

FINAL  
FISH AND WILDLIFE COORDINATION ACT  
REPORT

Coldwater Creek  
Flood Control Project  
St. Louis, County, Missouri  
May, 1987

Prepared  
for  
U.S. Army Corps of Engineers  
St. Louis District  
St. Louis, Missouri

Prepared  
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## Introduction

This report constitutes the final Fish and Wildlife Coordination Act (FWCA) report for the Coldwater Creek, Missouri Flood Control Project, conducted by the St. Louis District, U.S. Army Corps of Engineers. This report was prepared under the authority of and in accordance with the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4327), the Endangered Species Act of 1973, (16 U.S.C. 1531-1543), as amended, and the U.S. Fish and Wildlife Service Mitigation Policy.

The study was authorized by the United States Congress as part of the St. Louis Metropolitan Area, Missouri and Illinois Study. Study authorities that apply to Coldwater Creek include United States Senate Public Works Committee Resolutions dated October 4, 1966, July 15, 1970, and October 2, 1972, and United States House of Representative Public Works Committee Resolutions dated July 29, 1971, and October 12, 1972.

The St. Louis District completed a reconnaissance study of flooding and related problems and opportunities in the Coldwater Creek watershed in September, 1981. That report indicated that there were economically feasible alternatives to protecting the area from flood damages. In addition, the area has significant environmental and recreational problems and opportunities. Therefore, further study of the area was recommended by the District Engineer.

The Fish and Wildlife Service (Service) provided the St. Louis District with a Planning Aid Letter on August 14, 1981. The Service conducted a biological inventory on aquatic and terrestrial resources in the area and submitted a report on the same to the St. Louis District during August, 1981. The draft FWCA report was submitted to the District in March, 1986. Correspondence regarding Federally Threatened and Endangered Species is discussed in the Endangered Species section of this report.

## Project Alternatives

In addition to the No Action alternative, the St. Louis District, Corps of Engineers developed two plans. A display of the features in the plans is shown in tabular form in Table 1. The following features are common to both of these plans.

### Channel Modification

Coldwater Creek would be widened with rock riprap placed in erodible areas. In several locations, such as bridge crossings, concrete lined channels are planned.

Channel widening and a group of five 8-foot diameter tunnels would be placed through a railroad embankment at mile 1.63. The purpose of these features is to reduce flooding frequency that would otherwise be increased by upstream channel improvements.

### Levee

A small levee would be constructed to protect the historical Old Ferdinand's Shrine near the confluence of Coldwater and Fountain Creek.

### Clearing and Snagging

Clearing and snagging would occur in the channel downstream of the improved channels to decrease projected induced flood frequencies.

### Other Project Features Miscellaneous

Two picnic areas and an 8-foot wide trail would be constructed on one side of the improved channel. The trail would be made of crushed, rolled limestone.

The channel right-of-way would include the widened channel in addition to a 10-foot wide strip of land on each side of the channel for maintenance and repair.

Table 1. St. Louis District, Corps of Engineers  
Potential Channel Modification for Coldwater Creek

<u>Channel Reach</u>	<u>Feature</u>	
	Plan 1	Plan 2
1.63	.	Channel widened and five 8-foot diameter tunnels through railroad embankment
1.64-7.83	Clearing and snagging	
5.86-7.83		10-foot strip of land on each side of channel
7.83-13.80	Picnic area and recreational trail	Picnic area and recreational trail
10.35-10.45	Small levee	Small levee
13.80-17.68	Channel widened	Channel widened

## DESCRIPTION OF STUDY AREA

The Coldwater Creek basin lies in the northern part of St. Louis County, Missouri. The 47 square mile watershed has an elongated shape with an 18.7 mile long main channel known as Coldwater Creek and several relatively short tributary streams (fig.1). The creek originates in Overland, a northern suburb of St. Louis, and flows in a northerly direction through Breckenridge Hills, St. Anne, under Lambert-St. Louis International Airport in a double 10 foot by 15 foot box culvert, through Hazelwood to a point north of Florissant. Then, it turns in an easterly direction and flows through unincorporated St. Louis County and along the northern border of Black Jack where it joins the Missouri River at river mile 6.9.

Most of the Coldwater Creek watershed is composed of Pleistocene age lake bottom deposits composed of fine sand, clay and organic sediment that is relatively impermeable. This is overlain by a 5 to 25 foot layer of loess.

The downstream segment of Coldwater Creek consists of two layers of loessial soils over bedrock. The upper layer is silt rich and ranges from 0-10 feet thick, while the lower layer is clay-rich with low permeability and ranges from 20-50 feet thick.

Approximately 75% of the 47 square mile watershed is developed, resulting in a large amount of impermeable surfaces such as roofs, concrete streets, parking lots, driveways, and sidewalks. These features, combined with the limited permeability and water holding capacity of the local soils, produce large amounts of free-flowing surface runoff. As a result, periods of heavy rainfall, even if only of short duration, quickly fill the tributaries and creek banks, producing flooding without warning. This occasionally results in damage to commercial and residential properties. This condition could worsen with expanding urban development in the lower part of the drainage basin.

## Fish and Wildlife Resources without Project Conditions

### Aquatic Resources

In August, 1981, an aquatic biological inventory was undertaken (Nash, 1982). The inventory addressed conditions in the main channel of Coldwater Creek and over twelve of its tributaries. Benthos and fish were sampled at seven sites along the length of the main channel. A total of nineteen benthos associated taxa and six fish taxa were collected.

Table 2. Taxonomic groups and common name of benthos organisms collected in Coldwater Creek. St. Louis County, Missouri. 1981

<u>Group</u>	<u>Common Name</u>
Annelidea	
Hirudinea	
Rhynchobdellida	
Golssiphonidae	Leeches
Piscicolidae	Leeches
Oligochaeta	
Plesiopora	
Tubificidae	Aquatic earthworms
Arthropoda	
Crustacea	
Decapoda	
Orconectes	Fresh water crayfish
Isopoda	
Asellota	Fresh water sowbugs
Insecta	
Coleoptera	
Chrysomelidae	Leaf beetles
Diptera	
Chironomidae	Midges
Anthomydiae	Root Maggot flies
Tabanidae	Horse flies
Tetanoceratidae	March flies
Ephemeroptera	
Caenidae	Mayflies
Hemiptera	
Corixidae	Water boatman
Galestocoridae	Toad bugs
Neuroptera	
Corydalidae	Dobsonflies
Odonata	
Libellulidae	Dragonflies
Mollusca	
Gastropoda	
Basommatophera	
Ancylidae	Limpets
Physidae	Pouch snails

In terms of numbers of benthos specimens, samples were dominated by Tubificids and Chironomids. These organisms, along with the snail (Physa) are considered very tolerant of organic pollution. The tubificids and snail were found throughout the reaches of the creek with relatively even distributions, whereas the chironomids were found in greater numbers in the lower reaches. A taxonomic list of all the benthic organisms found is given in Table 2.

A total of 221 fish was collected in the Coldwater Creek inventory, representing six taxa (Table 3). Of this total, 214 or 97% were fathead minnows, Pimephales promelas. The other taxa were represented by only one or two individuals. The majority of the fathead minnows were found in the upper reaches of the creek, above the entrance of the airport culvert near Interstate Route 70. They are very tolerant of high temperature and turbidity as well as low oxygen levels. However, they also appear to be intolerant of competition by other fish and are seldom found together with a variety of other fishes.

From a water quality standpoint, most of the organisms collected from Coldwater Creek have been described as pollution tolerant or able to adapt to either polluted or non-polluted waste situations. Because of its location Coldwater Creek receives a variety of water pollutants, including those of direct discharge and run-off from industrial, commercial, airport facilities, varying degrees and qualities of sewage treatment discharges, and run-off from small farms and residential streets, lawns and gardens. The polluted nature of Coldwater Creek is reflected by the relatively low diversity and high numbers of those taxa present as well as the absence of those taxa that are restricted to non-polluted streams such as Plecoptera (stoneflies) and Tricoptera (caddisflies).

Furthermore, there are many physical pollutants within the creek and its tributaries. Shopping carts are most numerous, followed by discarded tires, other auto parts, appliances, furniture, as well as many miscellaneous items of residential trash.

#### Terrestrial Resources

There are no significant amounts of contiguous vegetative cover in the Coldwater Creek watershed. The land uses are: approximately 76% urban/residential area with varying degrees and types of vegetation present; 13% is agricultural; 6% is open space; 4% is forest; 0.8% is golf course and cemeteries; wetlands comprise about 0.2%.

Table 3. Taxonomic groups and common names of fish collected in Coldwater Creek.

<u>Group</u>	<u>Common Name</u>
Cypriniformes	
Cyprinidae	Golden shiner
	Red shiner
	Fathead minnow
	Carp
Ictaluridae	Black bullhead
Perciformes	
Centrarchidae	Bluegill



The most extensive forested habitat begins east of the point where Old Halls Ferry Road crosses Coldwater Creek and continues to its confluence with the Missouri River. This area has the highest value terrestrial wildlife habitat in the watershed. It is composed of bottomland floodplain forest tree species with a canopy of cottonwood and sycamore and an understory of boxelder, green ash, silver maple, blackberry and elms.

There are many shrubs and woody vines that are part of the understory vegetation. Elderberry, coralberry, pawpaw, and rough-leaved dogwood are common shrubs, whereas the woody vines present include Virginia creeper, trumpet creeper, poison ivy, raccoon grape, winter grape, and Korean bush honeysuckle.

Another area where there is an appreciable amount of stream corridor vegetation is an approximately 1.5 mile section upstream from where New Halls Ferry Road crosses Coldwater Creek.

Upstream from this area until the creek reaches Lambert-St. Louis Airport, there are intermittent small thick patches of trees and shrubs of various statures.

Very limited amounts of stream-side woody vegetation are evident upstream of the airport, and there are numerous types of debris that are associated with the commercial/urban nature of the area. Litter of all kinds is scattered throughout the drainages. Due to the steep, highly eroded banks of the creek and its backyard location within a highly urbanized area, it becomes a back-door alley or type of "public dump". However, because of its location and scarcity, even such marginal forested habitats become valuable.

Numerous small mammals occur in the riparian forested areas. These include the white-footed, deer, and house mice, short-tail and least shrew, and eastern mole. Larger mammals include the fox and gray squirrel, cottontail rabbit, groundhog, opossum, raccoon, skunk, red fox, and white-tailed deer.

A variety of birds use the various habitats in the watershed. The most abundant are those typically associated with urban environments, such as starlings, house sparrows, blackbirds, common grackles, blue jays, cardinals, robins, chickadees, and juncos. Many different sparrows, warblers, flycatchers, woodpeckers, and swifts also occur in the project area.

Common amphibians include the chorus frog, cricket frog, spring peeper, bull frog, and gray tree frog, Fowler's and American toads, the small-mouthed, spotted, and eastern tiger salamanders.

Some of the reptiles present are the eastern box turtle, five-lined skink, fence lizard, garter snake, and black rat snake.

These marginal quality of forested habitats are utilized by many Missouri urbanites participating in nature oriented activities. A 1980 survey by a Missouri Department of Conservation contractor indicated that feeding or watching birds and other wildlife near their homes, photographing wildlife, wild flowers, trees or other natural things, and hiking are the leisure pursuits most enjoyed by approximately one fourth of the urban adults in the state.

#### Endangered Species Comments

To facilitate compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, Federal agencies are required to obtain from the Fish and Wildlife Service information concerning any species, listed or proposed to be listed, which may be present in the area of a proposed action. Therefore, we are furnishing you the following list of species which may be present in the concerned area:

Endangered  
bald eagle

(Haliaeetus leucocephalus)

There is no designated critical habitat in the project area at this time.

The scope and nature of the subject project indicates that diurnal perches, roost sites, food sources, or other preferred habitat will not be affected. Therefore, the project will not affect the bald eagle or the gray bat. This precludes the need for further action on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. Should this project be modified or new information indicates endangered species may be affected, consultation should be reinitiated.

#### Fish and Wildlife Resources with Project Conditions

The selected alternative, Plan 2, involves Coldwater Creek in several locations. Concrete-lined channels are proposed at bridge crossings. A small levee with a maximum height of 5 feet that would protect 4 historic buildings is also included in the plan. In appropriate channel segments a

variety of trees will be planted on each side of the channel (see table 1). Additionally, a Flood Forecasting and Warning Plan and recreation measures are incorporated within the selected alternative.

The Coldwater Creek Flood Control Project would cause some impact to both fish and wildlife resources. In the upper watershed, where the wildlife habitat is the least abundant, losses to wildlife will not be substantial. However, in the areas further downstream where the stream and floodplain are wider and wildlife habitat is present, losses to wildlife will be greater.

Although the upper watershed is commercially, and industrially developed, the lower watershed is less altered by development and has a more natural and rural appearance. Even though this lower section of the watershed is moderately forested and provides higher value terrestrial habitat resources, the aquatic resource values in this same area are significantly lower than in the upper section. Due to the generally poor quality and continuous discharge of sewage treatment plant effluent, the water and substrate are chemically and physically contaminated such that they severely limit which aquatic organisms may inhabit the area. As urban development continues, more land will be cleared and the water quality will deteriorate as a result of increased run-off and effluent discharges. Therefore, every effort should be made to preserve the remaining undeveloped areas by providing guidance to the local interests and encouraging a reduction of the quantity and/or an improvement in the quality of the sewage effluent discharges. This would also reduce potential public health hazards.

Clearing and snagging along Coldwater Creek would decrease the present values by destroying the remaining breeding areas for many fish and wildlife species. Aquatic communities will suffer as a result of instream habitat degradation. In comparing the flood control features, we are most opposed to the project feature which involves wholesale clearing and snagging. The Corps should investigate other measures, such as selectively removing blockages, rather than denuding the entire creek bank.

Furthermore, in areas in which channel modification activities are not to take place, we would encourage the removal of the accumulated debris that exists in the creek channel. We believe this might be best accomplished through inter-agency cooperation between the Corps of Engineers, county and local agencies, and bordering residents. This could also result in the removal of potential safety hazards.

The widening of the channel would require the removal of the remaining narrow corridors of vegetation adjacent to the stream. This would cause some disruption of habitat for small mammals and other ground nesting species, remove escape and winter cover, interrupt travel lanes and destroy food sources for some wildlife species. Due to the scarcity of food and cover in the Coldwater Creek watershed, these species cannot relocate temporarily and would be in direct competition for food and cover with existing inhabitants. When possible, stream widening should be limited to one bank of Coldwater Creek, preferably the side where the least amount of trees are present. Wildlife habitat could be partially restored and the scenic nature of the channel improved by adding plantings favorable to wildlife along the channel. This would also aid in reducing soil erosion.

Aquatic communities, particularly the benthic community will suffer as a result of streambank and instream habitat degradation. Channel modification would also cause disruption in fish territoriality and orientation. Additionally, toxic chemicals that were bound to bottom sediments may be disturbed during the construction phase. Channel work should be scheduled during periods of low stream flows.

#### CONCLUSION

While we have stated that overall habitat losses will not be great in some reaches of Coldwater Creek, habitat losses will undoubtedly occur if the project is implemented. The Service's major goal for this project is to ensure, in accordance with the provisions of the Fish and Wildlife Coordination Act, that "...wildlife conservation shall receive equal consideration and be coordinated with other features of water resource development programs...". In our March 1986 draft FWCA we stated that this goal could be met through the inclusion of the following recommendations:

1. Stream widening should be limited to one bank of Coldwater Creek, where possible, preferably the bank with the least amount of vegetation. This would reduce the loss of riparian habitat and provide a continued source of habitat for wildlife. Fish and wildlife agencies should be contacted to obtain site specific information in vegetative clearing.
2. Construction and maintenance of the enlarged channel should occur during the low flow stages.
3. Those areas adjacent to the channel should be planted with species that are beneficial to wildlife. This would provide wildlife food and

cover as well as protection against subsequent erosion.

4. An alternative measure to wholesale or large scale clearing and snagging along Coldwater Creek should be investigated by the St. Louis District.

The draft Feasibility Report and Environmental Impact Statement indicates that the St. Louis District intends to follow these recommendations by (1) limiting stream widening to one bank only where possible; (2) avoiding wholesale or large scale clearing and snagging; (3) avoiding construction and maintenance activities during the low flow stages; and, (4) planting the channel bank with a ground cover such as bird's foot trefoil or crown vetch which will not be mowed and will provide cover for wildlife species.

We appreciate the opportunity to work with the St. Louis District, Corps of Engineers on the Coldwater Creek Flood Control Project. We hope that the information contained herein will contribute to viable solutions of the problems.

If you have any questions regarding this response or if we can be of any further assistance, please contact Dr. Mamie Parker or Richard Szlemp, Columbia Field Office, P. O. Box 1506, Columbia, Missouri 65205, (314)875-5374 or (FTS) 276-5374.

#### REFERENCES

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COLDWATER CREEK, MISSOURI  
SUPPLEMENT

The purpose of this document is to provide additional information that pertains to the Coldwater Creek, Missouri feasibility report dated May 1987.

1. Key assumptions pertaining to the hydraulic design of the project.

The hydraulic design of the project was based on the District's best estimate of future conditions in the Coldwater Creek watershed.

Future runoff was based on the St. Louis County Department of Planning projected land use at ultimate development. Although St. Louis County has adopted runoff control policies, they are applied only to the larger developments in unincorporated areas. Small developments, highway improvements, and developments within municipalities are exempt from these policies. The upper three-fourths of the basin is composed of highly developed municipalities. Therefore, to take a conservative approach, the runoff control policies were assumed to be non-effective.

Concrete channels that the Metropolitan St. Louis Sewer District (MSD) planned to construct on tributary streams in the near future were assumed to be in place. Other potential concrete channel projects that MSD did not expect to be funded were not assumed to be in place.

Bridges planned for construction were assumed to be in place. These included Old Jamestown Road, Washington Street, Taylor Road (Remove Dunn Road), and Marvin Avenue.

Except for the fill associated with the approaches to the Old Jamestown Road bridge, no future fill was assumed in the floodway or flood plain of Coldwater Creek. Most areas adjacent to the channel are currently either developed or dedicated park areas. In some areas, homes are located above the 100-year flood elevation, and their backyards slope down into the flood plain and floodway. It is likely that some isolated areas in the flood plain fringe will be developed in the future, but the location of these areas is uncertain and they were not included in the hydraulic model.

No increased capacity was assumed for the conveyance of stormwater under Lambert Airport. Airport officials consider this the most likely future condition. However, the airport is currently embarking on a master plan effort which may or may not recommend new storm water facilities.

2. Impacts of increased flood stages resulting from the project.

The main feature of the recommended plan is channel widening. This channel widening reduces flood levels in the highly developed middle and upper sections of Coldwater Creek. However, the proposed channel effects the velocity of flood waters, and the timing of the flood peaks on the main channel relative to the flood peaks on tributary streams. The result is that flood flows are greater in the downstream area with the project in place.

The 100-year flood plain downstream from New Halls Ferry Road is nearly free of structures. However, many structures are located just above the 100-year flood level. The recommended plan is designed to make flood damages in this area no worse with the project than they would be without the project.

The effects of the project can be seen by comparing the with-project flood profiles and flooded area maps to the without-project flood profiles and flooded area maps. The project includes tunnels through a railroad embankment at mile 1.6, and downstream of this point the 100-year flood is as much as two feet higher than it would be without the project. The downstream area is undeveloped except for a recreation trail planned for the right side of the creek and an eroding landfill on the left side of the creek. Both areas are owned by the St. Louis County Parks Department. The St. Louis District has provided technical assistance to the Parks Department on erosion control measures at the landfill.

Between the railroad embankment (mile 1.6) and Old Jamestown Road (mile 4.0) the flood profiles are lowered by the proposed tunnels, and the with-project 100-year flood profile is equal to or lower than the without-project profile. Between Old Jamestown Road and Lindbergh Boulevard (mile 6.7) the with-project profile is generally from zero to one foot higher than the without-project profile. Upstream from Lindbergh Boulevard the profile is lower with the project.

Between Old Jamestown Road and Lindbergh Boulevard there are only three houses, a stable, and two landscape company sheds in the with-project 100-year flood plain. The 100-year flood would be in the basements of the three houses. Of the six structures, one house and the other three buildings are also in the without-project 100-year flood plain.

The recommended plan, as designed, could have a slight adverse effect on the six structures. These adverse effects may be eliminated during the preconstruction engineering and design of the project. Two of the houses and the two landscape company sheds are between Old Halls Ferry Road and Lindbergh Boulevard and could be effected by slight design changes in the channel. Note that the Corps is going to consider widening the channel on one side in this area. The other house is just upstream of Old Jamestown Road and could be effected by slight changes in the downstream tunnel design. The potential adverse effects of the project will be considered in greater detail in the preconstruction engineering and design phase of the project.

In addition to affecting structures, the slight increase in flood height can also affect undeveloped land. Slightly more land would be in the 100-year flood plain. The border of the flood plain downstream of the railroad embankment is formed by bluffs. The horizontal area affected by the maximum two foot rise in the 100-year flood is very small and most of this area is St. Louis County Parks Department property. The horizontal area affected by the maximum one foot rise in the 100-year flood between Old Jamestown Road and Lindbergh Boulevard is also very small because of the sloping terrain at the edge of the flood plain. This several-foot-wide strip of land is generally located in open land, in pasture land, in land surrounding the Coldwater Creek



Sewage Treatment Plant facilities, and in sloping backyards. Again, the location of the 100-year flood limit could change slightly during preconstruction engineering and design when widening the channel on one side will be considered and a more detailed design of the tunnels through the railroad embankment will be coordinated with the Burlington Northern Railroad.

3. Reasons for not including interest during construction.

It is estimated that construction of all improvements along Coldwater Creek will be accomplished in four and one half years. The first phase of this construction will be the tunnels through the downstream railroad embankment. The tunnels will provide an immediate beneficial hydraulic impact. Then as channel widening is accomplished flood profiles will be reduced in other areas. Since benefits will be accruing, there is no economic cost associated with the opportunity cost of money. Therefore, no interest during construction was charged against any measure.

4. Environmental effects of land enhancement.

The recommended project will enhance the potential for development in two types of land areas, i.e., some fill disposal areas and some open land that will be less floodprone after the project is constructed.

Approximately 40 acres of disposal area land has the potential to be developed. Initially this land will be planted with a mixture of grasses and forbs preferred by song birds and small mammals. If this land is developed into its projected commercial and industrial uses, most of its value to wildlife will be lost.

About 70 acres of open land will have the potential to be developed because of decreased flood levels. This land is generally in small parcels adjacent to existing commercial and industrial areas. The land is generally not of high value to wildlife, however, if development takes place most of its value to wildlife will be lost.

The environmental effect of development will not be significant primarily because small parcels are involved in an urban setting where wildlife habitat values are generally low. Even the disposal areas planted with wildlife preferred grasses are likely to be abused with litter and industrial waste like adjacent areas.

5. Existing and future conditions damages and benefits.

This estimate of the existing conditions benefits resulting from the recommended plan is based primarily on a comparison of the relationship between existing and future conditions without project damages. All figures are October 1985 price levels.

$$\frac{\text{Existing Conditions Damages}}{\text{Future Conditions Damages}} = \frac{\$1,578,000}{\$1,744,000} = 0.9$$

	Future Conditions Plan 2 Benefits		Estimated Existing Conditions Plan 2 Benefits
Structure and Content	\$1,549,365	x0.9	\$1,394,400
Vehicles	112,135	x0.9	100,900
Residential Infrastructure	78,696	x0.9	70,800
Commercial Infrastructure	69,145	x0.9	62,200
Police Assistance	4,168	x0.9	3,800
Parks	868	x0.9	800
Bridges	192,897	x0.9	173,600
Erosion	276,672	x0.9	249,000
FIA Overhead	54,560	x0.9	49,100
Affluence	123,254 <sup>1/</sup>		0
Land Enhancement	36,419 <sup>1/</sup>		0
Fill	51,950 <sup>1/</sup>		0
Reduced Fill	2,916 <sup>1/</sup>		0
Aesthetics	24,501	x0.9	22,000
Recreation	<u>322,917</u>		<u>322,917</u> <sup>2/</sup>
Total	\$2,900,463		\$2,449,517

<sup>1/</sup> Benefits accrue over time in the future.

<sup>2/</sup> Recreation facilities are projected to reach their design usage two to five years after construction.

#### 6. Effect of the recommended plan on health, potential loss of life, and safety.

In the without project condition, frequent flooding will occur in the lowest lying areas along Coldwater Creek. Many of those areas have experienced flooding in the past. As urban development continues, the flooding problem will worsen slightly in the areas downstream from Lambert Airport. On relatively rare occasions, disastrous floods like the 25, 50 and 100-year floods will occur. These floods will result in widespread damages and possible injury and loss of life.

The recommended plan will substantially reduce flood heights and flood damages in Florissant and Hazelwood. The plan will slightly reduce flood heights in St. Ann and Breckenridge Hills but will reduce flood damages considerably. Generally, the recommended plan will reduce but not eliminate the safety hazard and the potential for loss of life associated with flooding.

The effect of the recommended plan on health, safety and the potential for loss of life can be partially illustrated by the plan's effect on flood heights. Some examples follow:

River Mile	Community	Development	Approximate Reduction In Future Flood Heights		Approximate Level Of Protection
			10-Year Flood	100 Year-Flood	
10.4	Florissant	Florissant Meadows Shopping Center	5 feet	5 feet	50-year
11.8	Hazelwood	French Quarter Apartments	4 feet	3.5 feet	25-year
15.8	St. Ann	St. Agnes Ave. (Subdivision)	1 foot	2.5 feet	25-year
18.0	Breckenridge Hills	Dix Ave. (Single Family Homes)	0.5 feet	0.5 feet	5-year

The two small levees in the recommended plan result in slight improvements to health and safety. Flooding in the historic Old St. Ferdinand's Shrine area and in seven basements along Foxtree Drive will be less frequent because of the levees. The levees protect against the 100-year and 25-year floods in the respective areas. On the relatively infrequent occasions when the small levees are overtopped, the areas behind the levees will experience more rapid inundation than if there were no levees. This would not create a hazard in the uninhabited Old St. Ferdinand's Shrine area. In this area visitors could escape by walking up a nearby hill or by going upstairs in the convent, rectory or school. There may be an increased hazard in the Foxtree Drive area if any of the basements are used for sleeping quarters. The escape route from the basements would be up the steps to the main floor of the house, and then over Foxtree Drive to higher ground.

Downstream of the airport the velocity of the flood waters will be slightly higher with the recommended plan. This may result in a slightly higher safety risk.

With the recommended plan the channel will have a trapezoidal shape. The sloped channel banks will be safer than the existing near vertical channel banks which are unstable in some areas.

The recreation trail in the recommended plan will result in an increase in healthy outdoor exercise activity.

#### 7. Disposal plan for material excavated from the channel upstream of the airport.

The cost estimate for the excavation of material from upper Coldwater Creek includes sufficient funds for the contractor to properly dispose of the excavated material. The plan is for the contractor to dispose of high quality fill material by making it available to contractors who would truck it to projects in the North St. Louis County area. The channel excavation contractor will dispose of rubble and vegetation by trucking it to the nearest approved landfill.

8. Flood plain mapping.

The flood plain mapping in the feasibility report on Plates 9-15 and 39-45 shows the area inundated by main channel Coldwater Creek flood flows, and by main channel backwater flooding on the tributaries. To make this fact clear to the readers, the legend on each plate says that the flood limits shown are for "main channel flooding".

9. National Weather Service assistance with the flood forecasting warning and preparedness system.

As currently envisioned, the flood forecasting warning and preparedness system in the recommended plan includes utilization of the National Weather Service rainfall gage at Lambert Airport. When the details of this system are developed during preconstruction engineering and design, a Memorandum of Understanding will be executed between the National Weather Service and the local sponsor.

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Further Info?

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