

Financial Analysis of Bonding for Open Space

Open Space Preservation Commission

New Hartford, Connecticut

Introduction

The following document presents the New Hartford Open Space Preservation Commission's (OSPC's) analysis of the financial costs and benefits of a \$1.5M municipal bond for open space preservation. The analysis concludes that bonding for open space would not only help meet the goals set forth in the New Hartford Open Space Plan but would be fiscally prudent for the Town. Effective use of the bond funds would prevent residential development on land of great value to the Town in its current, undeveloped state and would result in a net savings to taxpayers over time.

This document describes the methodology and assumptions used to conduct the financial analysis and summarizes the estimated costs and benefits associated with two preservation scenarios. The "low acreage" scenario assumes that 200 acres would be permanently preserved as open space using the bond funds. The "high acreage" scenario assumes that 600 acres would be permanently preserved as open space using the funds.

Based on this analysis, OSPC estimates that a \$1.5M bond would result in an increase in annual debt service of about \$117K, requiring a mill rate increase of 0.29 (or about a 0.90% increase over the current mill rate of 32.40).¹ OSPC also estimates that both scenarios would result in a net savings to New Hartford taxpayers over time, which would more than offset this mill rate increase. A summary of key assumptions and net present value benefits², expressed in terms of overall savings and net decrease in mill rate relative to the "no bond" scenario are presented in Table 1. These assumptions and results are explained in more detail in subsequent sections of this paper.

Table 1
Summary of Assumptions and Net Benefits of \$1.5M Bond for Open Space

	Low Acreage Scenario	High Acreage Scenario
Acres permanently preserved as open space	200 acres	600 acres
Average acquisition price	\$7,500/acre	\$2,500/acre
Residential lots prevented	80 lots	239 lots
Net present value savings to taxpayers	\$2.7M	\$11.6M
Increase in mill rate without preservation*	0.55	1.64
Mill rate for \$1.5M bond*	0.22	0.22
Net decrease in mill rate vs. "no bond" scenario* ³	0.33	1.42

* Calculated based on net present value at current (not revalued) grand list.

¹ The recent revaluation will increase the total grand list, which would have the effect of lowering the mill rate increase associated with debt service on an open space bond.

² "Present value" analysis is used to account for the time value of money (see discussion below). A present value mill rate will be lower than the nominal mill rate, as a dollar in taxes paid today will be worth more than a dollar paid in taxes in 10 or 20 years.

³ The "no bond" scenario evaluates the potential incremental increase in mill rate associated solely with residential development of the land otherwise preserved as open space, not considering other factors (e.g., residential development elsewhere in Town, commercial development, etc.) that could affect the mill rate.

Note that these scenarios are intended to provide a reasonable range of the financial costs and benefits of bonding for open space preservation; they do not represent a recommendation or foregone conclusion regarding how the bond funds would or should be spent. For a discussion of the process that OSPC would use to help the Town preserve open space with bond funds, please refer to the Open Space Strategy 2003. Depending on OSPC's success in purchasing development rights and the charitable intent of landowners, these scenarios may overestimate or underestimate the total land that could be preserved with the bond funds.

Note also that there are other costs and benefits of bonding for open space that are harder to quantify and are not captured in this analysis. Non-monetary benefits of the use of the bond funds for open space preservation would include those anticipated in the New Hartford Open Space Plan, such as increased preservation of the Town's rural character, water quality, land value, wildlife habitat, and the highly valued overall quality of life enjoyed by the citizens of New Hartford. Without bond funding, it is unlikely that these goals of the Open Space Plan will be met.

Methodology

This analysis presents the financial costs and benefits of bonding for open space in terms of: 1) the costs of assuming and servicing the debt for a \$1.5M open space bond; and 2) the financial costs and benefits of open space preservation, including its effect on tax revenue and expenditures associated with residential development. Costs and benefits are expressed in terms of present value to allow for comparison of costs and benefits realized at different times. The rationale for this approach is described below.

The costs and benefits of open space are broken down as follows:

- Debt assumption and servicing:
 - Costs:
 - Bond issuance and administration costs (e.g., for bond counsel)
 - Debt service (interest and principal payments)
 - Benefits:
 - Net reduction in Town expenditures (saved expenditures for residential services less expenditures incurred for open space services)
- Costs and benefits of preserving open space:
 - Costs:
 - Net reduction in tax revenue (lost residential taxes less open space tax revenue)
 - Benefits:
 - Net reduction in Town expenditures (saved expenditures for residential services less expenditures incurred for open space services)

Assumptions

Assumptions used to develop the financial cost-benefit analysis are summarized in Table 2, at the end of this document, and are discussed below.

Discount Rate

Present value analysis accounts for the time value of money, or the fact that one dollar received today is worth more than a dollar received a year from now and much more than a dollar received in 10 years. The time value of money is measured in terms of the discount rate, which can be thought of as the rate that funds used for open space bonding would have earned had they been invested elsewhere. For example, a dollar invested today at an annual interest rate of 3%, would be worth \$1.03 in a year. Expressed in another way, \$0.97 invested at 3% today would be worth \$1.00 a year from now. Using present value terminology, the present value of a dollar a year from now at a discount rate of 3% is \$0.97.

In the case of bonding for open space preservation, where the costs of bonding accrue to the present generation and the majority of the net benefits will be realized by future generations, the selection of the appropriate discount rate is a complex issue. If the discount rate is set too high, spending decisions will favor the current generation over future generations (future net benefits will be valued less). This is problematic because future generations have no say in current policy decisions. On the other hand, if the discount rate is set too low, it ignores the fact that if the money spent on bonding were instead invested, future generations could realize even greater returns. However, this type of simple analysis is complicated by the fact that all forms of capital are not substitutable—capital investment in lieu of open space bonding would likely be inadequate to reverse the effects of residential development that could have been prevented.

In a seminal work on the subject of discounting across generations, Nobel Laureates Kenneth Arrow and Joseph Stiglitz identify two ranges of discount rates, from 0.5% to 3% and from 3% to 6%, corresponding to different approaches to discounting.⁴ The latter range (3% to 6%) is based on considerations of returns on long-term, risk-free public investments. A discount rate of 3% was selected for this analysis to reflect the mid-point of these ranges and the tendency of investors over the last few years to use shorter-term (lower return) Treasury notes as the risk-free investment benchmark.

Bond Amount, Structure, and Costs

This analysis incorporates the initial assumptions of the Board of Finance and New Hartford Treasurer regarding the bond amount, structure, and other costs. The analysis assumes a general obligation bond issue with a total par value of \$1.5M, structured as 20-year term bonds with a coupon of 4.90%. It is assumed that the Town would make semi-annual principal and interest payments to a sinking fund administered by a trustee. Principal would be paid in constant amounts (i.e., \$75K/year) and interest would be paid based on the interest accrued on the outstanding principal. Total costs for bond issuance (e.g., for bond counsel) and administration (e.g., for sinking fund trustee) are assumed to be \$60,000. It is assumed that the bonds would be uninsured.

Open Space Preserved

For this analysis, it is assumed that the open space bond funds would be used primarily for the purchase of development rights but that there may be occasion when the Town decides that a potential property is of such value that outright purchase would be necessary. The ultimate disposition of land purchased by the Town for open space preservation is a matter for further policy discussion that is beyond the scope of this analysis. For the purposes of this analysis, it is assumed that if land (rather than development rights) is purchased by the Town, a conservation easement would be placed on the land, and it would be donated to the New Hartford Land Trust or other appropriate entity for long-term stewardship (i.e., the land would remain on the tax rolls).

For the purposes of this analysis, it is assumed that property rights or property could be purchased at a rate ranging from \$2,500 to \$7,500 per acre, depending on the potential for development of the land – which affects the market price – and the charitable intent of the landowner – which affects the discounted value that the landowner is willing to accept. This range is consistent with information regarding recent transfers of parcels with significant amounts of undeveloped acreage.⁵

⁴ Arrow et al. 1995. *Intertemporal equity, discounting, and economic efficiency*. World Bank Environment Paper Number 12. December. See http://www-wds.worldbank.org/servlet/WDSContentServer/WDS/IB/1995/12/01/000009265_3970128121426/Rendered/PDF/multi_page.pdf.

⁵ An analysis of sales of parcels in New Hartford with at least 10 acres of vacant land for the period of 1999-2003 for which both price and sales data were available (total 16 parcels) indicates price per acre values ranging from \$1,300 to \$10,000, with an average price per acre of \$4,600 and median price per acre of \$3,200.

It is also assumed that in the absence of open space preservation, the land that is preserved would have had the potential to be developed at an average rate of 1 single family house per 2.5 acres, based on data provided by the Farmington River Watershed Association (FRWA) Buildable Lands Study.⁶ Based on the FRWA study, it is assumed that 19% of the currently vacant land would be physically constrained from development due to the presence of wetlands or steep slopes. It is further assumed that approximately 10% of the acreage associated with a large, new development would be used for roadways and utilities. This would result in an average housing density in areas zoned for residential development (including R1.5, R2, and R4 zones) of 1 house per 2.51 acres.

To calculate savings in residential service expenditures, it is necessary to make assumptions regarding the timeline between bonding and when preserved land would have been developed. For the purposes of this analysis, it is assumed that the open space bond funds would be expended within 3 years of bonding. It is also assumed that in the absence of preservation, the preserved land would have been developed 5 years after it was preserved (e.g., 100 acre parcel preserved as open space in 2005 would have been developed as residential lots starting in 2010). This assumption reflects the intent of the OSPC to pursue open space preservation proactively (i.e., to work with landowners before they put their parcels on the market) and the general pace of residential development projected for the Town.

Cost of Community Services

The ratio of expenditures to tax revenue for potential new residences that would be prevented by open space preservation is estimated to be 1.23 (i.e., \$1.23 in Town services would have been provided for every \$1.00 in tax revenues that would have been received). This ratio was estimated based on a cost of community services (COCS) analysis presented in Addendum 8b to the New Hartford Open Space Plan, adjusted to account for non-tax revenue and differences in home prices and demographic characteristics between new households and the existing housing stock and population.

Addendum 8b to the Open Space Plan estimated a residential expenditure to revenue ratio of 1.58. For the purposes of this financial analysis, this ratio was adjusted to account for non-tax revenue received by the Town. Based on revenue data from the 1999-2000 tax year, it is estimated that for every dollar the Town receives in residential property tax revenue, it receives about \$0.40 in non-tax revenue associated with residential taxpayers (e.g., annual Education Cost Sharing grant from the State). Accounting for these non-tax revenues results in an adjusted, Town-wide average residential expenditure to revenue ratio of 1.11. Note that this ratio is similar to ratios for other Towns in Connecticut, which range from 1.05 to 1.33.^{7,8}

This ratio was then adjusted to account for assumptions regarding new home prices and demographic characteristics of people relocating to New Hartford. For the purposes of this analysis, it is assumed that new homes would have a market value of \$375,000 and, consequently, would yield relatively higher tax revenues. It is also assumed, based on relatively high increase in enrollment from newly located families relative to the overall in-migration rate, that the number of school-age children in new households would be greater than the average number of school age children among existing households, and education expenditures associated with new households would be relatively higher.⁹ Census data indicates that

⁶ Farmington River Watershed Association. 2003. Buildable Lands Study, Town of New Hartford, Open Space Preservation Commission. September.

⁷ Southern New England Forest Consortium, Inc. 1995. *Cost of Community Services in Southern New England*.

⁸ American Farmland Trust. 2002. *Cost of Community Services*. (see on-line summary at http://www.farmlandinfo.org/fic/tas/COCS_9-01.pdf.)

⁹ Based on CT Department of Public Health and CT Department of Education statistics, school-age children have accounted for more than half of the net in-migration to New Hartford since 1994.

about 40% of the households in New Hartford have children less than 18 years old. The average number of school-age children (age 5 to 18 years) in these households is 1.35 children/household. For the purposes of this analysis, it was assumed that 75% of families that would have located to newly constructed homes (i.e., the types of homes that would be prevented by open space preservation) would have contained an average of 1.35 school-age children, and the remaining new households would have had no children or older children.

Based on these assumptions, it is estimated that the ratio of the expenditures to tax revenue associated with households locating to newly built residences in New Hartford would be about 10% higher than the average residential expenditure to tax revenue ratio Town-wide, or about 1.23.

Addendum 8b to the Open Space Plan estimated a vacant land expenditure to revenue ratio of 0.05 (i.e., \$0.05 in Town services are provided for every \$1.00 in tax revenue received). The vacant land expenditure to revenue ratio was relatively unaffected by the above considerations, and a ratio of 0.05 was used in this analysis.

Results

Based on the assumptions presented herein, it is estimated that a bond issue with a total par value of \$1.5M would result in a total debt obligation of approximately \$2.3M. This equates to an annual debt service of about \$117K and an increase in the current mill rate of 0.29 to cover this debt service, based on the current Grand List of \$409M. The overall mill rate would need to be increased from 32.40 to 32.69, or an overall increase of less than 1%.¹⁰

The net benefits of open space preservation based on the low and high acreage scenarios are summarized in Table 3, and discussed below.

Low Acreage Scenario

The low acreage scenario assumes that property rights and/or property would be purchased at an average rate of \$7,500 per acre. This equates to a total acreage of preserved open space (e.g., total acreage for which development rights have been purchased) of 200 acres and a total of 80 residential lots prevented. Based on the assumptions presented herein, the preservation of the equivalent of 80 residential lots as open space would save the Town approximately \$840K/year in net expenditures (saved residential expenditures less incurred open space expenditures) and cost the Town approximately \$674K/year in net lost residential tax revenue (lost residential revenue less maintained open space revenue), for a net annual benefit of \$166K (about \$800 per acre per year) in perpetuity. Initial savings would be realized 5 years after the bond issuance and would ramp up to \$166K by year 7.

In terms of present value, the total cost to the Town of issuance, maintenance, and debt service for a \$1.50M bond issue with the structure, rate, and issuance costs assumed herein, would be equivalent to \$1.81M expended at the time of initial bond issuance. The total present value benefit of a net annual savings of \$166K, ramping up from year 5 to year 7 and continuing at this level from year 7 on, would be equivalent to \$4.48M received at the time of bond issuance. The total net present value benefit to the Town would, therefore, be about \$2.67M.

In terms of mill rate effects, the present value increase mill rate of \$1.80M in total debt service over 20 years, based on the structure and repayment terms assumed herein, would be 0.22. In the absence of the

¹⁰ Note that the mill rate increase based on the recent revaluation would be lower. For example, assume that the overall grand list increased by 25% due to the revaluation. This would result in a new grand list of about \$511M, a new mill rate (all things equal) of 25.9, and a mill rate increase associated with the open space bond of 0.23.

preservation of the equivalent of 80 residential lots, the mill rate would need to increase to cover the cost of services for these lots (all else equal) by 0.55. Therefore, based on this analysis, it is estimated that the bonding for open space would result in a net present value decrease in the mill rate of 0.33.

High Acreage Scenario

The high acreage scenario assumes that property rights and/or property would be purchased at an average a rate of \$2,500 per acre. This equates to a total acreage of preserved open space of 600 acres and a total of 239 residential lots prevented. Based on the assumptions presented herein, the preservation of the equivalent of 239 residential lots as open space would save the Town approximately \$2.52M/year in net expenditures and cost the Town approximately \$1.81M/year in net lost residential tax revenue, for a net annual benefit of \$490K (about \$800 per acre per year) in perpetuity. Initial savings would be realized 5 years after the bond issuance and would ramp up to \$490K by year 7.

In terms of present value, the total cost to the Town of issuance, maintenance, and debt service for a \$1.50M bond issue with the structure, rate, and issuance costs assumed herein, would be equivalent to \$1.81M expended at the time of initial bond issuance. The total present value benefit of a net annual savings of \$490K, ramping up from year 5 to year 7 and continuing at this level from year 7 on, would be equivalent to \$13.44M received at the time of bond issuance. The total net present value benefit to the Town would, therefore, be about \$11.64M.

In terms of mill rate effects, the present value increase mill rate of \$1.80M in total debt service over 20 years, based on the structure and repayment terms assumed herein, would be 0.22. In the absence of the preservation of the equivalent of 239 residential lots, the mill rate would need to increase to cover the cost of services for these lots (all else equal) by 1.64. Therefore, based on this analysis, it is estimated that the bonding for open space would result in a net present value decrease in the mill rate of 1.42.

Conclusions

Based on this analysis, OSPC concludes that given the current expenditure to tax revenue ratios in New Hartford, the issuance of a \$1.5M bond for the preservation of open space would result in a net savings to New Hartford taxpayers over time. OSPC estimates that the bond funds would enable the Town to prevent residential development of land with high value to the Town as open space to the extent that the savings in expenditures would more than offset the cost of bonding and associated debt service. OSPC estimates that in the absence of the preservation, the mill rate increase that would be required to provide services for residences on this land would be greater than the mill rate increase required to service the debt on the bond. Therefore, OSPC concludes that bonding for open space would not only help meet the goals set forth in the New Hartford Open Space Plan but would also be fiscally prudent for the Town.

Table 2
Assumptions for Cost-Benefit Analysis

Bond Amount, Structure, and Cost Factors	
Total par value	\$1,500,000
Term	20 years
Coupon	4.90%
Frequency of payment	semi-annual
Sinking fund payment structure	level payment
Issuance and administration fees (e.g., bond counsel)	\$60,000
Bond Fund Expenditure, Land Use, and Financial Factors	
Bond expenditure period	3 years
Average expenditure to development period	5 years
Average residential development density	1 house/2.51 acres
Average dwelling market value	\$375,000
Total grand list	\$409.0 million
Current mill rate	32.400
Residential expenditure/revenue ratio (new construction)	1.23
Open space expenditure/revenue ratio	0.05
Present Value Analysis Factor	
Discount rate	3.00%
Open Space Preservation - Low Acreage Scenario	
Land preserved as open space	200 acres
Number of potential residential lots preserved as open space	80 lots
Open Space Preservation - High Acreage Scenario	
Land preserved as open space	600 acres
Number of potential residential lots preserved as open space	239 lots

Table 3
Results of Cost-Benefit Analysis of \$1.5M Bond for Open Space Preservation

	Low Acreage Scenario		High Acreage Scenario	
	Nominal Value	Present Value	Nominal Value	Present Value
Open Space Preservation (assumptions)				
Acres preserved as open space	200 acres		600 acres	
Potential residential lots preserved as open space	80 lots		239 lots	
Estimated Bonding Costs and Debt Service				
Issuance fees (e.g., bond counsel)	\$60,000	\$60,000	\$60,000	\$60,000
Total principal	1,500,000	1,120,000	1,500,000	1,120,000
<u>Total interest</u>	<u>770,000</u>	<u>630,000</u>	<u>770,000</u>	<u>630,000</u>
Total repayment	2,330,000	1,810,000	2,330,000	1,810,000
Annual debt service (20-year term)	116,500	90,500	116,500	90,500
Estimated Open Space Preservation Costs and Benefits				
Tax revenue lost				
Residential tax revenue lost	\$680,000 (a) ¹	\$19,010,000	\$2,050,000 (a) ¹	\$57,030,000
Open space tax revenue collected	6,000 (a) ¹	180,000	20,000 (a) ¹	540,000
Net tax revenue lost	674,000 (a) ¹	18,830,000	2,030,000 (a) ¹	56,490,000
Service expenditures saved				
Residential expenditures saved	\$840,000 (a) ¹	\$23,320,000	\$2,520,000 (a) ¹	\$69,960,000
Open space expenditures incurred	300 (a) ¹	9,000	1,000 (a) ¹	30,000
Net service expenditures saved	839,700 (a) ¹	23,311,000	2,519,000 (a) ¹	69,930,000
Net benefit				
Savings minus losses	\$165,700 (a) ¹	\$4,481,000	\$489,000 (a) ¹	\$13,440,000
Total Net Present Benefit²				
Open space net benefit minus bonding costs	---	\$2,671,000	---	\$11,630,000
Estimated Mill Rate Effects²				
Mill rate increase required in absence of open space preservation	---	0.55	---	1.64
Mill rate increase for bonding costs	0.29	0.22	0.29	0.22
Net reduction in mill rate vs. "no action"	---	0.33	---	1.42

Notes:

1. Tax revenue and expenditure effects would occur *in perpetuity*; therefore, nominal values cannot be calculated. Estimated annual values (estimated from year 7 on) are reported in shaded cells.
2. Nominal benefit and mill rate effects from losses/gains *in perpetuity* cannot be estimated.