

A Research Paper by



Benefit-Cost Analysis of the Ponderay Undercrossing



April 2017

Benefit-Cost Analysis of the Ponderay Undercrossing

April 2017

ABOUT HEADWATERS ECONOMICS

Headwaters Economics is an independent, nonprofit research group whose mission is to improve community development and land management decisions in the West.

CONTACT INFORMATION

Megan Lawson | megan@headwaterseconomics.org | 406-570-7475

ACKNOWLEDGMENTS

This report was produced on behalf of the Friends of the Pend d'Oreille Bay Trail.



P.O. Box 7059
Bozeman, MT 59771
<https://headwaterseconomics.org>

Cover Photo: Friends of the Pend d'Oreille Bay Trail

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY	4
II. SOCIOECONOMIC CONTEXT	5
III. ASSUMPTIONS.....	5
IV. COSTS.....	5
V. BENEFITS.....	6
Safety.....	7
Quality of Life.....	7
Economic Competitiveness	9
Environmental Sustainability	9
VI. BENEFIT-COST RATIOS	10
VII. ENDNOTES	11

TABLE OF FIGURES

Table 1. Summary costs of the Pend d’Oreille Bay Trail Underpass (2017\$).....	6
Table 2. Summary benefits of the Pend d’Oreille Bay Trail Underpass (2017\$).	6
Table 3. Net present value of benefits and costs, and benefit-cost ratios, of Pend d’Oreille Bay Trail Underpass.....	10

I. EXECUTIVE SUMMARY

The proposed undercrossing from the City of Ponderay, Idaho to the Pend d'Oreille Bay Trail and Lake Pend Oreille will generate health, safety, transportation, and economic benefits to Bonner County residents and visitors. These benefits will particularly accrue to residents of the City of Ponderay, one of the most disadvantaged communities in the area, with eliminated morbidity and mortality risks from unsafe rail line crossings, improved access to safe places to exercise, increased non-motorized travel options, and added community pride.

This report describes the undercrossing benefits and their monetization, where possible. The net present value of monetized benefits during the next 20 years, at a seven percent discount rate, include:

- Improved bicycle and pedestrian experience due to new access: \$505,771;
- Increased property values: \$4,176,957;
- Reduced mortality due to increased physical activity: \$3,622,288;
- Reduced greenhouse gas emissions due to increased non-motorized commuting: \$13,445.

Some of the largest benefits of the undercrossing are not monetized due to a lack of baseline data or the difficulty of isolating the effects of the undercrossing alone. These include:

- Avoided morbidity and mortality due to avoided rail line crossings;
- Increased social cohesion and community pride in a disadvantaged community;
- Facilitating brownfield redevelopment; and
- New long-term jobs associated with increased tourism.

The benefit-cost ratios for this project range from 1.08 to 1.29. The lowest benefit-cost ratios are for the larger undercrossing, which would also bring greater non-monetized benefits such as facilitating brownfield redevelopment. The highest benefit-cost ratios are for the pedestrian-only proposal which would allow pedestrian access to the lake and trail, but would not enable lakefront redevelopment.

Detailed information on the cost estimates for the undercrossing are provided in Attachment: Costs.

II. SOCIOECONOMIC CONTEXT

The City of Ponderay abuts Lake Pend Oreille, the largest and deepest lake in Idaho, but currently has no safe, legal access to its waterfront because the Burlington Northern Santa Fe and Montana Rail Link main rail lines run between the city and the lake. This lack of access has led Ponderay to miss out on much of the region's prosperity.

The following statistics summarize the disparities between Ponderay and Bonner County as a whole:

- Median household income is \$25,539 compared to \$42,171 for the county;
- Twenty-two percent of Ponderay residents live below the poverty line compared to 15.3 percent for the county; and
- Thirty-two percent of Ponderay residents receive food stamps compared to 12.5 percent for the county.¹

This community is particularly in need of improved access to safe places to exercise, non-motorized travel options, and a source for community pride. The underpass will remove a significant barrier to access for this disadvantaged community.

With its proximity to natural amenities and existing tourist destinations of Schweitzer Mountain Resort and the City of Sandpoint, this underpass has the potential to connect Ponderay to the economic engine that drives much of the county.

III. ASSUMPTIONS

Throughout this benefit-cost analysis, all dollar values are reported in 2017 figures. We assume the project life will be 20 years, a very conservative estimate.

IV. COSTS

The costs for this project vary depending on the location and scale of the underpass. This benefit-cost analysis uses design and construction costs for Alternative 1 (Option 1) with the BEBO Arch Bridge Alternative, as the most preferred option. Design and construction costs were developed by AECOM; detailed methods and estimates are provided in Attachment: Costs.

This project will require the purchase of two parcels of land: a 4.6 acre parcel in the railroad right-of-way and a 0.54 acre parcel to provide access to the underpass from Route 200. To estimate the cost of the railroad right-of-way, we use the cost per square foot (\$10) paid by the City of Sandpoint to Burlington Northern-Santa Fe Railroad for the Little Sand Creek Water Treatment Plant in 2011.² Total costs for this parcel would be \$2 million.

To estimate the cost of the second parcel, we apply the per acre cost of the recently purchased Harbison property by the City of Ponderay, which is adjacent to the second parcel. Using the Harbison property rate of \$82,223 per acre, the Route 200 parcel would cost approximately \$44,400.

Total undiscounted maintenance costs over a 20-year project lifespan are \$507,500. Annual maintenance costs are \$15,500 per year, and include routine maintenance like patching and sealing as well as snow plowing. Larger costs over the project lifetime include new chip seals at Years 5 and 15 (\$44,000 apiece), 1.5" overlays at Years 5 and 15 (\$68,000 apiece), and minor structural repairs at Year 10 (\$20,000).

For purposes of discounting, we assume all land acquisition would occur in Year 0, design and engineering costs would occur in Year 1, and all construction and contingency costs would be divided evenly between Year 2 and Year 3. Maintenance costs would begin in Year 4 and continue until Year 20.

Table 1. Summary costs of the Pend d'Oreille Bay Trail Underpass (2017\$).

Selection Criteria	Costs, 7% Discount Rate	Costs, 3% Discount Rate
Land Acquisition	\$2,078,183	\$2,078,183
Design and Engineering	\$526,013	\$546,441
Construction and Contingencies	\$5,468,488	\$6,012,189
Operations and Maintenance	\$254,146	\$370,140
Total Costs	\$8,326,829	\$9,006,952

V. BENEFITS

This section characterizes the expected benefits during the next 20 years associated with building the underpass, by relevant primary selection criteria: safety, economic competitiveness, quality of life, and environmental sustainability.

Where monetization was possible, the net present values of the benefits are reported. Otherwise they are listed as “qualitative” and are not included in the total estimate. The total monetized benefits significantly underestimate the total value to the community because several benefits cannot be monetized, such as avoided mortality due to unsafe railroad crossings. These benefits, though without a dollar figure, are very valuable and must be emphasized.

Table 2. Summary benefits of the Pend d'Oreille Bay Trail Underpass (2017\$).

Selection Criteria	Benefits, 7% Discount Rate	Benefits, 3% Discount Rate
<i>Safety</i>		
Morbidity and mortality avoided due to avoided rail crossings	<i>Qualitative</i>	<i>Qualitative</i>
<i>Quality of Life</i>		
Improved bike/pedestrian experience due to new access	\$505,771	\$728,154
Increased property values	\$4,774,935	\$5,554,152
Reduced mortality due to increased physical activity	\$3,722,941	\$5,359,884
Increased social cohesion and community pride in a disadvantaged community	<i>Qualitative</i>	<i>Qualitative</i>
Facilitating brownfield redevelopment	<i>Qualitative</i>	<i>Qualitative</i>
<i>Economic Competitiveness</i>		
New long-term jobs to support economic competitiveness	<i>Qualitative</i>	<i>Qualitative</i>
<i>Environmental Sustainability</i>		
Reduced greenhouse gas emissions due to increased non-motorized commuting	\$13,848	\$21,098
Total Benefits	\$9,017,496	\$11,663,288

Full details of the calculations and assumptions are provided in Attachment: Benefits Analysis.

The following sections describe each category of benefits and the net present value at a seven percent discount rate.

Safety

Avoided Morbidity and Mortality due to Avoided Rail Crossings – Qualitative

Currently area residents cross the railroad tracks to reach Lake Pend Oreille. Approximately 35 trains pass along these tracks daily, with a blind corner nearby and at speeds averaging 35 miles per hour.³ Across Idaho between 2013 and 2016, there was an average of one fatal accident and 2.8 nonfatal accidents per year involving people trespassing across railroads.⁴

While no accidents have been documented at this site, anecdotes describe many near misses. These are likely to increase as the nearby population continues to grow.

Because no accidents have occurred, we do not quantify the improved safety provided by the underpass. One avoided death, however, is worth substantial benefits.

Quality of Life

Improved Bike/Pedestrian Experience Due to New Access – Net Present Value of Benefits: \$505,771

By creating a new access point to the Pend d’Oreille Bay Trail (POBT) and turning a dead-end trail into a through trail, the underpass is likely to increase trail use substantially and will significantly improve trail user experiences.

To determine a likely expected increase in trail use we use the example from Durham, North Carolina: after a bridge was constructed to connect two dead end trails, trail use increased by 133 percent.⁵ Based on the 2014 and 2015 estimates of an average of 192 trail users per day on the POBT,⁶ we estimate that trail use will increase by approximately 255 new users per day during the summer and 128 in the winter.

Litman estimates that improved trail user experience is worth \$0.25 per non-motorized mile traveled.⁷ Assuming the new users travel the three-mile roundtrip on the trail, we estimate the annual benefits to new users will be \$52,360. The net present value of benefits over the next 20 years are \$505,771.

Increase in Property Values – Net Present Value of Benefits: \$4,176,957

Currently, homes in Ponderay are very close to Lake Pend Oreille and to the terminus of the POBT, but there is no safe, legal access to the lake or trail. The underpass will provide safe, legal access to these existing resources that are not available to Ponderay residents presently.

Numerous peer-reviewed analyses demonstrate the value of proximity to trails and waterfront for homeowners. Using the average price premium from four studies, we estimate the underpass will increase the median home value by 8.5 percent.⁸ Using current median home value of \$145,637 and 452 total housing units,⁹ this translates into a total one-time increase in value of \$5.6 million. We allocate the value increase across three years, starting in project Year 3.

In addition to the parcels on the northeast side of the tracks, the underpass will also provide access to five currently inaccessible properties, two of which are owned by the City of Ponderay and three of which are privately owned. In an appraisal conducted for a different section of land used for the Pend d’Oreille Bay

Trail, analysts reviewed real estate transactions in the inland northwest for which access to the property was eliminated. They found that without access, properties lost on average 52 percent of their value.¹⁰

Using Bonner County Assessor records, the assessed value of the private properties presently are \$586,893. Assuming in their current state that they have lost 52 percent of their value, their value with access would be \$1.2 million, a difference of \$630,727. We allocate the value increase across three years, starting in project Year 3.

The net present value of these benefits is \$4.8 million.

Reduced Mortality for Ponderay Residents – Net Present Value of Benefits: \$3,722,941

Public health research demonstrates that living closer to trails is associated with increased physical activity, which translates into lower mortality rates and lower health care costs for a community.¹¹

In rural Missouri, researchers found that 58 percent of inactive residents increased their physical activity due to the construction of a nearby trail.¹² In Bonner County, 22 percent of residents currently are inactive.¹³ Based on the 947 current residents of Ponderay, we assume that the underpass will facilitate increased physical activity among 120 residents.

Using the Health Economics Analysis Tool,¹⁴ the value of the expected mortality risk reduction and reduced health care expenses associated with 120 residents walking three additional miles per week (the length of a roundtrip on the POBT), is \$375,000 per year. The net present value of these benefits over 20 years is \$3.7 million.

This figure is likely a significant underestimate because it only accounts for mortality risk reductions for Ponderay residents, while residents from other neighboring communities are likely to increase their physical activity as well.

Increased Social Cohesion and Community Pride for a Disadvantaged Community – Qualitative

As described earlier, the community of Ponderay is disadvantaged in terms of poverty, access to safe alternative transportation options, and access to the nearby Lake Pend Oreille that defines much of the region's identity.

The underpass will provide opportunity for improved social connection and community pride in Ponderay. Research has found that residents near trails highly value opportunities to meet neighbors, recreate with families, and engage in other social interaction.¹⁵

Facilitating Brownfield Redevelopment – Qualitative

New access provided by the underpass will facilitate the removal of a significant health and safety hazard, which in turn creates an opportunity for the city and its residents to capitalize on presently unusable, inaccessible lakeshore.

The Idaho Department of Environmental Quality, the City of Ponderay, and private landowners currently are working on a brownfield remediation and redevelopment plan for the Black Rock Brownfield site, which is on the opposite side of the railroad tracks from Ponderay and on the shores of Lake Pend Oreille. The underpass would provide much easier access to the brownfield site, allowing remediation activities to occur without constructing a temporary at-grade crossing.

Remediation of this site together with new access via the underpass will enable lakefront commercial and residential development. The City of Ponderay has developed a Lakeside Neighborhood Plan that captures the vision and the zoning requirements for this development to occur.

The health and economic benefits from site remediation are substantial. Because the grant request includes only funding for the underpass and funding for the brownfield is being secured separately, brownfield redevelopment is considered in this analysis as a qualitative benefit only.

Economic Competitiveness

New Long-Term Jobs to Support Additional Tourism – Qualitative

Building an underpass to the POBT will significantly enhance user experiences by creating a through-trail and will increase use by providing another access point. Much of the increased use is likely to come from visitors to the area who may be attracted because of the easily accessible recreation opportunities or who may extend their stay in the region. The construction of the underpass could draw visitors into Ponderay where they may patronize local restaurants, retailers, bike shops, hotels, and other businesses.

In Burlington, Vermont, the Waterfront Trail on Lake Champlain draws visitors who spend an estimated \$45,000 per weekend day during the five-month tourist season.¹⁶ This spending in turn supports local jobs. Because this region already has a strong reputation as a tourism destination and associated tourism infrastructure, the community can add this trail to its existing marketing efforts.

Due to the uncertainty associated with forecasting additional jobs and income associated with the trail, this new economic activity is included as a qualitative benefit only.

Environmental Sustainability

Reduced Greenhouse Gas Emissions Due to Increased Non-Motorized Commuting – Net Present Value of Benefits: \$13,848

The new underpass will create a safe, scenic non-motorized transportation option for commuters in the cities of Ponderay and Kootenai. In a 2015 survey of current users of the POBT, 90 percent stated they would use the POBT for transportation if it were linked through to Ponderay.¹⁷

To estimate the savings in greenhouse gas emissions that will be attributable to the underpass, we estimate the value of avoided carbon emissions due to reduced vehicle miles traveled (VMT).

Currently no residents of Ponderay report commuting by bicycle. We estimate that after the underpass is built, the share of Ponderay's residents commuting by bicycle will be 3.5 percent, the same as neighboring Sandpoint's current share.¹⁸ This is likely an underestimate because research has found that new trails can have much larger effects on bicycle mode share when they create an important connection in a network.¹⁹

We estimate the POBT underpass will avoid 524 metric tons of CO₂ emissions over the next 20 years. Using the current and projected social cost of carbon,²⁰ the net present value of these savings is \$13,848. Due to the relatively small quantity of other emissions avoided like NO_x, SO_x, and particulate matter, we do not monetize the benefits of these reductions.

VI. BENEFIT-COST RATIOS

The ratio of benefits to costs ranges from 1.08 to 1.29 for 7 percent and 3 percent discount rates, respectively. The net present value of benefits, costs, and the benefit-cost ratios are summarized in Table 3.

Table 3. Net present value of benefits and costs, and benefit-cost ratios, of Pend d'Oreille Bay Trail Underpass.

	3% Discount Rate	7% Discount Rate
Total Benefits	\$11,663,288	\$9,017,496
Total Costs	\$9,006,952	\$8,326,829
Benefit-Cost Ratios	1.29	1.08

VII. ENDNOTES

-
- ¹ U.S. Department of Commerce. 2016. Census Bureau, American Community Survey Office, Washington, D.C.
- ² Drumheller, S. Personal communication on March 17, 2017.
- ³ Collins, K. and V. Mundlin. 2013. "Appraisal of Real Property: Ponderay Bay Trail Zone 2." Auble, Jolicoeur & Gentry.
- ⁴ Federal Railroad Administration Office of Safety Analysis. 2017. 3.01: Trespasser Casualties by State. <http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/summary.aspx> . Accessed April 17, 2017.
- ⁵ Cook, T., S. O'Brien, K. Jackson, D. Findley, and S. Searcy. 2016. "Behavioral effects of completing a critical link in the American Tobacco Trail." *Transportation Research Record* 2598: 19–26.
- ⁶ Van Ooyen, J. 2015. "2015 Pend d'Oreille Bay Trail Count and Survey Final Report." Sandpoint, Idaho: Friends of the Pend d'Oreille Bay Trail; Rinck, J. 2014. "2014 Pend d'Oreille Bay Trail Count and Survey Final Report." Sandpoint, Idaho: Friends of the Pend d'Oreille Bay Trail.
- ⁷ Litman, T. 2017 "Evaluating active transport benefits and costs." Victoria Transport Policy Institute. Victoria, BC: Victoria Transport Policy Institute. Retrieved from <http://www.vtpi.org/nmt-tdm.pdf>.
- ⁸ Lansford Jr, N. and L. Jones. 1995. "Recreational and aesthetic value of water using hedonic price analysis." *Journal of Agricultural and Resource Economics* 20(2): 341-355; Asabere, P. and F. Huffman. 2009. "The relative impacts of trails and greenbelts on home price." *The Journal of Real Estate Finance and Economics* 38(4): 408-419; Lindsey, G., J. Man, S. Payton, and K. Dickson. 2004. "Property values, recreation values, and urban greenways." *Journal of Park and Recreation Administration* 22(3): 69-90; Karadeniz, D. 2008. "The Impact of the Little Miami Scenic Trail on Single Family Residential Property Values (unpublished Master's thesis)." Cincinnati, Ohio: University of Cincinnati School of Planning.
- ⁹ U.S. Department of Commerce. 2016. Census Bureau, American Community Survey Office, Washington, D.C.
- ¹⁰ Collins, K. and V. Mundlin. 2013. "Appraisal of Real Property: Ponderay Bay Trail Zone 2." Auble, Jolicoeur & Gentry.
- ¹¹ Abildso, C., S. Zizzi, S. Selin, and P. Gordon. 2012. "Assessing the cost effectiveness of a community rail-trail in achieving physical activity gains." *Journal of Park and Recreation Administration* 30(2): 102-113; Wang, G., C. Macera, B. Scudder-Soucie, T. Schmid, M. Pratt, and D. Buchner. 2004. "Cost effectiveness of a bicycle/pedestrian trail development in health promotion." *Preventive Medicine* 38(2): 237-242; Gordon P., S. Zizzi, and J. Pauline. 2004. "Use of a community trail among new and habitual exercisers: a preliminary assessment." *Preventing Chronic Disease* 1(4): 1-11; King W., J. Brach, S. Belle, R. Killingsworth, M. Fenton, A. Kriska. 2003. "The relationship between convenience of destinations and walking levels in older women." *American Journal of Health Promotion* 18(1):74-82.
- ¹² Brownson, R., R. Housemann, D. Brown, J. Jackson-Thompson, A. King, B. Malone, and J. Sallis. 2000. "Promoting Physical Activity in Rural Communities: Walking Trail Access, Use, and Effects." *American Journal of Preventive Medicine* 18(3): 235-242.
- ¹³ <http://www.countyhealthrankings.org/app/idaho/2016/rankings/bonner/county/outcomes/overall/snapshot>
- ¹⁴ <http://www.heatwalkingcycling.org>.
- ¹⁵ Corning, S., R. Mowatt, and H. Chancellor. 2012. "Multiuse Trails: Benefits and Concerns of Residents and Property Owners." *Journal of Urban Planning and Development* 138(4): 277-285.
- ¹⁶ Zhang, C., L. Jennings, and L. Aultman-Hall. 2010. "Estimating Tourism Expenditures for the Burlington Waterfront Path and the Island Line Trail, Report # 10-003." Burlington, VT: University of Vermont Transportation Research Center.
- ¹⁷ Van Ooyen, J. 2015. "2015 Pend d'Oreille Bay Trail Count and Survey Final Report." Sandpoint, Idaho: Friends of the Pend d'Oreille Bay Trail.
- ¹⁸ U.S. Department of Commerce. 2016. Census Bureau, American Community Survey Office, Washington, D.C.
- ¹⁹ Litman, T. 2017. "Evaluating active transport benefits and costs." Victoria, BC: Victoria Transport Policy Institute. <http://www.vtpi.org/nmt-tdm.pdf>.
- ²⁰ <https://www.transportation.gov/sites/dot.gov/files/docs/BCA%20Resource%20Guide%20-%20November%202016.pdf>.