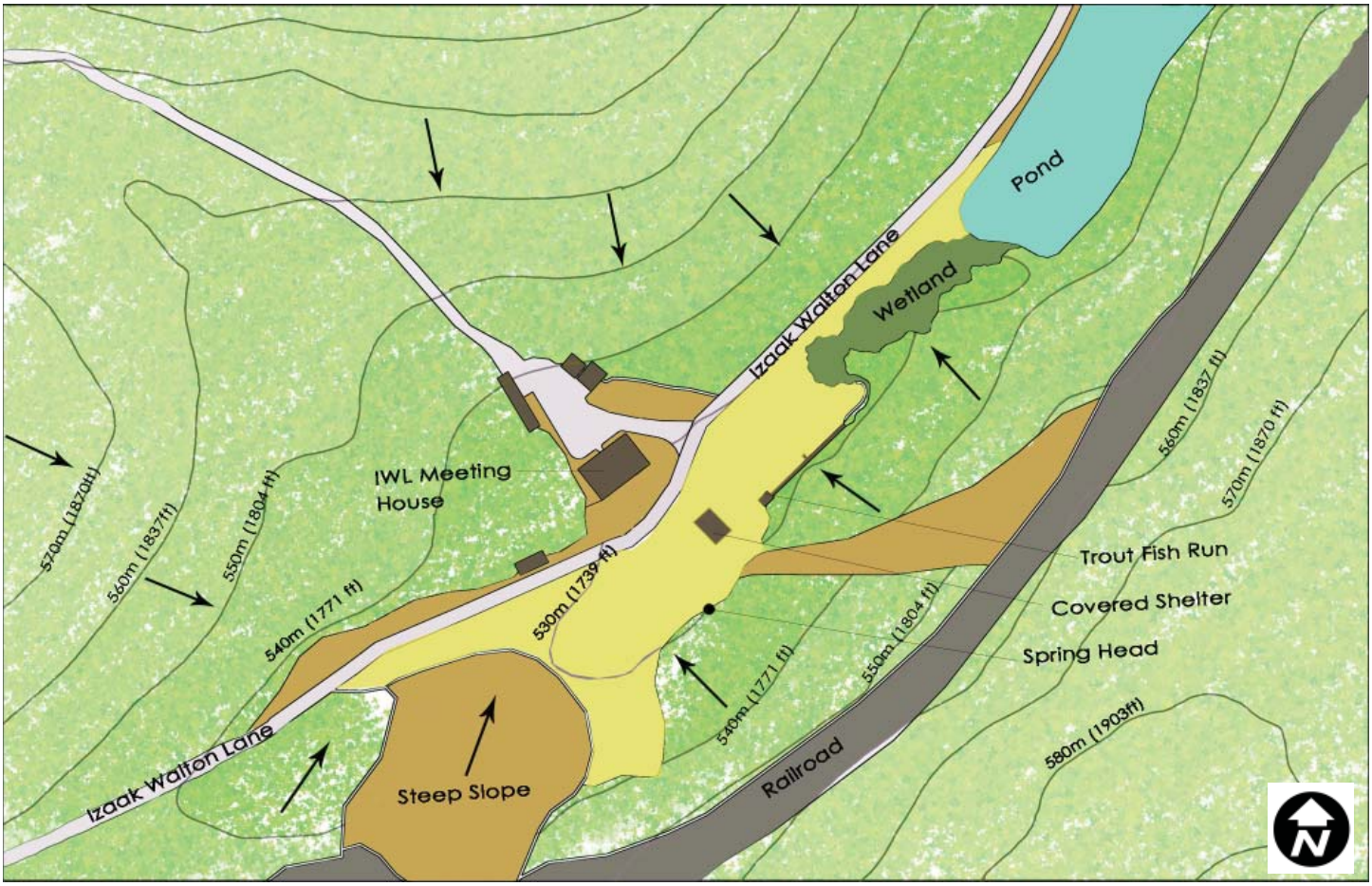
Trout fish run

Existing spring head.

View of covered shelter (far right), open grassed area, and road leading back to the shooting range.

Topography and Drainage

The Izaak Walton League (IWL) property is comprised of hillslope and valley. The mildest slopes on site are adjacent to the access road. The site is well vegetated, with good forest cover. The low amount of impervious surfaces helps minimize site runoff. (10-meter contour intervals were created from GIS data.)



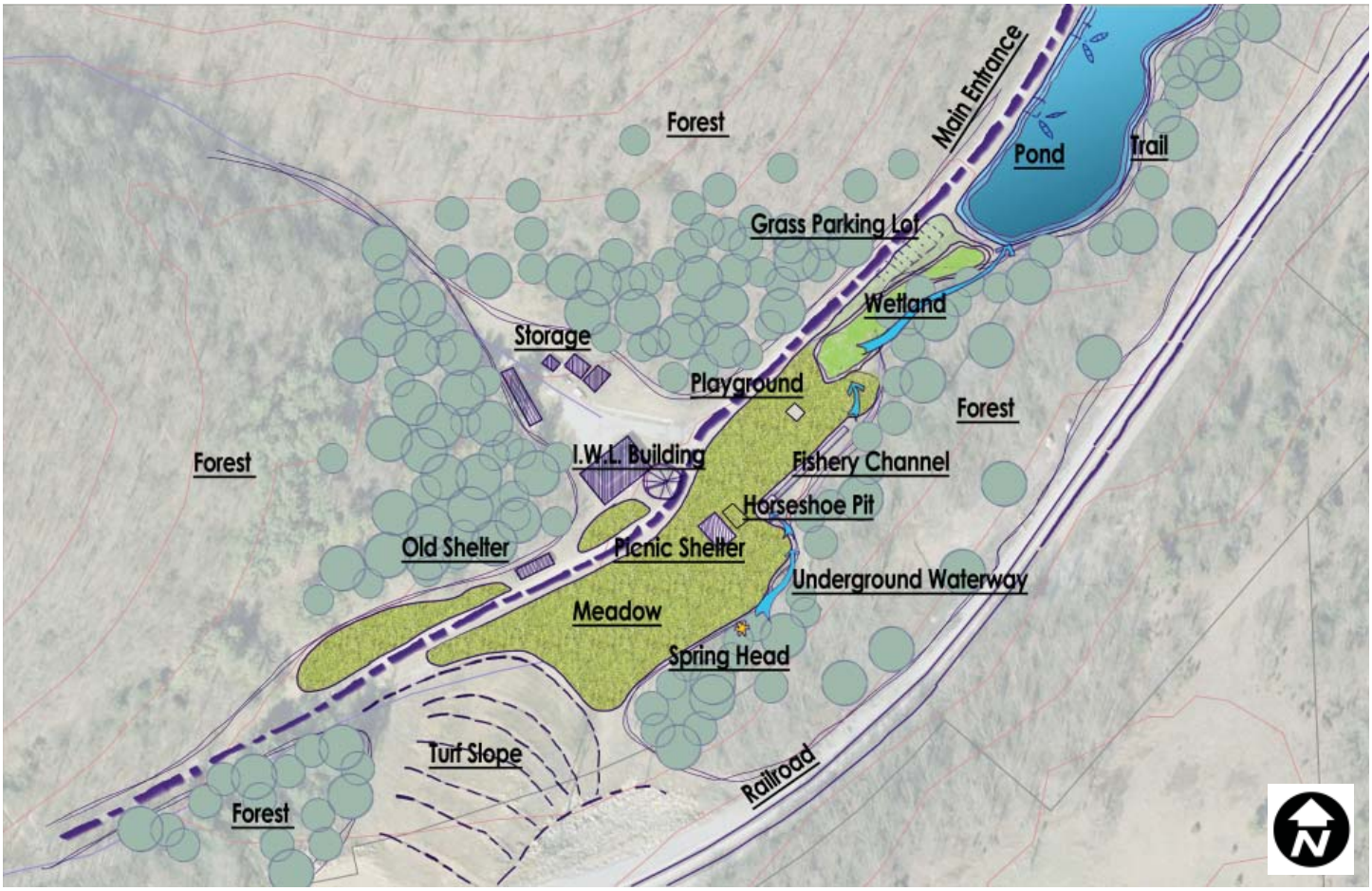
Drawing is not to scale

- Road
- Buildings
- Forest Slope
- Wetland
- Turf Slope
- Flat Meadow
- Pond

Site Features

The site offers excellent examples of diversity of habitat. There is a spring head, an underground waterway, a fishery channel (artificial), a surface stream, a wetland, and two created ponds. Due to the surrounding woods and stable output of the spring, the entire ecosystem is healthy and sustainable.

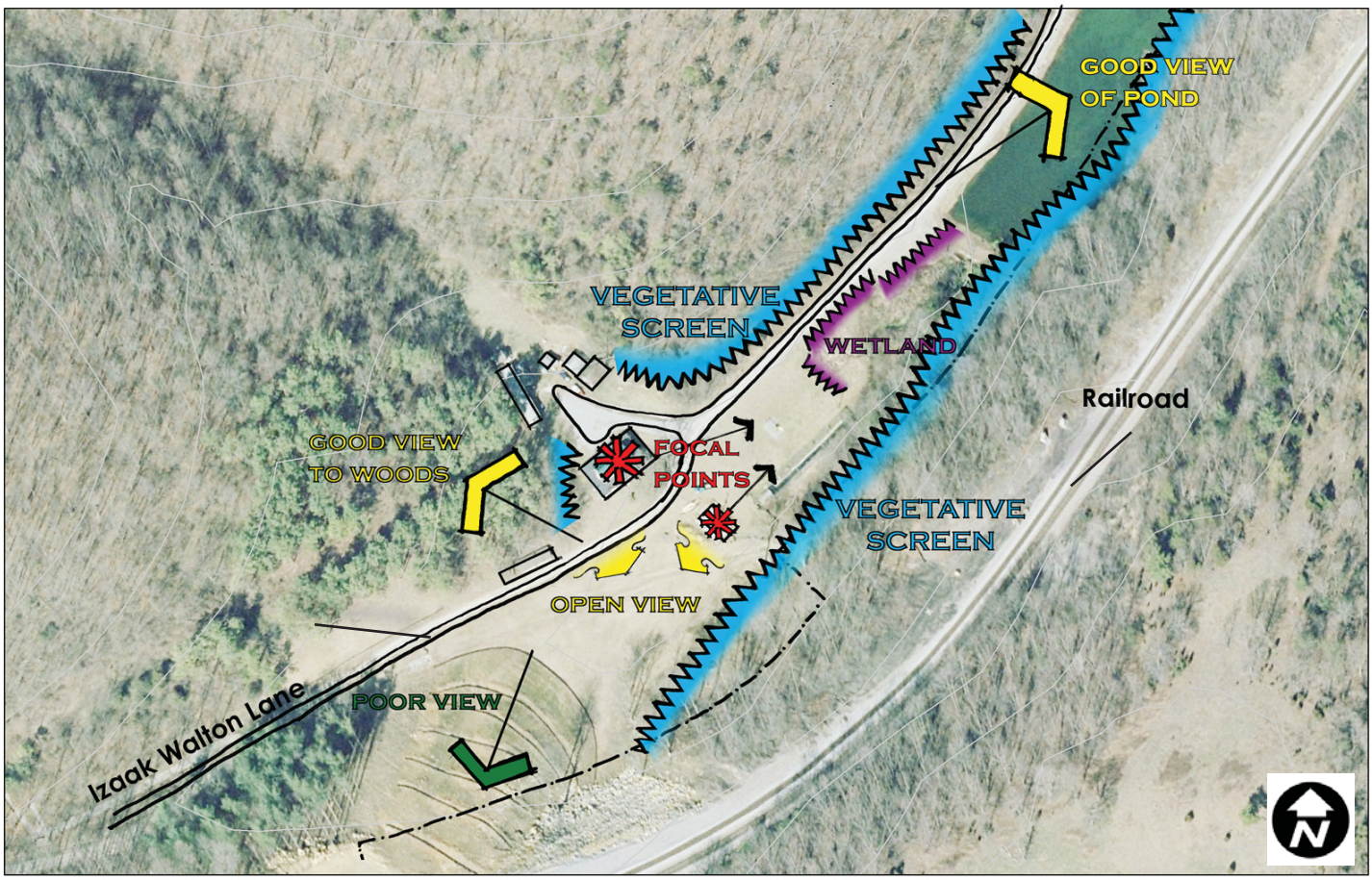
This site also possesses a rich history, tied to the spring and railroad. Some of this historical information is captured and displayed within the IWL house. Further, the site offers opportunities for hiking and botanical education on the forested hillslopes. There is only one 10 feet wide gravel road providing access into and out of the site.



Drawing is not to scale. Aerial Imagery copyright 2006-07 Commonwealth of Virginia

Visual Analysis

The visual analysis identifies both positive and negative views from the site to the surrounding environment. There is significant existing vegetation that frames the primary area of interest as it relates to the proposed outdoor classroom. The different views from the shelter and the open field provide positive potentials for the site design. The poor view of the slope in the southwest corner of the site needs to be improved by a vegetative screen.



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Preliminary Design Concepts

Jay Roberts (left center) and Spencer Winfry (right center) discuss preliminary design concepts with the CDAC team.

CDAC team member Daniel Ling presents Preliminary Design Concept B at the November Izaak Walton League meeting.

Two preliminary conceptual design alternatives were prepared and presented to County educators and IWL members for review and comment. Detailed descriptions of the two concepts can be found along with 11x17 reductions of the design options on the following pages.

Concept A

Concept A is structured by a linear trail system offering classes an opportunity to participate in a walking journey of learning. Based on the existing features of the site, this design divides the site into nine experiential zones with potential learning activities in each zone. Beginning at the Izaak Walton League building and ending at the stream, teachers and students will enjoy a series of outdoor learning opportunities along this walking journey such as, watershed learning, water testing, fish observation/fishing, and wetland study. A proposed signage system offers explanations for outdoor learning. Signage is arranged in each zone in order to provide students with a better learning experience. In addition, special events such as robotics demonstrations /experiments and open field activities can be held on site by providing gathering places in different locations.

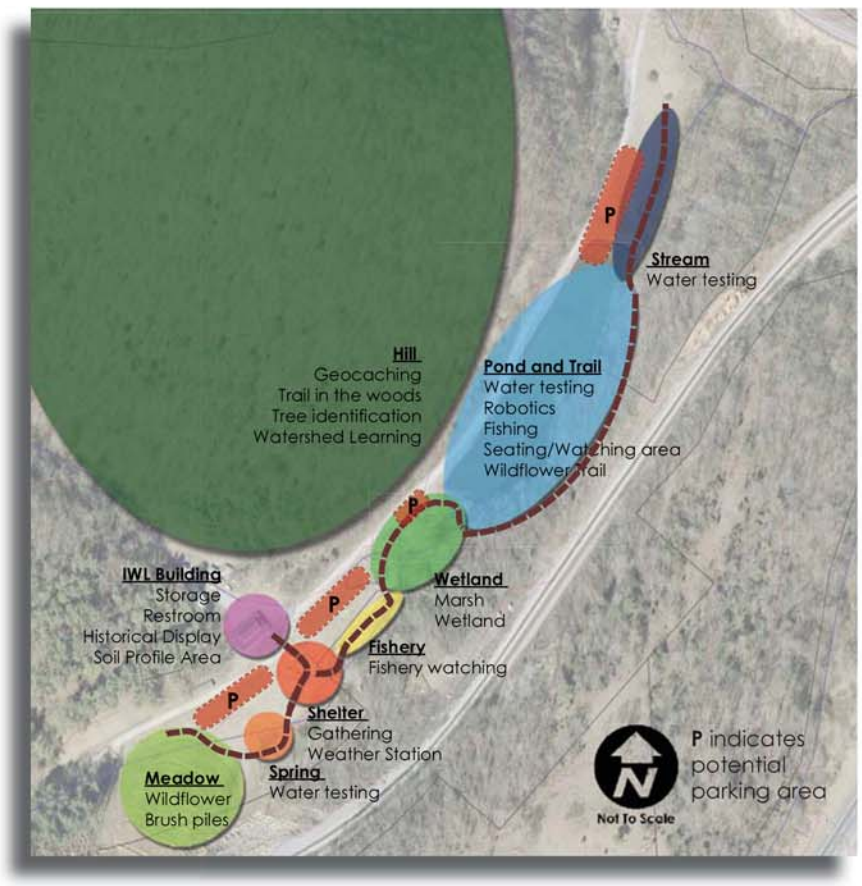
Concept B

Concept B aims to maximize the enhancement of the local environment with as little alteration to the physical environment of the site as possible. By spatial implication, this plan hopes to reduce the inter-disturbance between IWL club members' normal activities and educational activities. Combining the environmental goals and educational needs, this design focuses on the spring head, waterway exiting the fishery run, the internal hydrology of wetland, and the junction between the wetland and the trout pond. Through selective and prudential removal of riparian vegetation, followed by restoration of stream banks and wetland enhancement, this design intends to increase the accessibility for students to the different types of water bodies, as well as to improve ecological habitats.

Montgomery County Outdoor Classroom & Learning Landscape

Conceptual Plan A

Concept Diagram with Activities Zones



School bus parking

Stream water testing station

Pond trail

Robotics ramp

Proposed trails in the woodland

Fishing parking

Wood deck

Wetland Signage

Wetland

School bus turn-around

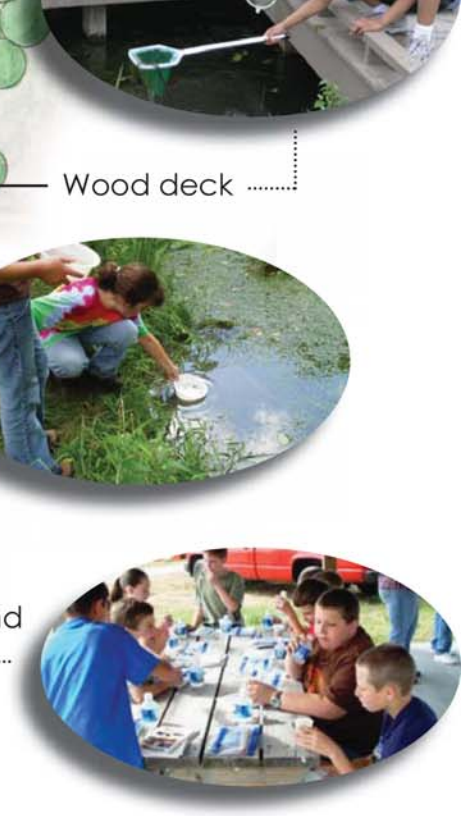
Multi-use field

Proposed planting

Fishery

Relocated playground

Existing shelter



Weather station

Multi-use field

Meadow

Spring water testing station

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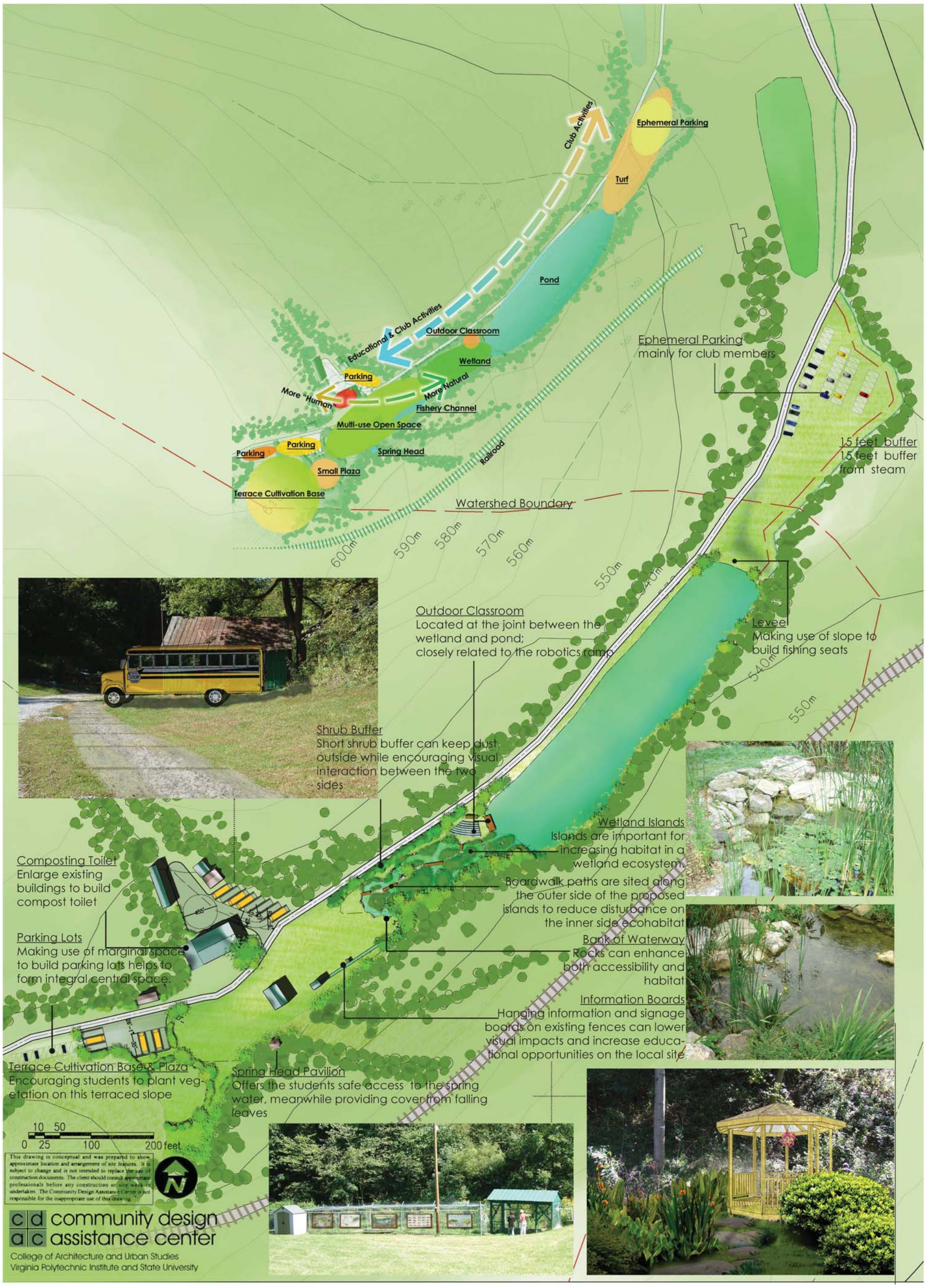
Conceptual Design B



MCPS Staff Development Day

Montgomery County teaches review preliminary design work for the proposed outdoor classroom.

CDAC team member Daniel Ling (left) describes design concepts to Patricia Gaudreau (right).

The CDAC team presented project analysis and Preliminary Concepts A and B to County teachers at the November 3rd, 2009 Staff Development Day at Christiansburg High School. Comments received from County educators included:

- The robotics ramp should be wide enough to serve as a boat launch if needed.
- The amphitheater-style area should accommodate 25-30 students and include a display table for presenters.
- Make sure a visitor can the whole path of the flow (of water) from the spring to the spillway exiting the pond.
- Model any improvement to the main building after the Selu wet labs.
- Designate an area for tent camping
- Definitely create an area for astronomy to watch stars.

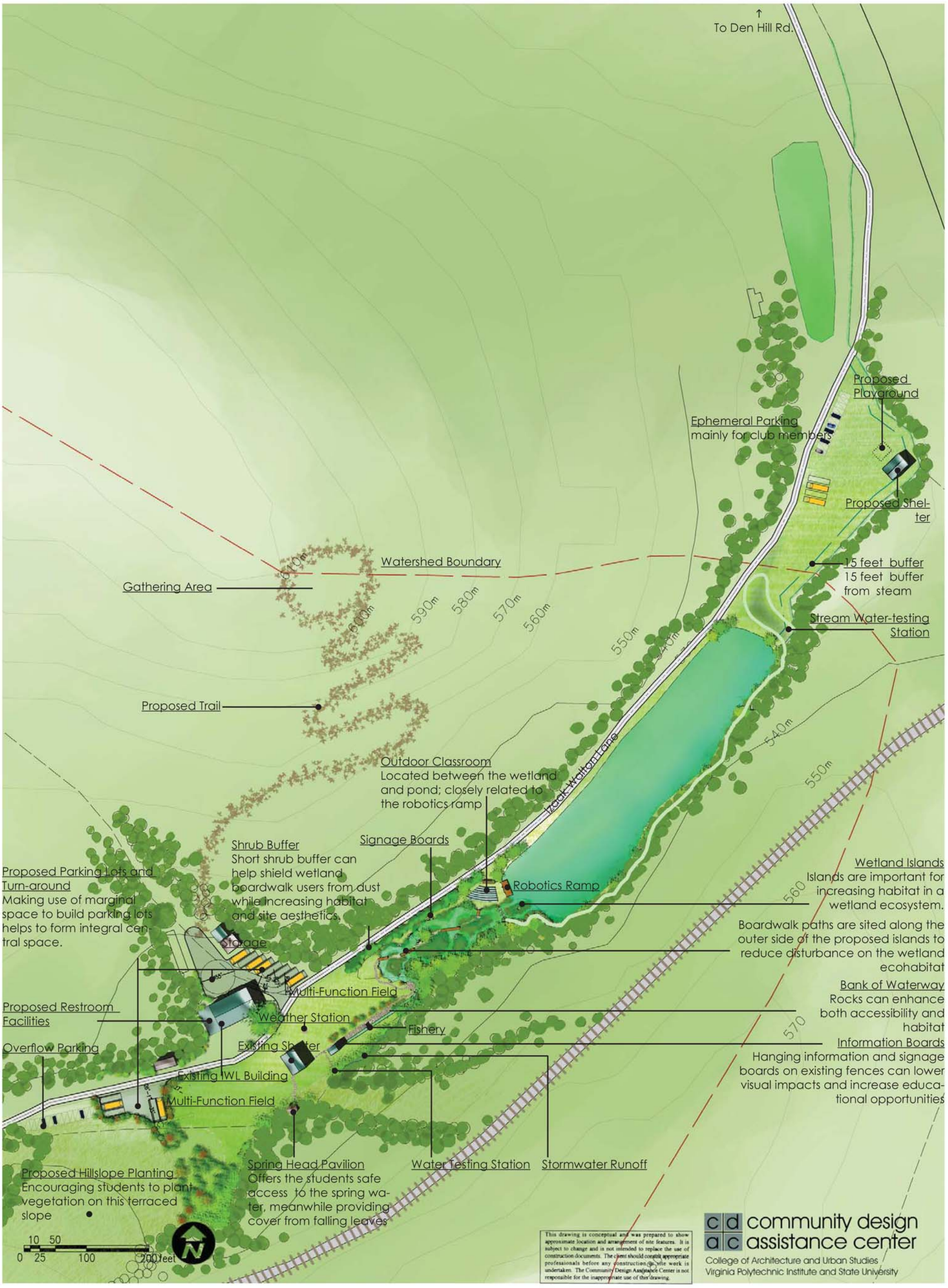
Final Conceptual Master Plan

The CDAC team used feedback obtained from the preliminary design presentation and MCPS teachers to refine the preliminary concepts into one final conceptual master plan. The final conceptual master plan aims to enhance the existing natural features of the Izaak Walton League (IWL) site and maximize opportunities for outdoor education and environmental stewardship. By spatial delineation of areas of use, the conceptual master plan hopes to reduce any disturbance of IWL club members' normal activities by on-site educational activities. Combining environmental goals and educational needs, this design focuses on enhancing five key areas: the spring head, the wetland, the juncture between the wetland and the large pond, the wooded trail adjacent to the pond, and the stream both as it enters the wetland and exits the large pond. Increased opportunities for access to and interaction with the spring head, the wetland, the pond and the stream allows students and club members alike to be engaged in activities such as water sampling, fishing, and other watershed studies. Suggestions for additional programmatic needs, such as parking, restrooms, and bus turn-arounds, are also addressed in the conceptual master plan.

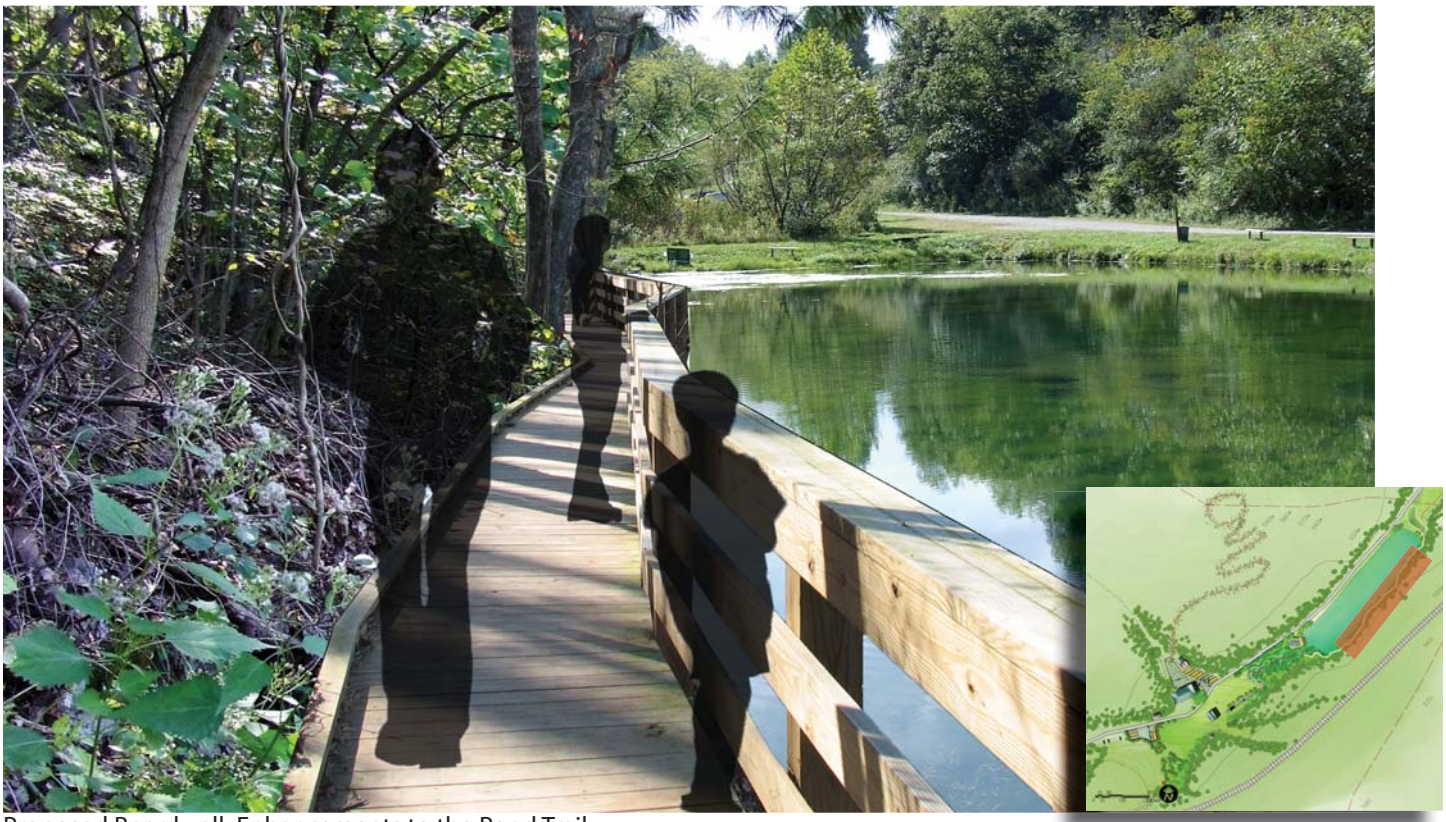
Below is a concept bubble diagram that indicates the general proposed locations of various elements and the flow of user activities for the final conceptual master plan.

Montgomery County Outdoor Classroom & Learning Landscape

Final Conceptual Plan



Supporting Images



Proposed Boardwalk Enhancements to the Pond Trail

Proposed Amphitheater

Proposed Wetland Boardwalk

Proposed Signage Board

Proposed Spring head Access Struc-

Proposed Information Board

Conclusion

The creation of an outdoor classroom on the Christiansburg-Montgomery County Izaak Walton League property will provide Montgomery County with a tremendous educational resource. The site's central location within the County makes it easily accessible by all of the county's public schools. Additionally, the outdoor classroom would be a tremendous resource for 4-H, homeschoolers, and members of the IWL itself.

Highlighting watersheds, water quality, habitat, and conservation, the outdoor classroom reinforces core principles of the IWL mission and provides an excellent avenue for the IWL for outreach to the community. Phased implementation of the conceptual master plan will enable the vision to become a reality, as funding is secured. There are ample opportunities for collaboration, partnership, and community building around the implementation of aspects of the master plan as well. The outdoor classroom will be a jewel in the county, enhancing the education of students and inspiring an appreciation for the natural environment for many future generations.



Images of the Izaak Walton League site in use as an outdoor classroom by Shawsville Elementary School students.

Appendices

Appendix A: Composting Toilets

Appendix B: Wetland Information

Appendix C: Project References

Appendix D: Project Feedback

Appendix A: Composting Toilets

"A composting toilet is an aerobic processing system that treats excreta, typically with no water or small volumes of flush water, via composting or managed aerobic decomposition" [Taken from US EPA "FactSheet:Composting Toliets" - http://www.epa.gov/owm/mtb/comp.pdf]. This is usually a faster process than the anaerobic decomposition at work in most wastewater systems, such as septic systems.

Composting toilets are often used as an alternative to central wastewater treatment plants (sewers) or septic systems. Typically they are chosen (1) to alleviate the need for water to flush toilets, (2) to avoid discharging nutrients and/or potential pathogens into environmentally sensitive areas, or (3) to capture nutrients in human excreta. Several manufactured composting toilet models are on the market, and construct-it-yourself systems are also popular.[2]

These should not be confused with pit latrines (see latrine, pit latrine, and arborloo or tree bog), all of which are forms of less controlled decomposition, and may not protect ground water from nutrient or pathogen contamination or provide optimal nutrient recycling." (http://en.wikipedia.org/wiki/Composting_toilet).

Images taken from http://www.compostingtoilet.org/applications/outhouses/index.php

Composting Toilet Frequently Asked Questions

(information taken from Envirolet Composting Toilet World: http://compostingtoilet.org/faq/index.php)

What are the advantages to the user and owner of a composting toilet?

Greatly reduced water storage or supply costs, possibility of a rebate for community sewage charges, production of compost, in many systems the ability to compost vegetable peelings and garden trimmings with toilet wastes.

What are the advantages to the community?

If a community were to embrace the total use of composting toilets and appropriate greywater systems, it would have no sewage charges, sewage pipe installations and maintenance costs. The community would also have greatly reduced water costs. It could also reduce its rubbish collection charges through recycling most vegetable matter, and would be able to produce valuable compost and worm castings for sale or reuse in community and private gardens.

What are the advantages to the environment?

The widescale use of composting toilets would be very beneficial to the environment. Reduced water use would minimize storage and piping impacts, elimination of sewage would reduce nutrient flows into river and oceans and subsequent rejuvenation of marine systems. Cities could become fertilizer factories instead of nutrient sinks, reducing environmental problems associated with manufacture of fertilizers.

How do you get rid of the waste?

With composting toilets there is no "waste," merely usable end-products. The liquid end product has undergone conversion into the composting pile and is a valuable liquid fertilizer and/or is evaporated. Check local regulations regarding use of liquid as a fertilizer. The solid end-product is a valuable humus with high nutrient levels in a form that is slowly released to plants on demand.

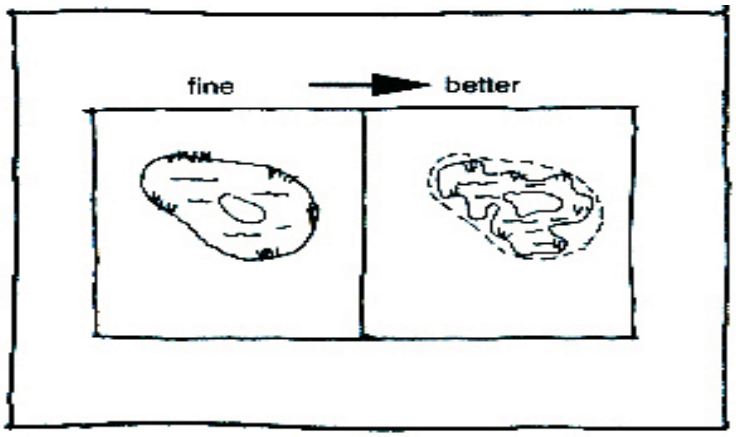
Don't they smell?

A correctly installed and operating composting toilet will not smell at all because there is a positive suction of air through the toilets at all times. In fact, there should be less smell than a conventional toilet. Units can produce smells if they are overloaded or not installed or operated correctly. Simple changes to the systems operation and usage will easily remedy the odor problems.

Appendix B: Wetland Information

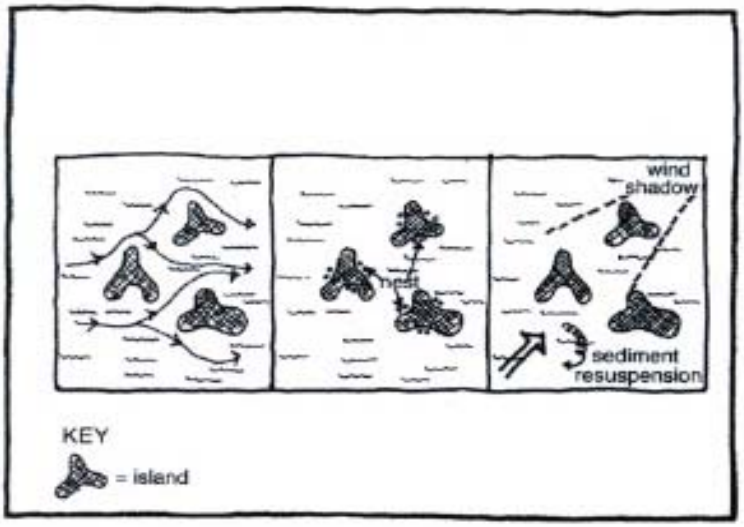
Design Guidelines

Chapter three of the book *Wetland Design* lists some design guidelines for creating wetlands. Some key guidelines are highlighted below:



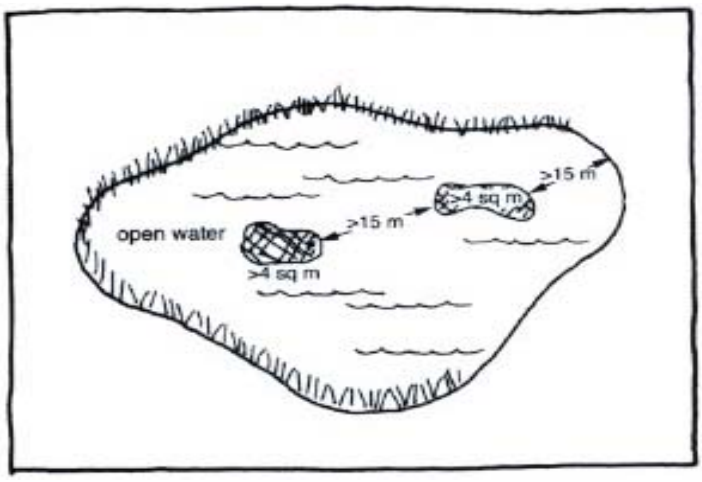
More for Less

For sites constrained by space, the water volume of the wetland area can be increased by increasing the extent of the surface edge contact through the design of complex areas of small changes in topography within the wetland.



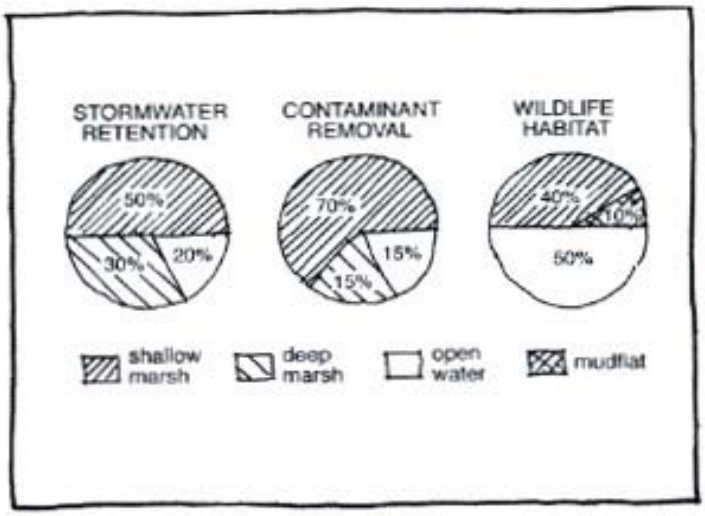
Microtopography

Multiple braided channels and islands promote water storage by increasing flow travel time which will improve effectiveness in reducing peak flows and improving water quality.



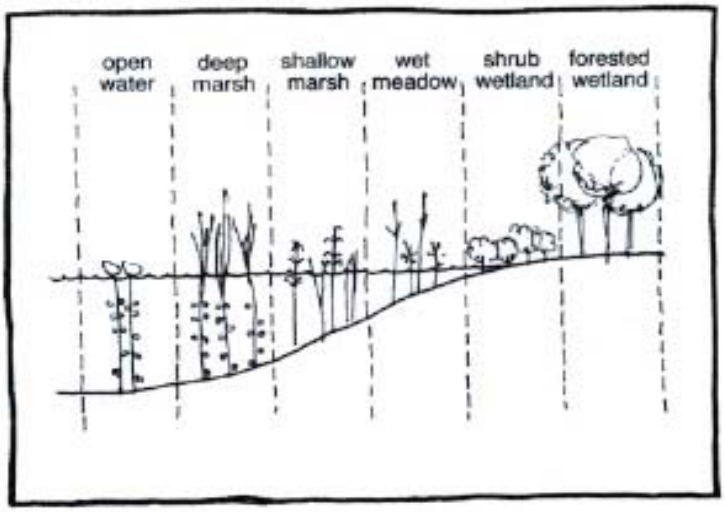
Islands

Islands should be at least 43 sq. ft. (4 sq. m) located 45ft (15m) apart, and be separated from the shoreline by a minimum of 45 ft. (15m) of permanently flooded water.



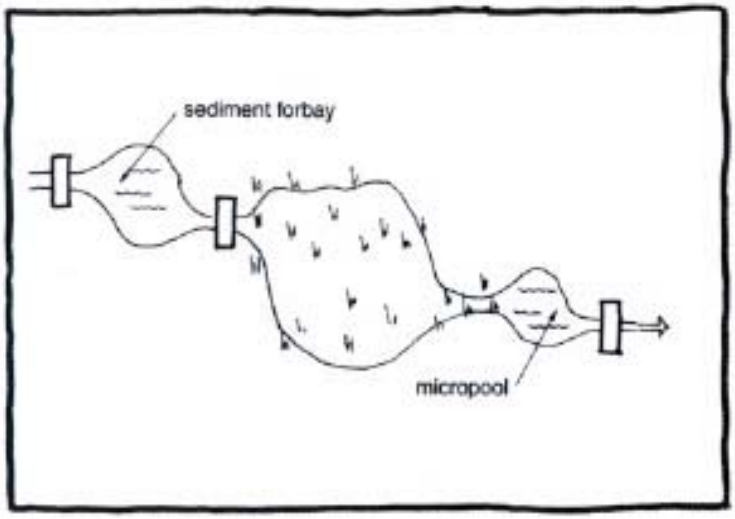
Proportions of Depth

According to different types of wetlands and functions, different proportions of depth should be considered.



Planting Zones

Six major planting zones exist in any wetland habitat in relation to the normal water level.



Elements

A pretreatment sediment forbay will serve to dissipate the energy of storm water. A micropool will reduce the downstream release of sediment and floating organic matter.

Appendix C: Project References

1. France, R. L. (Robert Lawrence). Wetland Design: Principles and Practices for Landscape Architects and Land-Use Planners*; Illustrated by Carlos Torres and Matthew Tucker.* New York : Norton, 2003.

2. Hammer, Donald A. Creating Freshwater Wetlands. Boca Raton, Fla. : CRC Lewis Publishers, 1997.

3. Kimbro, Creig C. Developing an Outdoor Classroom to Provide Education Naturally. UT Extension Agent, The University of Tennessee, 2006.

4. Littlewood, Michael. Landscape Detailing. Oxford ; Boston : Butterworth Architecture, 1993-2001.

5. Speichert, C. Greg. Encyclopedia of Water Garden Plants. Portland, OR. Timber Press (OR)

6. Tiner, Ralph W. Field Guide to Tidal Wetland Plants of the Mortheastern United States and Neighboring Canada: Vegetation of Beaches, Tidal Flats, Rocky Shores, Marshes, Swamps, and Coastal Ponds. Amherst : University of Massachusetts Press, 2009.

7. [Washington, D.C.] : Federal Interagency Stream Restoration Working Group, [1998]. Stream Corridor Restoration : Principles, Processes, and Practices.

Appendix D: Project Feedback

Initial Meeting with Client Team - September 11, 2009

Izaak Walton League information:
Approximately 300 members
1st Thursday – Board Meeting
3rd Thursday – Membership Meeting

Annual Event (3rd Sunday in May) ~ Fishing Rodeo. Open to all kids (free) with a cap set at 170 (first come, first serve). Door prizes are given to all. The fishing starts in the afternoon. Free snacks for kids. Parents welcome. Port-a-jons are brought in for this event.

IWL Committees (current):
- Grounds (oversees mowing)
- Clubhouse
- Fishing (ponds; Spencer on this committee)
- Kitchen

A caretaker lives on site in exchange for mowing and trash removal. The current caretaker is about to transition out and will be replaced with someone else.

Potable water on site is provided through a new well. They used to use the spring water. It is potable, but it would require frequent testing to verify it is ok. The IWL decided a well would be easier.

Spencer mentioned that he would like to see the pump house (near the spring) removed as it is no longer functional and would see it as a distraction to kids coming to the spring for sampling. Patricia was in agreement.

In general, Spencer thought the IWL would be open to the idea of a recycling station.

There are restrooms (with exterior access) by the meeting house, but they are not currently ADA accessible.

The railroad owns down to the base of the slope. There was a train accident a while back – you can see where it de-railed.

There is an existing walking path around the pond. The IWL is open to the school using it. There was some discussion of possibility enhancing the path (widening, making sure it is ADA accessible in terms of slope and surfacing material).

There is also an existing wetland on site. The wetland area had a wet (weather) spring there. It used to have catfish in it (pond I guess). They filled it in with construction trash. Wetland vegetation is evident. They are open to enhancing it and winding a boardwalk through it.

Spencer mentioned the IWL would like a mowing plan – indicating areas that can be seasonally mowed (for habitat and conservation) and areas that would need more frequent mowing.

He also noted that the horseshoe pit and the playground could be relocated if need be.

Montgomery County Outdoor Classroom:
Lots of opportunities on this site, but the main focus of use will be to provide students with "a meaningful watershed experience". They are looking at bringing all 4th, 6th, and 9th graders to the site each year. The overarching goal is "to introduce students to the joy of fishing and watershed stewardship."

Students would be coming to learn about: Trout, Fishing, & Watersheds

The spring on site drains into Albemarle Sound.

Patricia has a long term vision for a Watershed Summit – bringing all the classes from all the grades together one time a year to share what they have been learning (opportunities even for the 9th graders to teach the 4th or 6th graders some information).

Potential water sampling areas that Patricia envisions:
- Spring
- Fishery
- Wetland
- Stream

The possible (long term) maximum number of people/buses on site for a school event would be 12 buses (to access and park on the site).

Currently it is a little difficult for buses to turn around on site. Parking on the grass is acceptable to the IWL. Other options would be creating gravel lots or exploring porous grass pavers (look into ADA accessibility and where that could and couldn't be done).

For younger children there could be 75 kids/bus
For older kids, there could be about 50 kids/bus
There is usually at least a 1 to 20 ratio between kids and teachers.
Including chaperons, it would be a 1 to 5 ration (kids to adults).

Possible displays inside the Izaak Walton League building:
- Tracks (animal tracking – bear, turkey, deer frequently spotted on site)
- Water testing information
- Photos

The School System will be following GLOBE (global learning and observations to promote the environment) as a set of protocols for studying the environment.

Other programs – Montgomery County School System has a Robotics program (they have collaborated with mechanical engineering at Virginia Tech). They would love a small ramp to be constructed and added to the trout pond to allow the robot access to the bottom of the pond. This could be hooked up to a laptop (and maybe even longer term – a webcam) and give students a glimpse of the habitat at the bottom of the pond.

The County would like to select a site for a weather station on site (Patricia already has the components in her possession). We also discussed the possibility of siting a composting toilet) (in addition to upgrading the existing restrooms or in place of updating the existing restrooms).

The Montgomery County School system has some storage needs/wants for Montgomery County SS Outdoor Classroom – 4 watershed models that could be stored on site; testing material (water quality), nets, etc. IWL said they have excess storage that the school could have access to.