APPENDIX D

COAL CREEK NATIONAL ECONOMIC DEVELOPMENT (NED) ANALYSIS

HISTORY

Cedar City was named by early settlers because of the abundance of cedar (juniper) trees in the area. It was originally called Little Muddy, then Coal Creek, from the creek where the town was first established. Pioneers arrived on November 11, 1851 and soon set up the first iron refinery west of the Mississippi, using ore from the hills to the west, coal from nearby Cedar Canyon, and water from Coal Creek for energy.

From its mining and farming roots, Cedar City has grown to a city with a population of 25,056 persons in 2005.[1] It is home to the world-renowned Utah Shakespearean Festival which draws approximately 150,000 visitors annually (May through October),[2] the Utah Summer Games with approximately 8,400 athletes and 50,000 spectators (held in June)[3] and the American Folk Ballet. Paired with Southern Utah University (SUU), the community provides guests and residents alike with a huge variety of cultural and recreational offerings, including top-notch theater, NCAA Division I Sports, concert and lecture series, and more.

Coal Creek is in the center of many of the City's key events and facilities, as the creek runs through the middle of town. Further, peak stream flow for Coal Creek is reached in May and June when visitor levels in the city are highest from both the Shakespearean Festival and Summer Games attendees. As recently as May 2005, the *Salt Lake Tribune* reported, "National Weather Service hydrologist Brian McInerny said the greatest damage could come from Coal Creek. 'That has a high populace area,' he said. 'The stream runs right through the town.'"[4] Therefore, flooding from the Creek has the potential to damage not only surrounding structures, but also to disrupt well-known and highly-attended tourist attractions. On the other hand, parkway improvements will benefit not only local residents but will also improve the experience for thousands of tourists to the area.

1. http://governor.utah.gov/dea/05BaselineCityProj.xls
2. http://www.bard.org/About/quickfacts.html
3. http://www.utahsummergames.org/about.html
4. Salt Lake Tribune, "Frustration of Iron County Residents Rises with Waters," May 23, 2005.

DEMOGRAPHICS AND ECONOMICS

There are approximately 25,056 people living in Cedar City and 40,212 residents of Iron County[5] plus nearly 6,000 students attending Southern Utah University.[6] Iron County has a healthy rate of growth, averaging 3.3% over the past five years. Cedar City's population is somewhat younger than the state average, likely due to the college student population, with a median age of 23.3 years (state median age is 27.1 years) and a median household income of $32,403 (state median income is $45,726).

Table D.1. Cedar City Largest Employers

Employer	Industry	Jobs
Southern Utah University	Public Higher Education	1500
Iron County School District	Public Education	1050
Convergys	Call Center	510
State of Utah	State Government	360
Wal-Mart	Discount Department Store	375
Valley View Medical Center	Health Care	350
Federal Government	Federal Government	380
Brian Head Resort Inc	Ski Resort	300-350
Smead Manufacturing	Paper Products Manufacturing	243
Iron County	Local Government	300
WECCO	Chemical Manufacturing	176
Cedar City Corporation	Local Government	120
Kolob Regional Care	Nursing Care Facility	125
Western Quality Foods	Dairy Products Manufacturing	115
NAMPAC	Plastic Pail Manufacturing	140
Leggett & Platt	Retail Store Fixture Manufacturing	113
Lozier	Retail Store Fixture Manufacturing	100

Source: http://www.cedarcity.org/pdfs/EconomicProfileNov2004.pdf

5. http://governor.utah.gov/dea/05BaselineCityProj.xls
6. http://www.suu.edu/general/

Cedar City has a healthy, diverse economy which is comprised of four major sectors: Manufacturing – 28%; Retail Trade – 28%; Accommodations & Food services – 20%; and Administrative Services & Support – 13% [7] The city's largest employers are in education – Southern Utah University and Iron County School District.

ECONOMIC IMPACTS OF CREEK AND PARKWAY IMPROVEMENTS

Economic impacts from improvements to Coal Creek and the parkway will occur in several ways. First, improvements to the creek will reduce the likelihood of flooding. Flood costs include not only damage to structures, agricultural land and personal property in the flood-plain—both privately and publicly-owned—but also the cost of cleanup by city crews, missed work days and potential increases in flood insurance premiums. The potential for reducing damages from flooding is discussed below under "Benefits – Flood Damage Reduction."

Parkway improvements will also result in increased recreational opportunities and improved aesthetics in the area. While it is difficult to quantify the value of aesthetics and recreational use, there are federal government guidelines that provide a means of estimating the "value" of recreation activities and facilities to users. These benefits are discussed below under "Benefits – Recreation Users."

Substantial research shows that real estate values increase with proximity to trails, open space and parks. Increased values are dependent on a number of factors, including type of improvements and distance from the improvements. These benefits are discussed below under "Benefits – Impacts to Real Estate Values."

BENEFITS – FLOOD DAMAGE REDUCTION

Improving Coal Creek Parkway will reduce the likelihood of flood damage to nearby property by reducing the size of the 100-year and 500-year floodplains. Existing and proposed floodplains are shown in Figure 2.1.

Flood damage within these floodplains would primarily impact improvements such as buildings, both residential and commercial, although some agricultural property is included in the 500-year floodplain. In total, if improvements are made to the creek, 112 parcels will be removed from the 100-year floodplain and remain in the 500-year floodplain while another 457 parcels will be removed from the 500-year floodplain altogether.

PRIVATE PARCELS IN FLOODPLAIN

Of the 112 parcels that would remain in the 500-year floodplain, 65 parcels are privately owned and 47 are publicly-owned. Of the privately-owned parcels, 30 are classified residential, 19 are private undeveloped land, and 16 are non-residential (developed).

7. Source: http://www.city-data.com/business/econ-Cedar-City-Utah.html 20 July 2005.

Table D.2. Floodplain Parcels – With and Without Improvements

	Current # of Parcels	Change in # of Parcels	Total Parcels -- # after Creek Improvements	Net Change in Parcels
100-year floodplain	321	-112	209	-112
500-year floodplain	453	+112 (from 100-year) -457 (no longer in floodplains)	111	-342

Source: SWCA Environmental Consultants.

Table D.3. 100-Year Floodplain Parcels Moved 500-Year Floodplain

	Number of Parcels
Residential	
Basement, one-story	14
Basement, 1.5-stories	1
No basement, 1-story	9
No basement, 1-5 stories	2
No basement, 2 stories	1
Residential Unknown	3
Subtotal residential	30
Private Non-Residential Developed	16
Private Land Undeveloped	19
Public Property	47
TOTAL	112

Source: SWCA; Iron County Assessor's Office; Lewis Young Robertson & Burningham, Inc.

457 parcels currently in the 500-year floodplain would no longer be in a floodplain if the planned improvements to the creek take place (Table D.4). Of these 457 impacted parcels, 386 (84%) are privately owned, with 229 residential, 45 private land and 112 non-residential private development.

PROPERTY VALUE ESTIMATES

PRIVATE PROPERTY VALUES

The potential to reduce damages from flooding is calculated based on a percentage of the value of the structures and personal property ("contents") located within the floodplain. Parcels within the 100-year and 500-year floodplains were identified by SWCA; the Iron County Assessor's office provided property values, assessed as of 2004, for these individual

Table D.4. 500-Year Floodplain Parcels No Longer in Floodplain

	Number of Parcels
Residential	
Basement, one-story	131
Basement, 1.5-stories	6
Basement, 2 stories	1
Basement, split entry	3
No basement, 1-story	52
No basement, 1.5 stories	7
No basement, 2 stories	2
No basement, bilevel	3
No basement, split entry	1
Residential Unknown	23
Subtotal Residential	229
Non-Residential Private Development	112
Private Land Undeveloped	45
Public Property	71
TOTAL	457

Source: SWCA; Iron County Assessor's Office; Lewis Young Robertson & Burningham, Inc.

parcels. A summary of property values for parcels impacted by the creek improvements (i.e., parcels moving from the 100-year to the 500-year floodplain and those parcels no longer categorized as lying within the 500-year floodplain) is shown in Tables D.5 and D.6 below.

PUBLIC PROPERTY VALUES

Structural value associated with publicly-owned parcels moved from the 100-year to the 500-year floodplain totals $4,456,193; parcels moved out of the 500-year floodplain total $10,479,246 (Table D.7). Structural values for public parcels in Iron County are not recorded by the County Assessor. Thus, structural values for public parcels within the floodplains were estimated using the average structural value per commercial acre for property within the floodplain. Value per commercial acre was found by dividing the structural value of each parcel within the floodplain by the parcel acreage. Each value per commercial parcel was averaged to produce a full average structural value per commercial acre. This figure was then multiplied by the acreage of each public parcel to produce an estimated structural value per parcel.

Table D.5. Real Property Value (Structures Only) – Moved from 100-year to 500-year Floodplain

Private Ownership		
Classification	**Number of Parcels**	**Structural Value**
Basement, residential, one story	14	$1,079,217
Basement, residential, 1.5 stories	1	$69,002
No Basement, residential, one story	9	$523,070
No basement, residential, two story	1	$99,629
No basement, residential, 1.5 stories	2	$110,541
Residential Unknown	3	$542,711
Non-Residential Private Development	16	$3,401,015
Total	46	$5,825,185

Source: SWCA; Iron County Assessor's Office; Lewis Young Robertson & Burningham, Inc.

Table D.6. Real Property Value (Structures Only) – Moved from 500-Year to Outside Floodplain

Private Ownership		
Classification	**Number of Parcels**	**Structural Value**
With basement, single-family residence, one-story	131	$9,383,452
With basement, single-family residence, two-story	1	$81,980
With basement, single-family residence, 1.5 story	6	$530,256
With basement, single-family residence, split entry	3	$304,073
Without basement, residence, one story	52	$3,503,433
Without basement, residence, two story	2	$165,800
Without basement, residence, 1.5 story	7	$440,303
Without basement, residence, bilevel	3	$273,169
Without basement, residence, split entry	1	$81,478
Residential Unknown	23	$7,308,172
Commercial, privately owned	112	$25,251,557
Total	341	$47,323,673

Source: SWCA; Iron County Assessor's Office; Lewis Young Robertson & Burningham, Inc.

Table D.7. Real Property Value (Structures Only) – Moved from 100-year to 500-year Floodplain and From 500-Year to Outside of Floodplain

	Public Ownership	
Classification	**Number of Parcels**	**Structural Value**
From 100-Year to 500-Year Floodplain:		
Public parcels	47	$4,456,193
From 500-Year to Outside of Floodplain:		
Public parcels	71	$10,479,246

Source: SWCA; Iron County Assessor's Office; Lewis Young Robertson & Burningham, Inc.

FEDERAL GUIDELINES FOR ESTIMATING REDUCTION IN FLOOD DAMAGES

The potential for flood damage reduction is calculated using Flood Insurance Damage tables provided by the Federal Insurance Administration.[8] These tables estimate flood damage as a percent of structural and personal property values for varying levels of flood waters. Bowen, Collins & Associates and SWCA (consultants on the Coal Creek project) estimate that water depth in the 100-year floodplain would be two feet or less and one foot or less for the 500-year floodplain. Calculations also take into account differing residential designs, including with or without basement and number of stories in the structure. The percentages for one- and two-foot flood depths (used in our analysis), based on the 100-year and 500-year floodplains, have been highlighted in Tables D.8 and D.9.

Personal property damages are assessed based on fifty percent of structural value (assumed personal property value), multiplied by the percent damages (based on flood depth) shown in the following two tables – residential and small business personal property depth percent damage curves.

Personal property damage curves for small business are based only on the first floor and above. These percentages are as follows in Table D.10.

PRIVATE PROPERTY - CHANGE FROM 100-YEAR TO 500-YEAR FLOODPLAIN

Using the damage curves for structural and personal property, we have calculated the potential for flood damage reduction at $539,319 for structural damages and $856,964 for personal property damages for the 65 private parcels originally located in the 100-year floodplain and moving to the 500-year floodplain after improvements are made to the creek (Table D.11). The $539,319 figure will need to be annualized and discounted to account for the probability of flooding in any given year.

8. Natural Resources Conservation Service, *Water Resources Handbook for Economics,* Appendix 4B, July 1998.

Table D.8. Federal Insurance Administration Structure Residential and Small Business Depth Percent Damage Curves

Depth	One story, with basement	Split level, with basement	One story, no basement	Two or more stories, no basement	Split level, no basement
-5	13%	11%			
-4	14%	13%			
-3	15%	14%			
-2	16%	14%			
-1	18%	15%			
0	20%	18%	7%	5%	4%
1	29%	21%	26%	12%	13%
2	37%	26%	36%	19%	24%
3	44%	31%	42%	24%	30%
4	49%	36%	47%	29%	35%
5	53%	38%	49%	32%	37%
6	55%	42%	53%	36%	40%
7	58%	43%	55%	38%	41%
8	59%	53%	58%	41%	49%
9	60%	58%	60%	47%	60%
10	60%	62%	60%	50%	64%
11	60%	66%	60%	54%	66%
12	60%	68%	60%	56%	70%
13	60%	71%	60%	59%	71%
14	60%	72%	60%	60%	72%
15	60%	72%	60%	60%	72%
16	60%	72%	60%	60%	72%

Natural Resources Conservation Service, *Part 611 – Water Resources Handbook for Economics,* Appendix 4B.

Table D.9. Federal Insurance Administration Contents – Residential Depth Percent Damage Curves

Depth	All on first floor and basement	All on first two or more floors, with basement	All in split level, with basement	All on first floor	All on first two or more floors	All in split level, without basement
-5	10%	10%				
-4	16%	11%	10%			
-3	17%	14%	12%			
-2	18%	15%	12%			
-1	20%	16%	18%			
0	25%	16%	22%	6%	5%	2%
1	48%	26%	37%	42%	19%	23%
2	70%	41%	53%	60%	34%	38%
3	84%	52%	62%	72%	44%	49%
4	91%	58%	70%	82%	52%	56%
5	94%	61%	73%	89%	56%	61%
6	94%	62%	76%	94%	59%	64%
7	94%	64%	77%	94%	60%	66%
8	94%	67%	79%	94%	61%	67%
9	94%	71%	83%	94%	66%	75%
10	94%	77%	88%	94%	70%	83%
11	94%	85%	91%	94%	78%	90%
12	94%	91%	94%	94%	86%	94%
13	94%	94%	94%	94%	94%	94%
14	94%	94%	94%	94%	94%	94%
15	94%	94%	94%	94%	94%	94%
16	94%	94%	94%	94%	94%	94%

Natural Resources Conservation Service, *Part 611 – Water Resources Handbook for Economics,* Appendix 4B.

Table D.10. Federal Insurance Administration Contents – Small Business Depth Percent Damage Curves

Flood Depth	Percent Damage
0.0	0%
0.1	2%
0.2	3%
0.3	5%
0.4	6%
0.5	9%
0.6	11%
0.7	15%
0.8	17%
0.9	19%
1.0	22%
1.1	25%
1.2	28%
1.3	31%
1.4	34%
1.5	37%
1.6	41%
1.7	46%
1.8	50%
1.9	55%
2.0	59%
2.1	63%
2.2	68%
2.3	72%
2.4	77%
2.5	81%
2.6	85%
2.7	89%
2.8	93%

Table D.10. Federal Insurance Administration Contents – Small Business Depth Percent Damage Curves, continued

Flood Depth	Percent Damage
2.9	97%
3.0	100%

Natural Resources Conservation Service, *Part 611 – Water Resources Handbook for Economics,* Appendix 4B.

The value of personal property is estimated at 50% of structural (i.e., "building") value,[9] and then multiplied by the appropriate damage curves. The undiscounted potential for flood damage reduction for personal property is $856,964 for parcels changing from the 100-year to 500-year floodplain (Table D.12).

PRIVATE PROPERTY - CHANGE FROM 500-YEAR TO OUTSIDE OF FLOODPLAIN.

The structural flood damage reduction potential for the 386 privately-owned parcels moving from the 500-year floodplain to outside of the floodplain boundaries is $11,389,324 (not discounted) (Table D.13).

In addition, personal property flood reduction potential for the parcels leaving the 500-year floodplain reaches $6,731,876 (not discounted) (Table D.14).

PUBLIC PROPERTY - CHANGE FROM 100-YEAR TO 500-YEAR FLOODPLAIN.

Using the damage curves for structural and personal property, we have calculated the potential for flood damage reduction at $445,619 for the 47 public parcels originally located in the 100-year floodplain and moving to the 500-year floodplain after improvements are made to the creek (Table D.15). The $445,619 figure will need to be annualized and discounted to account for the probability of flooding in any given year.

9. State Economist, USDA Natural Resources Conservation Service.

Table D.11. Flood Damage Reduction Potential – Structural. Private Parcels Originally in 100-year Floodplain, now in 500-year Floodplain

	Structural Value	1 ft (500-yr floodplain)	2 ft (100-yr floodplain)	Change in Percent	Structural Damage Reduction Value
Residential					
Basement, 1 story	1,079,217	29%	37%	8%	86,337
Basement, 1.5 stories	69,002	21%	26%	5%	3,450
Basement, 2 stories	-	20%	25%	5%	-
Basement, Split Entry	-	21%	26%	5%	-
No Basement, 1 story	523,070	26%	36%	10%	52,307
No basement, 1.5 stories	110,541	13%	24%	11%	12,160
No basement, 2 stories	99,629	12%	19%	7%	6,974
No basement, bilevel	-	13%	24%	11%	-
No basement, split entry	-	13%	24%	11%	-
Residential Unknown	542,711	12%	19%	7%	37,990
Nonresidential, with Improvements	3,401,015	26%	36%	10%	340,102
Total Private Parcels	5,825,185				539,319

Table D.12. Flood Damage Reduction Potential – Personal Property. Private Parcels Originally in 100-Year Floodplain, now in 500-Year Floodplain

	Personal Property Value	1 ft (500-yr floodplain)	2 ft (100-yr floodplain)	Change in Percent	Personal Property Damage Reduction Value
Residential					
Basement, 1 story	539,609	48%	70%	22%	118,714
Basement, 1.5 stories	34,501	37%	53%	16%	5,520
Basement, 2 stories	0	26%	41%	15%	0
Basement, Split Entry	0	37%	53%	16%	0
No Basement, 1 story	261,535	42%	60%	18%	47,076
No basement, 1.5 stories	55,271	23%	38%	15%	8,291
No basement, 2 stories	49,815	19%	34%	15%	7,472
No basement, bilevel	0	23%	38%	15%	0
No basement, split entry	0	23%	38%	15%	0
Residential Unknown	271,356	19%	34%	15%	40,703
Nonresidential, with Improvements	1,700,508	22%	59%	37%	629,188
Total Private Parcels	2,912,593				856,964

Table D.13. Flood Damage Reduction Potential – Structural. Private Parcels Originally in 500-Year Floodplain, no Longer in Floodplain

	Structural Value	1 ft (500-yr floodplain)	2 ft (100-yr floodplain)	Change in Percent	Structural Damage Reduction Value
Residential					
Basement, 1 story	9,383,452	29%		29%	2,721,201
Basement, 1.5 stories	530,256	21%		21%	111,354
Basement, 2 stories	81,980	20%		20%	16,396
Basement, Split Entry	304,073	21%		21%	63,855
No Basement, 1 story	3,503,433	26%		26%	910,893
No basement, 1.5 stories	440,303	13%		13%	57,239
No basement, 2 stories	165,800	12%		12%	19,896
No basement, bilevel	273,169	13%		13%	35,512
No basement, split entry	81,478	13%		13%	10,592
Residential Unknown	7,308,172	12%		12%	876,981
Nonresidential, with Improvements	25,251,557	26%		26%	6,565,405
Total Private Parcels	47,323,673				11,389,324

Table D.14. Flood Damage Reduction Potential – Personal Property. Private Parcels Originally in 500-Year Floodplain, no Longer in Floodplain

	Personal Property Value	1 ft (500-yr floodplain)	2 ft (100-yr floodplain)	Change in Percent	Personal Property Damage Reduction Value
Residential					
Basement, 1 story	4,691,726	48%		48%	2,252,028
Basement, 1.5 stories	265,128	37%		37%	98,097
Basement, 2 stories	40,990	26%		26%	10,657
Basement, Split Entry	152,037	37%		37%	56,254
No Basement, 1 story	1,751,717	42%		42%	735,721
No basement, 1.5 stories	220,152	23%		23%	50,635
No basement, 2 stories	82,900	19%		19%	15,751
No basement, bilevel	136,585	23%		23%	31,414
No basement, split entry	40,739	23%		23%	9,370
Residential Unknown	3,654,086	19%		19%	694,276
Nonresidential, with Improvements	12,625,779	22%		22%	2,777,671
Total Private Parcels	23,661,837				6,731,876

Table D.15. Flood Insurance Damage – Structural

Public Parcels Originally in 100-Year Floodplain, Now 500-Year Floodplain	
Structural Value	$4,456,193
Structural Depth Percent Damage Curve	
1 ft (500-yr floodplain)	26%
2 ft (100-year floodplain)	36%
Change in Percent	10%
Structural Damage Reduction Value	$445,619

Natural Resources Conservation Service, *Part 611 – Water Resources Handbook for Economics,* Appendix 4B.

The value of personal property is estimated at 50% of structural (i.e., "building") value, and then multiplied by the appropriate damage curves. The undiscounted potential for flood damage reduction for personal property is $824,396 for parcels changing from the 100-year to 500-year floodplain (Table D.16).

Table D.16. Flood Insurance Damage – Personal Property

Public Parcels Originally in 100-Year Floodplain, Now 500-Year Floodplain	
Personal Property Value	$2,228,096
Personal Property Depth Percent Damage Curve	
1 ft (500-yr floodplain	22%
2 ft (100-year floodplain	59%
Change in Percent	37%
Personal Property Reduction Value	$824,396

Natural Resources Conservation Service, *Part 611 – Water Resources Handbook for Economics,* Appendix 4B.

PUBLIC PROPERTY - CHANGE FROM 500-YEAR TO OUTSIDE OF FLOODPLAIN

The structural flood damage reduction potential for the 71 publicly-owned parcels moving from the 500-year floodplain to outside of the floodplain boundaries is $2,724,604 (not discounted) (Table D.17).

As stated previously, the value of personal property is estimated at 50% of structural (i.e., "building") value, and then multiplied by the appropriate damage curves. The undiscounted potential for flood damage reduction for personal property is $1,152,717 for parcels changing from the 500-year floodplain to outside of the floodplain area (Table D.18).

Table D.17. Flood Insurance Damage – Structural

Public Parcels Originally in 500-Year Floodplain, Now Outside of Floodplain	
Structural Value	$10,479,246
Structural Depth Percent Damage Curve	
1 ft (500-yr floodplain)	26%
2 ft (100-year floodplain)	NA
Structural Damage Reduction Value	$2,724,604

Natural Resources Conservation Service, *Part 611 – Water Resources Handbook for Economics,* Appendix 4B.

Table D.18. Flood Insurance Damage – Personal Property

Public Parcels Originally in 500-Year Floodplain, Now Outside of Floodplain	
Personal Property Value	$5,239,623
Personal Property Depth Percent Damage Curve	
1 ft (500-yr floodplain)	22%
2 ft (100-year floodplain)	NA
Change in Percent	
Personal Property Reduction Value	$1,152,717

Natural Resources Conservation Service, *Part 611 – Water Resources Handbook for Economics,* Appendix 4B.

FLOOD PROBABILITY OF OCCURRENCE – ANNUALIZED AND DISCOUNTED VALUES

Since flood damage cost savings will only occur in the event of flooding, the structural and personal property damages calculated above must be adjusted according to the probability of a 100-year or 500-year flood. The damages to be adjusted are shown in Tables D.19 and D.20 as follows for both private and public structures and personal property.

In any given year, the probability of a 500-year flood occurring is 0.2%. Similarly, the probability of a 100-year flood occurring in any given year is 1.0%. These probabilities are multiplied by the total estimated damages for the 100- and 500-year floods to calculate an "average" annual savings, thus spreading flood reduction savings evenly over the appropriate number of years. A present value (PV) of this potential future stream of cost savings was then calculated using the published FY 2005 discount rate for water resources projects (5.375%). This results in an estimated $932,668 in private savings (Table D.19) and $379,296 in public savings in flood reduction damages (Table D.20).

Total flood reduction damages for private properties are estimated at $932,668 and $379,296 for public properties, for a grand total of $1,311,964 in flood reduction damages (Table D.21).

Table D.19. Total Property Flood Damage Reduction Value – Private

Property Type	100-yr Savings	500-yr Savings
Real Property (Structures)	$539,319	$11,389,324
Personal Property	$856,964	$6,731,876
Total Value	$1,396,283	$18,121,199

Table D.20. Total Property Flood Damage Reduction Value – Public

Property Type	100-yr Savings	500-yr Savings
Real Property (Structures)	$445,619	$2,724,604
Personal Property	$824,396	$1,152,717
Total Value	$1,270,015	$3,877,321

Table D.21. Total Property Flood Damage Reduction Value – Private and Public

Discounting	100-yr Saving	500-yr Saving	Total Savings
Probability	1.00%	0.20%	
Yearly Probable Value – Private	$13,963	$36,242	
Yearly Probable Value – Public	$12,700	$7,756	
Discount Rate	5.375%	5.375%	
Discounted (PV) – Private	$258,391	$674,277	$932,668
Discounted (PV) – Public	$235,024	$144,272	$379,296
Total – Public and Private Discounted	$493,415	$818,550	$1,311,964

In addition to the above flood reduction damages, the following section describes localized flooding, outside of the mapped FEMA floodplains. Implementation of the North Field Canal option would also reduce flooding and associated cleanup costs outside of the FEMA floodplains.

Localized Flooding Damage Reduction for Public and Private Properties

There is seasonal, localized flooding outside of mapped FEMA floodplains that is associated with high-discharge events in Coal Creek. Localized flooding in the vicinity of the North Field Canal and 1045 North is tied to discharge in Coal Creek. Cedar City estimates that flooding occurs in this area three times annually. Cedar City also estimates that public cleanup and restoration due to the flooding of existing open ditch canals costs approximately $10,000 annually. The City estimates the annual costs to private property owners to restore damaged fences, landscaping, and basements is approximately $2,500. Elimination of these costs would provide a benefit of approximately $12,500 annually. A present value (PV) of this potential future stream of cost savings was then calculated using the 5.375% discount rate for water resources projects.

The North Field Canal option would result in an estimated $1,025,443 in private savings and $750,864 in public savings in flood reduction damages both within and without the mapped FEMA floodplains (Table D.22).

Table D.22. Total Property Flood Damage Reduction Value – Private and Public for North Field Canal Option

Discounting	100-yr Saving	500-yr Saving	Total Savings
Probability	1.00%	0.20%	
Yearly Probable Value – Private	$16,463	$38,742	
Yearly Probable Value – Public	$22,700	$17,780	
Discount Rate	5.375%	5.375%	
Discounted (PV) – Private	$304,655	$720,789	$1,025,443
Discounted (PV) – Public	$420,080	$330,784	$750,864
Total – Public and Private Discounted	$724,734	$1,051,573	$1,776,307

BENEFITS - IMPACTS TO REAL ESTATE VALUES

According to the National Park Service, "Rivers, trails, and greenway corridors (linear open spaces connecting recreational, cultural and natural areas) are traditionally recognized for their environmental protection, recreation values, and aesthetic appearance. These corridors also have the potential to create jobs, enhance property values, expand local businesses, attract new or relocating businesses, increase local tax revenues, decrease local government expenditures, and promote a local community."[10]

The convenient recreational opportunities and attractive views of parkways are valued by people and result in increased real property values and marketability for property located near trails and open space. According to a survey done by American Lives in 1995, 77.7% of all home buyers and shoppers in the study rated natural open space as either "essential" or "very important" in planned communities. The findings of this 1995 study differ greatly from the 1980s preferences for tennis courts, golf courses and swimming pools.[11]

The effect on property values of a location near a park or open space has been the focus of numerous studies (Table D.23). Case study results are varied, partly due to the fact that it is difficult to isolate the impact of trails, parks and open space from other factors such as community economics, age of structures, etc. Correll found that property adjacent to park areas in Boulder, Colorado increased as much as 32%.[12] From a study of property in Minneapolis,

10. National Park Service, "Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors," 4th ed., 1995.
11. San Francisco Chronicle, January 8, 1995.
12. Correll, Lillydahl, and Singell. May 1978. "The Effects of Greenbelt on Residential Property Values: Some Findings on the Political Economy of Open Space," *Land Economics*.

Table D.23. Property Value Appreciation Ranges

Distance in Feet	0-50	51-999	1000-1500	2500-3200
Appreciation	33%		9%	4%
	20%		13%	
	32%			
Average	**28%**	**15%**	**11%**	**4.2%**

Minnesota, Anderson found property adjacent to parks to increase 20%.[13] Hammer found that property values increased in proportion to the proximity to park land. Property in Philadelphia increased between 4 and 33% depending on the distance from the green space. Adjacent property (0-50 ft) appreciated 33%; property between 1000-1500 feet appreciated 9%; and property 2500-3200 feet from park land appreciated 4.2%.[14] Espey found that property in South Carolina appreciated 13% between 1000-1500 feet from the park area.[15] Because results have been varied, we have included a range of impacts—from 4% to 28% increases—in our analysis. Using studies by various experts, this analysis estimates that property values increase up to a distance of 3200 feet from the proposed parkway.

While all property (publicly and privately owned) benefits from close proximity to parkways, this analysis quantifies only those impacts to private property. Although public property values would increase, such land is infrequently sold on the market and hence the price appreciation is rarely realized.

METHODOLOGY

A table of appreciation rates by distance from the parkway was created from the studies cited above. The average for each distance range was then found and applied to actual property values in Cedar City for the properties within each range in order to predict the average increase in property value by distance and in aggregate for the parcels located along the parkway.

The research did not specifically identify appreciation rates for land between 51 and 999 feet from the parkland. Fifteen percent appreciation was applied to this category based upon slope analysis. Value appreciation per foot was calculated through each designated range that revealed a specific slope for each distance category. The slopes decline or appreciate

13. Anderson, Soren. June 2000. "The Effect of Open Space on Single-Family, Residential Home Property Values." *Mccalester College.*
14. Hammer, Thomas R., Robert E. Coughlin and Edward T. Horn IV. July 1974. "Research Report: The Effect of a Large Park on Real Estate Value." *Journal of the American Institute Planners.*
15. Espey, Molly and Owusu-Edusei, Kwame. January 2001. "Park and Property Values in Greenville, South Carolina," *Department of Agriculture and Applied Economics – Clemson University.*

less quickly farther from the parkland. Fifteen percent appreciation produced a slope that was approximately the mean difference between the appreciation slope of category 0-50 feet and 1000-1500 feet.

The average increase for all properties is 6.7%, which equates to an increase of $19,099,014 in added value for privately owned properties (Table D.24).

Table D.24. Property Value Appreciation Ranges - Private

Distance in Feet	0-50	51-999	1,000-1,500	2,500-3,200	Total
Average Appreciation	28%	15%	11%	4.2%	
Value / Range	$3,090,467	$6,240,535	$84,176,361	$191,140,522	$284,647,885
Increased Value	$875,632	$936,080	$9,259,400	$8,027,902	$19,099,014
Total Value	$3,966,099	$7,176,615	$93,435,761	$199,168,424	$303,746,899
Average Value Increase					6.7%

However, this value will not all be realized immediately. No benefit will accrue to private owners until properties are sold and the added gains are realized. Therefore, we have discounted the $19,099,014 as if the entire value is not reached until five years in the future (assuming some sales will occur before and some after that time period)[16] in order to reach a present value of $14,700,192 for increased real estate value.

Benefits – Recreation Users

Recreation facilities provide benefits to the local and tourist population that are more qualitative than quantitative in nature. How does one measure the value from walking along a parkway, increased aesthetic value, increased feeling of community, etc.? Recognizing the difficulty of assessing these types of benefits, the National Resources Conservation Services outlines a "Unit Day Value Method" in its Water Resources Handbook for Economics.[17] This approach relies on expert judgment to evaluate the willingness to pay for recreation activities. Surveys (see sample form below) were provided to several agencies in the Cedar City area requesting information regarding the anticipated recreation experience at Coal Creek, with the parkway added, in comparison to other recreation sites in the area. All

16. United States Census 2000 data for Cedar City states that the median year a householder moved into an owner-occupied unit was 1995 – a period five years previous to the Census. http://factfinder.census.gov/servlet/DTTable?_bm=y&-context=dt&-ds_name=DEC_2000_SF3_U&-mt_name=DEC_2000_SF3_U_H039&-CONTEXT=dt&-tree_id=403&-all_geo_types=N&-geo_id=06000US4902190344&-search_results=01000US&-format=&-_lang=en.
17. Natural Resources Conservation Service, *Water Resources Handbook for Economics,* Section 5-3.

respondents are familiar with the plans for the parkway area as well as other recreational sites in the Iron County area and are well-prepared to evaluate the parkway's recreational benefits.[18]

On the Benefit Evaluation Worksheet, respondents were asked to rate the following five categories with up to the maximum number of points as indicated in parentheses by each factor. The following form and factors are exactly as set forth in the Water Resources Handbook for Economics.

Recreation experience (30) means the number and quality of recreation experiences available at the site.

Availability of opportunity (18) measures the substitutes available to the recreationist.

Carrying capacity (14) refers to facilities available at the site.

Accessibility (18) means the extent of roads and access to the site and within the site.

Environmental quality (20) is used to measure the esthetic factors, such as water, vegetation, geology and topography.

Table D.25. Sample Survey Form

	No Action Alternative		With Parkway	
	Points	Basis for Point Value	Points	Basis for Point Value
Recreation experience (30)				
Availability of opportunity (18)				
Carrying capacity (14)				
Accessibility (18)				
Environmental quality (20)				
TOTAL				

Source: Natural Resources Conservation Service, *Part 611 Water Resources Handbook for Economics,* Appendix 5A.

Results from the respondents are as follows, with "recreation experience" garnering the most points from all respondents.

18. Survey forms were sent to Cedar City elected officials, Cedar City Parks and Recreation Department, Wildlife Refuge and Iron County.

Table D.26. Summary of Benefit Evaluation Forms

	No Action				Parkway Improvements				Difference
	1	2	3	Average	1	2	3	Average	Average
Recreation experience	5	20	5	10	30	25	25	27	17
Availability of opportunity	0	12	5	6	15	15	15	15	9
Carrying capacity	0	9	4	4	14	12	10	12	8
Accessibility	3	10	5	6	18	12	15	15	9
Environmental quality	10	10	6	9	20	15	18	18	9
TOTAL	18	61	25	35	97	79	83	86	51

With an average score of 51 points, the 2005 unit day value per user is $6.78, following the federal guidelines set forth above. The General Recreation 1982 Base Table values in Table D.27 below are as set forth by the National Resources Conservation Service. These values have been updated to June 2005 values based on the Consumer Price Index.[19]

Table D.27. Unit Day Value Method for Estimating Recreation Benefits

Year	General Recreation 1982 Base Table	Current Index Conversion
0	$1.60	$3.19
10	$1.90	$3.79
20	$2.10	$4.19
30	$2.40	$4.79
40	$3.00	$5.98
50	$3.40	$6.78
60	$3.70	$7.38
70	$3.90	$7.78
80	$4.30	$8.58
90	$4.60	$9.18
100	$4.80	$9.58

Source: http://waterhome.brc.tamus.edu/NRCSdata/PriceIndexes/data/Principles%20and%20Guidelines,%20local%20site.pdf; Consumer Price Index.

19. A factor of 199.5% – nearly twice the original values – was used.

Based on increased usage of 350 visitors per day (roughly double the current visitation) with parkway improvements,[20] and an average per day user value of $6.78 (rounded), parkway improvements will result in benefits of $866,145 annually. Over a 50-year time-frame, this results in a present value of $14,938,527 (Table D.28).

Table D.28. Summary of Visitation and Recreation User Benefits

Current parkway visitation per day	350
Increased visitation from parkway	350
Total visitation after parkway improvements	700
Increased annual visitors	127,750
Value of increased visitation	$866,145
Discount rate	5.375%
Present Value of increased visitation (50 years)	$14,938,527

BENEFITS NOT INCLUDED IN ANALYSIS

This discussion does not include reduced national flood insurance costs for servicing flood insurance policies. Where it is determined that land use in the floodplain is the same with and without the project (as in the case of Coal Creek), the reduction in insurance overhead becomes a claimable flood reduction benefit. However, based on federal guidelines, the reduction in costs is very small -- "$14 per policy is considered a fixed cost." The Water Resources Handbook for Economics also suggests estimating the number of policies in effect by interviewing floodplain residents.[21] Due to budget limitations and the anticipated minimal benefits calculated, this was not felt to be cost effective for this project.

This analysis also makes no attempt to quantify the number and value of "lost worker days" if a flood should occur.

PRIVATE COSTS

No direct private costs have been identified.

PUBLIC COSTS

The estimated construction costs for the five improvement plans are provided in Table D.29. These estimates were provided by Bowen, Collins & Associates, and SWCA Environmental Consultants. All construction costs are considered to be upfront costs spent in the initial year of construction.

20. Based on information provided by Cedar City Parks and Recreation.
21. Natural Resources Conservation Service, *Part 611 Water Resources Handbook for Economics,* Appendix A, Miscellaneous Techniques.

Table D.29. Construction Costs

Alternatives	Channel Improvement Costs and General and Structural Construction Costs	Parkway Construction Costs	Easement Acquisition	Annual O&M Costs
A	--	--	--	$28,000
B1	$14,626,300	1,454,600	Yes	9,000
B2	$14,626,300	1,469,750	No	9,000
C1	$14,717,700	1,460,900	Yes	9,000
C1 w/ single pipe	$15,294,200	1,460,900	Yes	7,500
C2	$15,197,000	1,460,900	Yes	9,000
C2 w/ single pipe	$15,773,400	1,460,900	Yes	7,500

Alternatives	Description	Total
A	No Action	$28,000
B1	Relocate diversion upstream (w/ surface crossing at Main St. Bridge)	$16,089,900
B2	Relocate diversion upstream (w/ surface crossing using 400 N. pedestrian bridge)	$16,105,050
C1	Replace diversion in same place (pedestrian crossing using elevated concrete path under the Main Street Bridge)	$16,187,600
C1 w/ single pipe	Replace diversion in same place (pedestrian crossing using elevated concrete path under the Main Street Bridge and North Field canal piped to 1045 N)	$16,762,600
C2	Replace diversion in same place (pedestrian crossing using box culvert adjacent and north of Main Street Bridge)	$16,666,900
C2 w/ single pipe	Replace diversion in same place (pedestrian crossing using box culvert adjacent and north of Main Street Bridge and North Field canal piped to 1045 N)	$17,241,800

NED APPROACH

The federal objective of water and related land resources planning is to contribute to national economic development consistent with protecting the nation's environment. Contributions to NED are increases in the net value of the national output of goods and services that are marketed as well as those that may not be marketed, expressed in monetary units. National economic impacts are different from regional economic impacts and do not consider the impacts that are merely a transfer of benefits from one economic region to another. Rather, NED benefits are benefits to the nation as a whole.

The specific objective of the Coal Creek project is to reduce flood damages from Coal Creek and to enhance the recreation experience along the parkway. Analysis shows that these objectives will be met by reducing the size of the 100-year and 500-year floodplains (and thus reducing the potential for flood damages) and by increasing the number of recreation users along the parkway as well as the overall recreation experience at the parkway (based on survey responses). The adverse impacts of the plan are the opportunity costs of resources that could be used elsewhere, if not required for the given project.

BENEFIT-COST ANALYSIS

Table D.30 below summarizes the benefit-cost ratio for each of the alternatives. Note that benefits vary only slightly between the alternatives with and without the single-pipe option (North Field Canal). Thus, the resulting ratios for each of the alternatives are very similar in nature, ranging between 1.8:1 and 1.9:1. The analysis below does not assume any increased real estate values for public buildings located in the proximity of the parkway. If, however, public properties were to be put on the market, or if they were to be used as security (as an asset) in funding scenarios, the added value would be of benefit to the public.

Table D.30. Benefit-Cost Analysis

	BENEFITS					COSTS		NET IMPACTS	BENEFIT-COST RATIO
	Flood Reduction		Recreation Use	Real Estate					
	Private	Public	Public	Private	Public	Private	Public	Public and Private	Public and Private
A			$0	$0	$0	$0	$28,000	-$28,000	NA
B1	$932,668	$379,296	$14,938,527	$14,700,192	$0	$0	$16,089,900	$14,860,783	1.9:1
B2	$932,668	$379,296	$14,938,527	$14,700,192	$0	$0	$16,105,050	$14,845,633	1.9:1
C1	$932,668	$379,296	$14,938,527	$14,700,192	$0	$0	$16,187,600	$14,763,083	1.9:1
C1 1-pipe	$1,025,443	$750,864	$14,938,527	$14,700,192	$0	$0	$16,762,600	$14,652,426	1.9:1
C2	$932,668	$379,296	$14,938,527	$14,700,192	$0	$0	$16,666,900	$14,283,783	1.9:1
C2 1-pipe	$1,025,443	$750,864	$14,938,527	$14,700,192	$0	$0	$17,241,800	$14,173,226	1.8:1

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