Cost/Benefit Analysis of the Hercules Country Club

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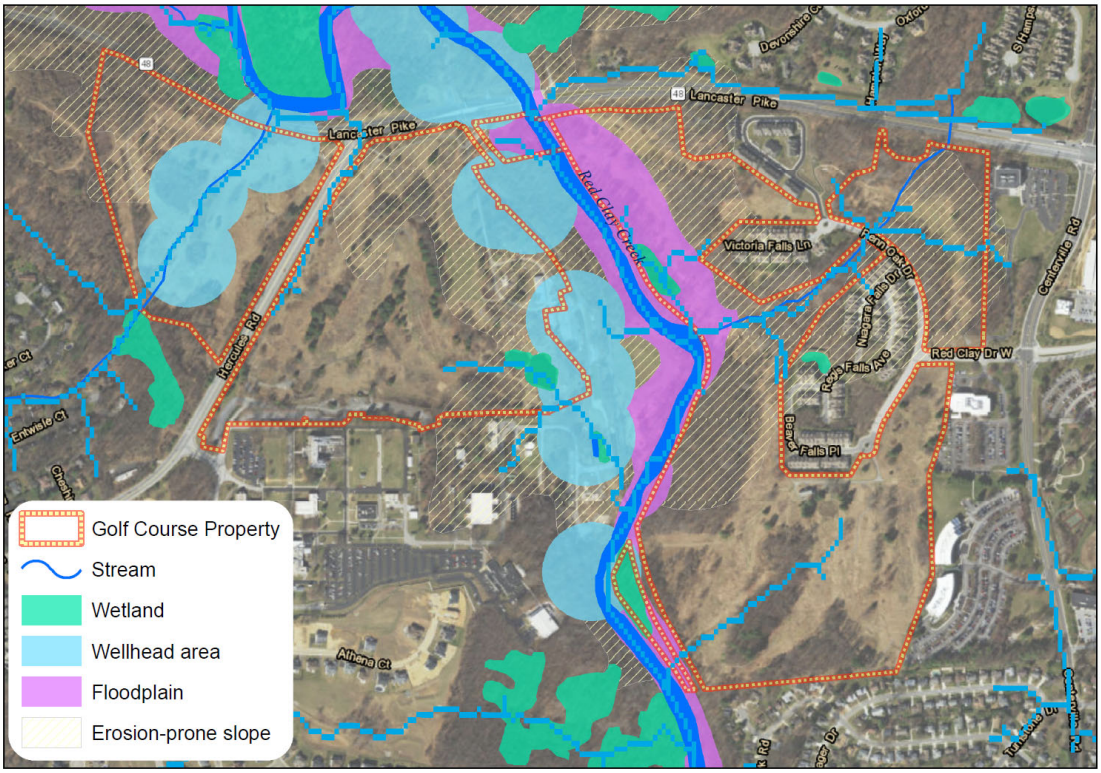
Oct 1, 2020 (rev Oct 26, 2020)

Objective

The objective of this paper is to conduct an *ex ante* (before the project) cost/benefit analysis (CBA) of the Hercules Country Club (CC). Two alternatives are evaluated: (A) preserve land for 205-acre county park and (B) develop 205-acre site for 258 homes. The project standing is the Red Clay Creek watershed in New Castle County, Delaware with a population of 23,500 residents in 2015. The discount rate over a 30-year assumed project life is 3%. The CBA employs the equation: Net Present Value (NPV) = Present Value Benefits (B) minus Present Value Costs (C) or NPV = B – C (Boardman 2001). The alternative with the highest NPV provides the most economic benefits to society.

Project Definition

In 2010, the Hercules Company sold the 205-acre country club to a landowner with plans to develop the site for 258 homes. As this land occupies some of the last open space in the middle of northern New Castle County between Newark, Pike Creek, and Wilmington at an environmentally sensitive location along 4,000 feet of Red Clay Creek which is a drinking water supply downstream for SUEZ Delaware, a group of interested citizens became interested in preserving the land perhaps as a county park. If land is not preserved as a park, the owner has sought approval from the county to build 258 homes at a gross density of 0.5 acre/dwelling. The park would provide hiking, bird watching, and other passive recreation activities with measureable economic and environmental value to society.



Golf Course Property
Environmental Constraints

Figure 1. Hercules Country Club site

Cost/Benefit Analysis

We evaluate the cost effectiveness of the Hercules Country Club as a public park or private housing development utilizing the cost/benefit analysis (CBA):

1. Specify alternatives.
2. Decide project standing.
3. Catalogue impacts, select indicators, and monetize and attach dollar values.
4. Compute net present value (NPV) of each alternative.
5. Make recommendations based on the NPV of each alternative.

1. Specify Alternatives

Two alternatives are evaluated for the 205-acre Hercules Country Club property:
(A) Preserve land for county park.
(B) Develop land for 258 homes.

Alternative A: The land is sold to the county to preserve as open space for a city park, which has environmental and recreational benefits. Fair market appraisals indicate the land cost of the unimproved 205-acre site is $18.4 million or $89,756/ac. The park land would be removed from county tax rolls.

Alternative B: A land owner would erect 258 homes as approved by New Castle County Council. There would be limited recreational and environmental benefits. Land appraisals indicate the land cost of an improved site permitted for homes with water and sewer is $18.4 million. The site would be added to the county tax rolls with property taxes of $5,000 per parcel accruing from 258 new dwellings.

2. Decide project standing.

Next we decide for whom the benefits and costs should be counted. In this case county residents are interested and would benefit from passive recreation and ecosystem services provided by the preserved habitat at the park. Therefore, the project standing is the 23,500 residents who live in the red Clay Creek watershed in New Castle County, Delaware.

3. Catalogue impacts, select indicators, and monetize values to all impacts.

In this step we associate dollar values to the benefits and costs of the alternatives.

Benefits

Environmental Benefits: Accrue economic value from preserving the reservoir land for a park for (1) ecosystems habitat, (2) recreation (hiking), (3) health/community cohesion/water pollution/air pollution, (4) and (4) water supply benefits.

(1) Ecosystem services are the value of habitat that provides environmental benefits to society such as goods (commodities like water, crops, and timber that can be sold) and services (functions such as flood control, water filtration, wildlife/fisheries habitat, and carbon storage) provided by wetlands, forests, farms, and open water. The ecosystem services value of habitat for Alternative A county park with freshwater wetlands, forest, farm, and open water habitat is $602,780/yr (Table 1). The ecosystem services value of habitat for Alternative B build 258 homes with urban land is $246,120.

Table 1. Ecosystem services habitat value of Hercules CC site
(NJDEP 2007 converted to $2020 by annual CPI of 3%)

Ecosystem	Habitat Value $/ac/yr	(A) Park (ac)	(B) 258 Homes (ac)	(A) Park ($/yr)	(B) 258 Homes ($/yr)
Freshwater wetlands	17,332	5	5	86,660	86,660
Farmland	4,871	10	0	48,710	0
Forest	2,517	175	25	440,475	62,925
Urban	435	5	165	2,175	71,775
Open water	2,476	10	10	24,760	24,760
Total		**205**	**205**	**602,780**	**246,120**

(2) Recreational benefits accrue from the preservation of the property as a county park (Walsh et al. 1992). Trail counts indicate park may record up to 250 visitors/day. The U.S. Forest Service estimates the willingness to pay for recreation hiking varies from $5.02 to $451.00 per day with a mean of $78.19/day (Rosenberger et al. 2017). Assuming a low range plug in value for hiking of double the low range value to be $10.04/person/day, the recreational hiking value at the new county park would be $2,510/day or $916,150 annually for 250 park visitors/day. By comparison the Delaware State Park system charges $4.00 per vehicle for instate and $8.00 per vehicle for out of state residents.

(3)The Trust for Public Land (2009) found the 444-acre City of Wilmington park and recreation system provides annual economic value and savings to the public from: (1) health benefits from exercise in the parks ($9,734/ac), (2) community cohesion benefits from people socializing in the parks ($2,383/ac), (3) water pollution mitigation benefits from parks in treating stormwater ($921/ac), and (4) Air pollution mitigation value from tree and shrub absorption ($88/ac). Assuming the data from the City of Wilmington study is appropriate for value (benefits) transfer, a new 205-acre county park provides $2,690,830 in annual economic benefits (Table 2).

Table 2. Economic benefits of Hercules CC Park (Trust for Public Land 2009)

Park Benefit (205 ac)	$/ac	ac	$
Health benefits from exercise	9,734	205	1,995,470
Community-cohesion, people socializing	2,383	205	488,515
Water pollution mitigation, treating stormwater	921	205	188,805
Air pollution mitigation, tree and shrub absorption	88	205	18,040
Total		**205**	**2,690,830**

(4) The U. S. Forest Service and Delaware Center for Horticulture (Nowak et al. 2008) estimated 7,137 acres of forests in New Castle County have carbon storage/sequestration and air pollution benefits. Applying these multipliers, 175 acres of forests at the Hercules CC have annual economic benefits of $206,675 from carbon storage ($144,725), air pollution removal ($46,550), building energy savings ($9,800), carbon sequestration ($5,075), and avoided carbon emissions ($525).

Table 3. Carbon and air pollution benefits of forests at the Hercules CC (Nowak et al. 2008)

Forest Benefits	Value ($/ac)	Forest (ac)	Hercules CC ($/yr)
Carbon storage	827	175	144,725
Carbon Sequestration	29	175	5,075
Air Pollution Removal	266	175	46,550
Building Energy Savings	56	175	9,800
Avoided Carbon Emissions	3	175	525
Total	**1,181**	**175**	**206,675**

(5) The Chester County Planning Commission (2019) found that 139,000 of parks and open land provided $39.4 million/yr in water supply protection benefits or $283/ac. Given the 205-acre Hercules CC site straddles the Red Clay Creek (a drinking water supply for SUEZ DE water treatment plant downstream in Stanton) preserving the land as a park provides $58,000/yr in drinking water supply benefits.

Property Tax: If the reservoir site were developed with 258 homes, property tax revenues would be $5,000 per property or $1,290,000/yr.

Costs

Land appraisals indicate the acquisition cost of the 205-acre site is $18.4 million or $943,000/yr over 30 years based on annual costs derived over 30 years at a discount rate (n) of 3% for a capital recovery factor (A/P) of 0.05125. Construction costs for a new park are $1 million or annualized to $51,250/yr over 30 years. Maintenance costs of Alternative A new park are $50,000/yr.

4. **Compute Net Present Value (NPV) of each alternative**.

Compute the Net Present Value (NPV) of each alternative as NPV = B – C (Table 3).

Table 3. Hercules CC cost/benefit analysis, net present value over 30 years at i = 3%

Benefit/Costs	(A) County Park ($/yr)	(B) Build 258 Homes ($/yr)
Benefits		
Environmental		
Ecosystems Habitat	602,780	246,120
Recreational Hiking	916,150	
Parks (Health/Community)	2,690,830	
Forests (Carbon/Air Pollution)	206,675	
Water Supply	58,000	
Property Tax/Avoided Land Cost	0	1,290,000
Benefits (B)	**4,474,435**	**1,536,120**
Costs		
Land Acquisition	943,000	
Construction	51,250	
Maintenance	50,000	0
Costs (C)	**1,044,250**	**0**
Net Present Value (NPV = B-C)	**3,430,185**	**1,536,120**

Alternative	**Benefits (B) ($/yr)**	**Costs (C) ($/yr)**	**NPV = B-C ($/yr)**
(A) County Park	4,474,435	1,044,250	3,430,185
(B) Build 258 Homes	1,536,120	0	1,536,120

5. Make recommendation based on the NPV of each alternative

Public policy makers usually recommend the alternative with the highest net present value to society since this alternative will cost least over the project lifetime.

Alternative A – Preserve as park is the highest NPV at $3,430,185/yr. The park accrues significant habitat protection, recreational, environmental, and drinking water supply benefits to county residents over the years that outweigh the relatively modest acquisition and construction cost of a park when annualized over 30 years.

Alternative B - Build 258 homes has a NPV of $1,536,120/yr less than half that of a public park.

Recommendations

This cost/benefit analysis of the Hercules Country Club indicates that Alternative A preserve as county park is the most socially and economically beneficial to the Red Clay Creek watershed population of New Castle County from a CBA perspective as this alternative has appreciable environmental and recreational benefits.

References

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Figure 2. Hercules Country Club in 1939