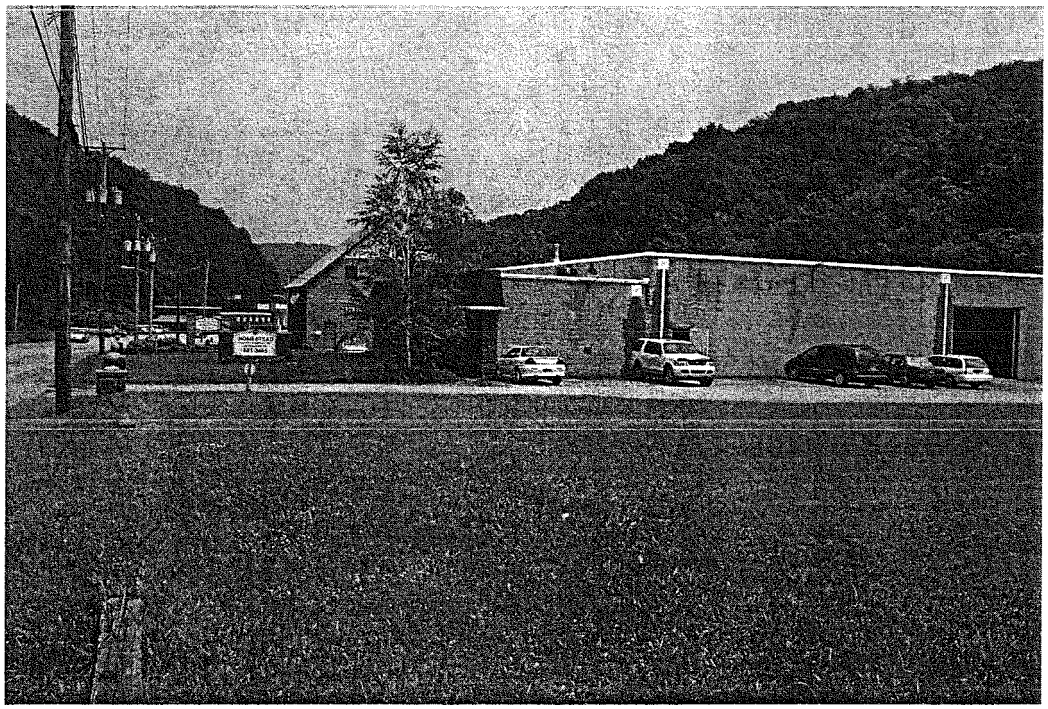
US Army Corps of Engineers
Pittsburgh District

September 2003

Streets Run Watershed, Allegheny County, PA



(Typical business along Streets Run in Baldwin)

SECTION 905(b) (WRDA 86) Analysis

Reconnaissance Report

Streets Run Watershed, Allegheny County, PA
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1. Study Authority

This Section 905(b) (WRDA 86) Analysis was prepared as an initial response to the Committee on Transportation and Infrastructure, U.S. House of Representatives, Resolution, Streets Run Watershed, Allegheny County, Pennsylvania, adopted May 22, 2002, which reads as follows:

The committee has provided $100,000 for the Corps of Engineers to conduct a reconnaissance level investigation to address flood damage reduction measures along Streets Run in Allegheny County, Pennsylvania.

Funds in the amount of $100,000 were appropriated in Fiscal Year 2003 to conduct the reconnaissance phase of the study. Actual funding received in April 2003 by the Pittsburgh District totaled $75,000 after 25% "savings and slippage" in the amount of $25,000 was withheld.

2. Study Purpose

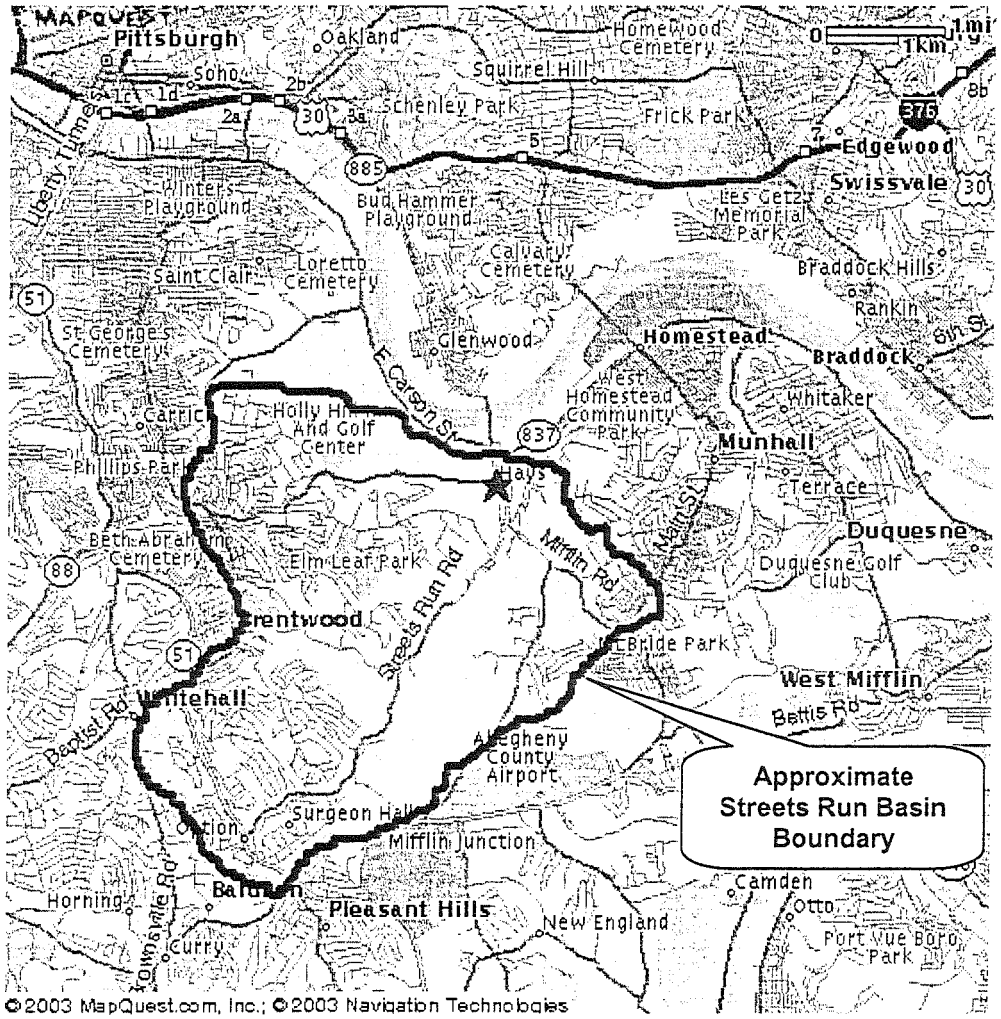
The purpose of this reconnaissance investigation is to determine if there is a Federal (Corps) interest in participating in a cost shared feasibility-phase study to develop solutions to local flooding problems occurring within the Streets Run Watershed, Allegheny County Pennsylvania. In response to the study authority, the reconnaissance phase of the study was initiated on April 21, 2003. This phase of the study has resulted in the finding that there is no Federal interest in continuing the study into the feasibility phase. Information obtained during the conduct of this Section 905(b) study documents the basis for this finding. Because Federal interest could not be established for a future project, funds normally reserved during the current phase of the study to prepare a Feasibility Cost Sharing Agreement (FCSA) and Project Study Plan were used instead to provide the local sponsor with useful technical detail on storm water management.

3. Location of Study, Non-Federal Sponsor and Congressional Districts

The Streets Run Watershed (study area) is located in southwestern Pennsylvania entirely within southern Allegheny County. This stream, which flows generally northward, drains portions of eight heavily urbanized, independent communities: the City of Pittsburgh (Hays section), and the Boroughs of Baldwin, Whitehall, West Mifflin, Brentwood, Munhall, Homestead, and West Homestead. The bulk of the drainage basin lies in Baldwin Borough and the Hays portion of the City of Pittsburgh. The Streets Run drainage basin is approximately 10 square miles at its mouth and enters the Monongahela River at river mile 6. The headwater and upper portion of the basin is highly developed consisting of a mix of residential communities and a large variety of commercial and retail establishments. The mid portion of the stream basin is located in a very

narrow, steep sided valley that is relatively free of development. The lower portion of the Streets Run basin in the Hays Section of the City of Pittsburgh contains closely packed residential/commercial structures with some industry. The study area includes the entire basin and all of the small streams and drainages tributary to Streets Run. PLATE 1 at the end of the report shows the Streets Run basin boundary superimposed over a USGS quadrangle map. FIGURE 1 below shows the approximate basin boundary overlain on a street map.

FIGURE 1



The non-Federal sponsor for the feasibility phase, if one were to be undertaken, would likely have been Baldwin Borough and possibly Whitehall Borough. Since this effort concluded that there is no Federal Interest, there will be no follow-on feasibility study as part of the normal Corps of Engineers study initiatives.

The study area lies within the jurisdiction of the following Congressional District:

- 18th Congressional District (Doyle)

4. Prior Reports And Existing Projects

The following reports were reviewed as a part of this study:

- Report on Streets Run Flood Problems and Inventory of damages, Hays Section, City of Pittsburgh, Allegheny County, PA, October 1995

- Flood Protection Study, PADEP 1990

5. Plan Formulation

During a study, six planning steps that are set forth in the Water Resource Council's Principles and Guidelines are repeated to focus the planning effort and eventually to select and recommend a plan for authorization. The six planning steps are: 1) specify problems and opportunities, 2) inventory and forecast conditions, 3) formulate alternative plans, 4) evaluate effects of alternative plans, 5) compare alternative plans, and 6) select recommended plan. The iterations of the planning steps typically differ in the emphasis that is placed on each of the steps. In the early iterations, those conducted during the reconnaissance phase, the step of specifying problems and opportunities is emphasized. That is not to say, however, that the other steps are ignored since the initial screening of preliminary plans that results from the other steps is very important to the scoping of the follow-on feasibility phase studies. The sub-paragraphs that follow present the results of the initial iterations conducted during the reconnaissance phase plus additional detail not normally developed during a typical 905(b) study because it had been determined early that there would likely be insufficient benefits to justify Federal interest in a flood control project.

5.1 National Objectives

The national or Federal objective of water and related land resources planning is to contribute to national economic development consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Contributions to national economic development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the nation.

The Corps has added a second national objective for Ecosystem Restoration in response to legislation and administration policy. This objective is to contribute to the nation's ecosystems through ecosystem restoration, with contributions measured by changes in the amounts and values of habitat.

5.2 Public Concerns

A number of public concerns have been identified during the course of the reconnaissance study. Initial concerns were expressed in the study authorization. Additional input was received

through coordination with the Borough of Baldwin and the Streets Run Watershed Association. The public concerns that are related to the establishment of planning objectives and planning constraints for the Streets Run Watershed Study are:

Municipalities within the watershed have identified local flooding as a serious problem along Streets Run. They are concerned that existing storm water management facilities have been compromised by ongoing urban development and that the existing drainage system is inadequate to effectively handle storm water flows. The consequence of the development within the watershed has been increased flooding at properties in the Streets Run valley, within Baldwin Borough, and the Hays section of the City of Pittsburgh at the lower end of the stream near its mouth.

The flood-affected municipalities are also concerned about stream bank erosion caused by high water events and its effect upon the structural integrity of Streets Run Road, a heavily used two-lane road that is located immediately adjacent to Streets Run in the stream's mid and lower sections within the watershed.

The local municipalities within the watershed are concerned about the degradation of aquatic and riparian habitat caused by past commercial, industrial and residential development along the stream as well as recent clear-cut logging conducted on the steep hillsides adjacent to the stream's right bank along its undeveloped mid section. However, for this study they asked that we focus our efforts on a hydrologic analysis of the watershed instead of ecosystem restoration.

5.3 Problems and Opportunities

The evaluation of public concerns often reflects a range of needs, which are perceived by the public. This section describes these needs in the context of problems and opportunities that can be addressed through water and related land resource management. The problems and opportunities that have been identified are related to flooding, storm water management, bank erosion and environmental degradation:

The flooding problem is caused by rapid urban runoff, collected stormwater drainage, inefficient infiltration of groundwater in the headwaters of the basin and inefficient stream design and poorly designed bridges. Most of the flood related damages occur in the lower reaches of the basin downstream of Lutz Hollow Road, where the stream is forced into a 90-degree bend to go under a railroad embankment and Streets Run Road. About 350 feet downstream of this bend, the stream jumps the bank at high flows and creates a parallel overland flow that moves downstream and impacts several commercial establishments. Backwater from the inadequately designed bridges also adds water to the parallel overland flow in this reach of stream. Because of these conditions, temporary flooding resulting in the closure of the lower portion of Streets Run Road in Hays is common during high water events (20%-chance [5-year] event flows). Due to poor drainage, water tends to pond on parts of Streets Run Road, making driving hazardous during even minor storm events.

Within the Hays section of the City of Pittsburgh, along Ganges Way and Calera Street, residential structures are affected by flooding from a combination of overland flow and over bank flooding and storm sewer backup from Streets Run. To deal with the problem in Hays, the City of Pittsburgh and the Commonwealth of Pennsylvania are negotiating to construct a flood reduction project on Streets Run from near Ganges Way downstream to the stream's mouth. Since structural alternatives are already being evaluated in the Hays reach of Streets Run, the Corps studied other potential flood reduction measures in the watershed. Based upon local input, the investigations described in this reconnaissance report focused upon the use of detention basins strategically located along tributaries of Streets Run to help reduce flooding by intercepting high flows before they entered Streets Run itself. In addition, the clearing of sediment within the Streets Run channel in combination with detention basins was also evaluated.

Along much of its length, Streets Run Road parallels and crosses back and forth over Streets Run. Along several places where the elevation of the road is only a few feet above the stream, the banks exhibit erosion from past flood episodes, which threatens the road's structural integrity creating a hazardous condition. Emergency dumping of rock over the bank by Baldwin and City of Pittsburgh officials has temporarily protected these areas. To permanently correct the bank erosion and protect Streets Run from future erosion would require the engineered installation of some form of emergency stream bank protection. If desired, Baldwin officials could request assistance from the Corps under the continuing authority provided by the Section 14 Emergency Streambank Protection program to protect eroding banks that threaten Streets Run Road.

Streets Run exhibits severe aquatic habitat degradation due the excessive buildup of silt and sediment within the stream from past flood episodes, and a lack of riparian vegetation caused by urban development and recent logging. If desired in the future by local officials, stream and riparian habitat degradation could be addressed under the continuing authority provided by the Corps' Section 206 Aquatic Ecosystem Restoration program.

5.4 Planning Objectives

The water and related land resource problems and opportunities identified in this study are stated as specific planning objectives to provide focus for the formulation of alternatives. These planning objectives reflect the problems and opportunities and represent desired positive changes in the "without project" conditions. The planning objectives are specified as follows:

- To complete a hydrologic analysis of the Streets Run watershed to more accurately define the flooding problems within the basin.

- To determine alternative means to increase the efficiency of the present storm water management system to reduce flood related damages to residential and commercial/industrial buildings.

- To determine Federal interest in pursing a flood control project.

- To recommend general actions local authorities could pursue on their own to control flooding should a Federal project be determined infeasible.

5.5 Planning Constraints

Unlike planning objectives that represent desired positive changes, planning constraints represent restrictions that should not be violated. The planning constraints identified in this study are as follows:

Hazardous, Toxic, and Radiological Waste (HTRW) may be present in the stream channel or its banks due to the presence of industry in the project area. A phase 1 Environmental Site Assessment will have to be completed in the project area as part of the feasibility phase planning process. If HTRW are found, the local sponsor will be responsible for 100% of the remediation costs and will have to be completed prior to the initiation of any construction.

Alternative and recommended plans will have to be evaluated under the National Environmental Policy Act (NEPA) and legislation protecting extant cultural resources as well as other applicable Federal Executive Orders, Statutes and Regulations.

Future project(s) will be subject to required State and local permits.

Future project(s) will be subject to land availability and associated real estate costs.

Facilities in urban areas designed to collect and convey runoff from rainfall or snowmelt to natural watercourses are designated as storm sewer systems. These systems include storm drains, inlets, manholes, pipes, culverts, conduits, sewers, sewer appurtenances, on-site storage and detention basins, curbs, gutters and other drainage ways that remove or help to manage runoff in urban areas. According to Engineering Regulation 1165-2-21 (Flood Damage Reduction Measures in Urban Areas), the construction of storm sewer systems and components thereof is a local responsibility. Storm water systems, therefore, cannot be constructed under present Corps of Engineers mission authorities, unless specifically directed by Congressional legislation.

By Corps definition, the reach of Streets Run located upstream of Brentwood road would be designated as storm sewer systems. Engineering Regulation 1105-2-100 states, "Water damage problems may be addressed under flood damage reduction authorities downstream from the point where the flood discharge is greater than 800 cubic feet per second for the 10 percent flood (one chance in ten of being equaled or exceeded in any given year) under conditions expected to prevail during the period of analysis. Drainage areas which lie entirely within the urban area and which are less than 1.5 square miles in area are assumed to lack sufficient discharge to meet the above hydrologic criterion." This definition would classify all of the tributaries of Streets Run as storm sewer systems. However, under the above criteria, Streets Run downstream of Brentwood Road, would be eligible for a Corps flood damage reduction project if one could be economically justified, i.e. where the annualized dollar value of damages prevented by a project exceeds the annualized cost of project construction.

Future projects must complement and not interfere with a Local Flood Protection Project proposed for construction within the Hays section of the City of Pittsburgh. The City will be cost-sharing this project with the Commonwealth of Pennsylvania.

5.6 Alternative Measures to Address Identified Planning Objectives

5.6.1 Alternative 1 - No Action

The Corps is required to consider the option of "No Action" as one of the alternatives in order to comply with the requirements of NEPA. For this report, "No Action" assumes that no project would be implemented by the Federal government to achieve the planning objectives. The "No Action" alternative assumes that a project will be constructed in Hays by the City of Pittsburgh in conjunction with the Commonwealth of Pennsylvania. The paragraph below summarizes the impacts of adopting the no action alternative.

If a local flood protection project is constructed within Hays, the flooding will be reduced in the lower reach of the basin near its mouth. However, under the No Action alternative, the present flooding problems would continue unabated upstream of the proposed Hays project. Approximately 26 structures consisting of a mix of commercial/industrial buildings and residential dwellings will continue to incur flood damages. Flooding of these structures as well as the roadway itself will grow worse as stream sedimentation increasingly occludes openings under bridges and accumulates within the streambed. Closings of Streets Run Road due to minor nuisance flooding would continue to disrupt traffic for local residents and commuters and force businesses to shut down or reduce operations until flood flows recede. Unimpeded bank erosion caused by high storm runoff will eventually cause roadbed failure at one or more locations along Streets Run Road that would adversely affect residents and businesses and threaten motorist safety. From an ecological perspective, degradation of the riparian and aquatic habitat would grow worse as high flows erode the stream banks and its vegetation and fill the stream with sediment.

5.6.2 – Non Structural Alternatives

Nonstructural measures reduce flood damages without significantly altering the nature or extent of flooding. Damage reduction from nonstructural measures is accomplished by changing the use made of the floodplains, or by accommodating existing uses to the flood hazard. Examples are raising structures, flood proofing, relocation of structures, flood warning, and preparedness systems (including associated emergency measures), and regulation of floodplain uses. The non structural alternatives would only be applicable to those structures upstream of the flood control project proposed by the City of Pittsburgh and Commonwealth of Pennsylvania within the Hays section of the City. Within this upstream reach of Streets Run, approximately 26 structures are subject to flooding. The paragraphs below briefly describe these non-structural methods of flood protection:

5.6.2.1 Raising Structures

Raising consists of lifting structures off of their foundations to designated elevations above flood stage. Raising structures, especially older homes, involves risk, and the houses along Streets Run are all older homes. Lifting jacks, which are used to raise structures, may apply vertical loads that are different than those that the structures have experienced for many years. This loading could cause serious damages to frames, walls, floors, and ceilings. Because of the age and condition of the structures along Streets Run this option would involve considerable risk and was not investigated further.

5.6.2.2 Flood Proofing

Flood proofing consists of constructing some type of impenetrable barrier around a structure that would protect it from rising floodwaters. The barrier could be earthen levees, or walls constructed of concrete, steel, timber, or a continuous rubber membrane. Earthen levees, usually the lowest cost option, require horizontal distances for alignment and placement. Because of this horizontal requirement, sufficient lateral clearances required to construct levees may not be available between the houses and the stream. Concrete, steel and timber walls do not require the lateral clearance of levees; however, they are generally more expensive because they require a foundation to transfer hydrostatic load from the static water pressure to the ground or rock. Another consideration regarding flood proofing for individual homeowners is that these methods may be aesthetically displeasing and could create physical barriers that may eliminate easy access to outbuildings, such as detached garages or sheds, etc.

5.6.2.3 Flood Warning

Flood warning systems consist of methods for determining the flood threat; methods for disseminating the flood warning, such as sirens and radio reports, and preparedness plans detailing the response to that warning. The Corps involvement in development of methods for determining the flood threat and disseminating the warning can include selection, siting, installation, and calibration of gages and other equipment to collect, evaluate and disseminate pertinent data. In addition, the Corps could provide assistance and guidance to ensure that the preparedness plan is adequate and will provide the necessary response to minimize the possibility of loss of life, and to reduce damages. This includes coordinating with local officials, providing technical advice and planning guidance, and developing adequate mapping to identify flood threatened areas, evacuation routes, temporary shelters, etc. At Streets Run, because of the small size and steep terrain of the basin, there is little time available to forewarn residents and business owners of imminent flooding. The installation of such a system along Streets Run would, therefore, not provide adequate protection and was not investigated further.

5.6.2.4 Relocations and Evacuation

Two other non-structural options are also available, relocation and evacuation. Relocation involves the actual lifting and moving of a house or building out of the floodplain to a designated off-site location and placed on a new foundation. Evacuation would reimburse a homeowner and/or business for a fee, to allow relocation to other areas. The buildings subject to buyout would be demolished, and the land formerly occupied by these structures would be restricted to

uses that are not impacted by flooding. Because of the type of businesses and industrial facilities that exist along Streets Run (garden center, cabinet manufacturing shop, auto salvage yard, steel fabricating plant, large restaurant, et al.), and the extreme difficulties, high costs and unacceptable business risks associated with finding suitable locations for such facilities outside the project area, evacuation and relocation were not considered further.

Based upon a preliminary evaluation of the non-structural alternatives, the District determined that, due to the local conditions, non-structural alternatives would not be economically feasible, practicable, or locally acceptable. Due to the age of the flood-affected residences along Streets Run, raising structures would involve considerable risk and expense. Because of the narrow floodplain and limited areas behind most homes along Streets Run, flood-proofing methods, such as levees and structural walls would prove either impracticable and/or too expensive. As mentioned above, because of the nature the flash flooding problem in the basin, a flood warning system would not provide sufficient forewarning to be of much use. Relocating structures would involve the same high risks as raising the structures in place. Evacuation would have adverse consequences to the homeowners and pose severe risks to business owners and the local community itself that are beyond the capability of this reconnaissance report to address. Because of the problems associated with non-structural alternatives, they were given no further consideration in this report.

5.6.3 Preliminary Construction Alternatives

Structural solutions including detention basins and channel improvements were evaluated to determine potential reductions in flood damages along Streets Run. Structural solutions in Hays were not considered because they might create a conflict with a flood reduction project currently being studied by PADEP and cost shared with the City of Pittsburgh.

5.6.3.1 General Description of Studies Conducted

The District was challenged with developing a flood control program that would effectively reduce local flooding without interfering with any work in the main Streets Run channel that is currently being considered by PADEP. Early in the reconnaissance investigation the District determined that the most logical method to reduce flooding in the mid portions of the Streets Run valley would be to construct storm water detention basins along tributaries. These basins would collect and control high storm water flows before they entered Streets Run. To determine where these basins should be located required the District to conduct hydrologic and hydraulic investigations of the entire basin.

The hydrologic and hydraulic analyses accomplished by the District consisted of a cursory analysis and assessment of existing flood discharges and elevations. Potential sites for detention basins were then identified based upon a field reconnaissance and local input. However, the number and placement of potential detention basins was limited due to dense urban development within the watershed and its steep topography. Detention basin sites that would have caused significant impacts to existing roads, residential housing, businesses and commercial structures, and other facilities were avoided. These restrictions, necessary to keep costs and social impacts down, limited the total area that could be controlled with detention basins thus limiting potential

flood reductions. In addition, the steep valley slopes reduced the storage capacity of detention basins further limiting potential flood reductions.

Five potential sites were eventually identified for consideration as shown in Plate 2. The detention basins were designed to maximize flood reduction benefits while meeting the criteria of a Class C-2 structure under the Pennsylvania Code for Dam Safety. This category applies to dams less than 40 feet in height with less than 1000 acre-feet of storage and a potential loss of life of "few" with "appreciable" economic losses. Constructing larger dams would prove to be exceedingly expensive. Reductions in peak flood discharges and the associated reductions in flood elevations were then estimated. Reconnaissance level cost estimates were developed for each alternative.

In addition to hydrologic and hydraulic analyses, the District also performed an analysis to estimate the magnitude of the impact of flooding in the Streets Run valley of various flood frequencies (the "without project" condition) and to determine how the various alternatives described below would reduce flood heights (the "with project" condition). A description of the economic analysis and its results is presented in Section 6.4

5.6.3.2 Alternative 2 - Five Detention Basins

This alternative consists of the five detention basins shown in Plate 2. Each basin would be constructed of impervious fill with a maximum height of 40 feet. A primary outlet control structure with a conventional stilling basin would be provided for normal flows with an emergency spillway to prevent overtopping during severe flood events. With these five detention basins in place, flood heights would be reduced by 0.5 to 0.8 feet for various flood frequencies as shown in **TABLE 1,** below.

TABLE 1
Approximate Average Flood Reductions In Feet Along Streets Run
For Three Construction Alternatives

Alternative	10% flood (10-Year)	2% flood (50-Year)	1% flood (100-Year)	0.2% flood (500-Year)
Alt. 2 - Five Detention Ponds	0.5 ft.	0.7 ft.	0.7 ft.	0.8 ft.
Alt. 3 - Three Detention Ponds	0.4 ft.	0.6 ft.	0.6 ft.	0.8 ft.
Alt. 4 - Three Detention Ponds with Channel Clearing	0.7 ft.	0.9 ft.	0.9 ft.	1.0 ft.

5.6.3.3 Alternative 3 – Three Detention Basins

This alternative consists of constructing three detention basins located at the US Steel Site, Brentwood Road site and the Willock Road site as shown in Plate 2. As in Alternative 2 above, each basin would be constructed of impervious fill with a maximum height of 40 feet. A primary

outlet control structure with conventional stilling basin would be provided for normal flows with an emergency spillway to prevent overtopping during severe flood events. **TABLE 1,** above, shows the reduction in flood heights with three detention basins functioning in place. This alternative will reduce flood heights from 0.4 to 0.8 feet for various flood frequencies.

5.6.3.4 Alternative 4 – Three Detention Basins and Channel Clearing

Due to sediment and debris buildup in Streets Run, another alternative was developed that included constructing detention basins as well as cleaning out the stream. Thus, Alternative 4 consists of constructing the three detention basins shown above in Alternative 3 combined with cleaning of debris and woody vegetation from the main channel of Streets Run to improve hydraulic efficiency. The reduction in flood heights with this alternative, which ranges from 0.7 to 1.0 feet, is also shown above in **TABLE 1**.

6. Preliminary Economic Evaluation of Alternatives

6.1 Real Estate Requirements

TABLE 2, below, lists the real estate requirements to construct the five detention basins and the estimated land value of the real estate needed. As can be seen in the table, approximately 16. 4 acres of land valued at $103,000 would be required if all five detention basins were constructed as described in Alternative 2.

TABLE 2*
Estimated Acreage And Land Values For Five Detention Ponds

	Glass Run Site	Dupont Site	Brentwood Site	US Steel Site	Willock Site	*Totals*
Estimated Acreage	3.0	4.25	3.75	3.0	2.4	**16.4 acres**
Land Value Per Acre	$5,000	$5,000	$5,000	$5,000	$5,000	**$5,000**
Subtotal Land Value	$15,000	$21,250	$18,750	$15,000	$12,000	**$82,000**
25% Contingency**	$3,750	$5312	$4687	$3750	$3,000	**$20,500**
Estimated Total Land Value (rounded)	$18,750	$26,500	$23,500	$18750	$15,000	**$103,000**

* The values shown in the table are for acquiring land in fee with an assumption that the properties have adequate access and do not include utility relocations. The U.S. Steel and Willock Street sites were not accessible at the time of the field investigation. The prices represent undeveloped raw land and could change if future development occurs or zoning laws change.
** A 25% contingency has been added due to the preliminary, screening level nature of this cost estimate.

6.2 Land, Easements, Rights-of-Ways, Relocations and Disposal Areas (LERRDs):

Preliminary investigations have identified that approximately sixteen and four tenths acres (16.4) will need to be acquired encompassing an estimated twenty-eight (28) separate tax parcels. In addition to the values assigned to the real estate and any costs associated with more detailed studies, a conservative estimate for performing all of the acquisition activities in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act, Public Law 91-646, would be approximately $490,000.00.

Impacts associated with other issues have been identified, but at this preliminary stage no value has been placed on these items:

1) Utility Relocations – From site investigations it appears that at least three of the impoundments (Glass Run, Brentwood Road and the Dupont Site) would be located directly over existing sewer lines.

2) Public Roads - Site investigations also indicate that one of the impoundments (Brentwood Road) may require the closing or relocation of a public street.

3) Borrow / Disposal Sites – It is assumed that no disposal and/or borrow sites will be necessary for the construction of this project, therefore no borrow or disposal areas are being included in the estimate of costs for acquiring real estate.

6.3 Estimated Construction Costs

The district completed cost estimates for each detention basin as well as for channel clearing. A summary of the cost estimates is shown in **TABLE 3,** below. Copies of the individual estimates are contained in **APPENDIX A** located at the end of this report. Because of the preliminary nature of this study, several assumptions were made regarding the construction costs. These assumptions were that 1) all excavated material would be soil; 2) all disposal would be local, within ¼ mile, and without fee; and 3) needed fill material would be purchased with no borrow area. The construction cost estimates provided below are consistent with Real Estate Division's assumptions noted in Section 6.1 and 6.2 above; no relocation costs have been included.

TABLE 3
Summary Of Construction Costs For Detention Basins And Channel Clearing

SITE	*ESTIMATED COST*
Glass Run Site	$1,147,000
Dupont Site	$1,165,000
Brentwood Road Site	$1,161,000
US Steel Site	$1,147,000
Willock Road Site	$1,143,000
Channel Clearing	$130,000

6.4 Estimated Flood Damages and Benefits (damages prevented)

In the economic analysis of Streets Run, all structures located within the 100-year floodplain were considered as part of the potential project area. The inventory of structures located within the 100-year floodplain was identified using the Flood Insurance Rate Maps for Allegheny County, Pennsylvania dated October 4, 1995. This area stretches from the upper reach located just upstream of The Chesapeake Steak and Seafood Restaurant located at 1965 Streets Run Road to the lower reach in the vicinity of Galvtech (formerly the Hays Ammunition Plant) located along Mifflin Street. During the investigation, one hundred structures were identified as residential and thirty-five were identified as non-residential. **TABLE 4,** below, categorizes the structures located within the 100-year floodplain of Streets Run.

TABLE 4
Inventory of Structures
Streets Run

Classification	Description	Total
Residential	1-story with basement	3
Residential	2-story with basement	96
Residential	Mobile Home	1
Non-residential	1-story no basement	20
Non-residential	2-story no basement	7
Non-residential	2-story with basement	7
Non-residential	Multistory	1
Grand Total		**135**

First floor elevations for each structure were previously identified in a report on Streets Run completed in October 1995 by the Pittsburgh District. In addition, depreciated replacement values for the 135 structures were estimated using a number of sources including the 1995 Corps of Engineers Report, Tax Assessment Records for Allegheny County, and the Marshall & Swift Commercial Estimator 7 and Residential Estimator 7 software packages.

Flood Profiles for the 10% (10-year), 2% (50-year), 1% (100-year), and 0.2% (500-year) flood events for the portion of Streets Run located within Baldwin Borough were identified from the Flood Insurance Study (FIS) completed for the Borough in February 1978. For the portion of Streets Run located within the city limits of Pittsburgh (Hays), flood profiles were not available. Consequently, the profiles were estimated for this portion of the stream by extrapolating the profiles available from the February 1978 FIS for Baldwin to profiles available where Streets Run meets the Monongahela River.

Structure and content damages were estimated for residential structures using the Huntington depth damage curves developed by the U.S. Army Corps of Engineers, Huntington District. Structure and content damages for non-residential structures were estimated using depth damage curves developed from the Grand Forks/East Grand Forks General Reevaluation Report conducted by the U.S. Army Corps of Engineers, St. Paul District.

In addition to content and structure damages, infrastructure damages and emergency costs that would result from Streets Run flooding were also estimated. Infrastructure damages include damages to roadways, bridges, sidewalks, railways, and similar items. Emergency costs include items, such as debris removal, individual assistance, flood fighting, police protection, etc. Content and structure damages, infrastructure damages, and emergency costs, and total damages for the "without project" condition are presented in **TABLE 5**.

TABLE 5
"Without Project" Damages

Flood Event	Content & Structure Damages	Infrastructure Damages	Emergency Cost	Total Damages
10% (10-Year)	$609,000	$37,000	$54,000	$700,000
2% (50-Year)	$1,057,000	$64,000	$94,000	$1,215,000
1% (100-Year)	$1,332,000	$81,000	$119,000	$1,532,000
0.2% (500-Year)	$1,852,000	$113,000	$165,000	$2,130,000
Average Annual	$369,000	$23,000	$33,000	$425,000

As previously described in Sections 5.6.2.2, 5.6.2.3, ands 5.6.2.4, three project alternatives were considered to reduce flooding in the Streets Run watershed. Alternative 2 included the construction of five detention basins. Alternative 3 considered the creation of three detention basins and Alternative 4 combined channel clearing with the three detention ponds considered in Alternative 3. The approximate average flood reduction in feet attributable to the three alternatives for the 10%, 2%, 1%, and 0.2% chance flood events were listed previously in **TABLE 1.** The table is repeated here for ease of reference.

TABLE 1 (Repeated from page 13)
Approximate Average Flood Reductions In Feet Along Streets Run
For Three Construction Alternatives

Alternative	10% flood (10-Year)	2% flood (50-Year)	1% flood (100-Year)	0.2% flood (500-Year)
Alt. 2 - Five Detention Ponds	0.5 ft.	0.7 ft.	0.7 ft.	0.8 ft.
Alt. 3 - Three Detention Ponds	0.4 ft.	0.6 ft.	0.6 ft.	0.8 ft.
Alt. 4 - Three Detention Ponds with Channel Clearing	0.7 ft.	0.9 ft.	0.9 ft.	1.0 ft.

After taking into account the approximate average flood reductions achieved for the four flood frequency events, structure and content damages were estimated for the three project alternatives using the Huntington depth damage curves for residential structures and the depth damage curves developed from the Grand Forks/East Grand Forks General Reevaluation Report for non-residential structures. In addition to content and structure damages, infrastructure damages and emergency costs as a result of Streets Run flooding were also estimated for the three project alternatives. Content and structure damages, infrastructure damages, and emergency costs, and

total damages for Alternative 2, Alternative 3, and Alternative 4 are located in **TABLE 6**, **TABLE 7**, and **TABLE 8,** respectively.

TABLE 6
Alternative 2 – Five Detention Ponds
Damages

Flood Event	Content & Structure Damages	Infrastructure Damages	Emergency Cost	Total Damages
10% (10-Year)	$480,000	$29,000	$43,000	$552,000
2% (50-Year)	$946,000	$58,000	$84,000	$1,088,000
1% (100-Year)	$1,225,000	$75,000	$109,000	$1,409,000
0.2% (500-Year)	$1,627,000	$99,000	$145,000	$1,871,000
Average Annual	$299,000	$18,000	$27,000	$344,000

TABLE 7
Alternative 3 – Three Detention Ponds
Damages

Flood Event	Content & Structure Damages	Infrastructure Damages	Emergency Cost	Total Damages
10% (10-Year)	$503,000	$31,000	$45,000	$579,000
2% (50-Year)	$955,000	$58,000	$85,000	$1,098,000
1% (100-Year)	$1,234,000	$75,000	$110,000	$1,419,000
0.2% (500-Year)	$1,627,000	$99,000	$145,000	$1,871,000
Average Annual	$310,000	$19,000	$28,000	$357,000

TABLE 8
Alternative 4 – Three Detention Ponds with Channel Clearing
Damages

Flood Event	Content & Structure Damages	Infrastructure Damages	Emergency Cost	Total Damages
10% (10-Year)	$431,000	$26,000	$38,000	$495,000
2% (50-Year)	$909,000	$55,000	$81,000	$1,045,000
1% (100-Year)	$1,081,000	$66,000	$96,000	$1,243,000
0.2% (500-Year)	$1,594,000	$97,000	$142,000	$1,833,000
Average Annual	$271,000	$17,000	$24,000	$312,000

Average Annual Benefits (or damages prevented by a project) for the three project alternatives are determined by subtracting the Total Average Annual Damages for each of the "*with project*" conditions (shown above in **TABLES 6,7**, and **8**) from the Total Average Annual Damages for the "*without project*" condition (shown in **TABLE 5**). For example, the estimated total benefits for the 10% chance flood for Alternative 2 is determined by subtracting $552,000 (found at the top, far right column of **TABLE 6)** from $700,000 (found at the top, far right column of **TABLE**

5). The summarization of benefits by flood event and Average Annual Benefits for the considered alternatives is shown below in **TABLE 9**.

TABLE 9
Benefits by Flood Event and
Average Annual Benefits
Project Alternatives

Flood Event	Average Annual Benefits		
	Alternative 2	Alternative 3	Alternative 4
10% (10-Year)	$148,000	$121,000	$205,000
2% (50-Year)	$127,000	$117,000	$170,000
1% (100-Year)	$123,000	$113,000	$289,000
0.2% (500-Year)	$259,000	$259,000	$297,000
Average Annual	$81,000	$68,000	$113,000

TABLE 10, below, presents a detailed economic summary for each of the considered project alternatives.

TABLE 10
Economic Summary
Project Alternatives

	Alternative 2	Alternative 3	Alternative 4
Annual Without-Project Damages	$425,000	$425,000	$425,000
Annual With-Project Damages	$344,000	$357,000	$312,000
Annual Benefits	$81,000	$68,000	$113,000
Implementation Cost	$5,773,000	$3,461,000	$3,591,000
Interest During Construction*	$169,000	$101,000	$105,000
Total First Cost	$5,942,000	$3,562,000	$3,696,000
Annualized First Cost**	$370,000	$222,000	$230,000
O&M Costs	$1,750	$1,050	$3,150
Total Annual Costs	$372,000	$223,000	$234,000
Benefit-Cost Ratio (BCR)	0.22	0.30	0.48
Net Benefits	-$291,000	-$155,000	-$121,000

* Assumes a 12 month construction period at the FY03 Federal discount rate of 5.875%
** Assumes a 50-year project life at the FY03 Federal discount rate of 5.875%

7. Federal Interest

Federal participation in the construction of a flood protection project is only warranted when the Average Annual Benefits are equal to or greater than the Average Annual Cost of the project, yielding a Benefit Cost Ratio (BCR) of 1.0 or higher. When the BCR is less than 1.0, the project is not considered economically justified.

For every alternative considered in this reconnaissance report, the BCR is less than unity (i.e. 1.0). As shown in Table 10, the BCR's range from a low of 0.22 for Alternative 2 to high of 0.48 for Alternative 4. Because of the low benefits generated by all of the alternatives in relation to their costs, a Federal project cannot be economically justified. Thus, there is no Federal interest in pursuing a flood control project at Streets Run.

8. Cost Sharing and Funding

If a project were found to be economically feasible, a local sponsor would have been required to provide 50 percent of the cost of the next phase of work, the feasibility phase. However, due to the low benefit-to-cost ratio, which negates Corps participation in a flood control project under its normal authorities, a feasibility study cannot be pursued at this time.

9. Follow-on Work

Due to the negative findings of the reconnaissance investigation, no Federal follow-on work is necessary. APPENDIX B at the end of this report lists some actions that the locals can consider taking on their own to reduce flooding.

10. Views of Other Resource Agencies

Because of the extreme time constraints imposed upon the District to complete this reconnaissance study, no coordination has been conducted with other resource agencies except PADEP. Normally, reconnaissance investigations are completed over period of about 12 months. The Streets Run study was completed in about 4.5 months.

11. Potential Issues Affecting Initiation of Future Work

Continuation of this study into a cost-shared feasibility phase would be contingent upon receiving specific Congressional authorization because the alternatives considered during the reconnaissance investigation do not generate sufficient benefits to justify construction costs.

12. Conclusions and Recommendations

Due to lack of sufficient net benefits to justify proceeding into the feasibility phase, I recommend that the Streets Run Watershed Study be terminated

Date _____

Raymond K. Scrocco
Colonel, Corps of Engineers
District Engineer
Pittsburgh District

APPENDIX A

Preliminary Cost Estimates for Five Detention Basins and Channel Clearing

PROJECT: Streets Run 905B, Detention Basins
LOCATION: Baldwin, PA
COST LEVEL: August 2003
CHANNEL CLEARING
COST ESTIMATE STAGE: Recon Study

Estimated By: RJB
Checked By:
Last Updated: 4/8/2003

	Item Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Cost
1	Clearing and Grubbing	25	Acres	$4,000.00	$100,000.00	25%	$125,000.00
2	Mob and Demob	1	LS	$1,700.00	$1,700.00	25%	$2,125.00
3	Bonds	1	LS	$11,500.00	$11,500.00	25%	$2,900.00
					Sub-Total =		$127,125.00

Total Construction Cost, Rounded = **Total Construction Cost, Rounded =** **$130,000**

Assumptions:
All excavated material is soil
All disposal is local (within) 1/4 mile and no fee
Fill material purchased, no borrow area

PROJECT: Streets Run 905B, Detention Basin/Dam
LOCATION: Baldwin, PA
COST LEVEL: August 2003
COST ESTIMATE STAGE: Recon Study
SITE: Willock Road

Estimated By: RJB
Checked By: CRC
Last Updated: 8/26/2003

This estimate includes costs for one detention basin/dam only!

	Item Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Cost
1	Clearing and Grubbing	2	Acres	$4,000.00	$9,600.00	25%	$12,000.00
2	Excavation ((Cutoff Trench)Local Disp.), Soil	2,059	CY	$15.00	$30,885.00	25%	$38,606.25
3	Foundation Excavation, Soil	3,684	CY	$15.00	$55,260.00	25%	$69,075.00
4	Structure Excavation, Soil	30	CY	$15.00	$450.00	25%	$562.50
5	Emergency Spillway Excavation, Soil	0	CY	$15.00	$0.00	25%	$0.00
6	Embankment Fill	23,812	CY	$12.00	$285,744.00	25%	$357,180.00
7	Sand Filter	552	CY	$57.00	$31,464.00	25%	$39,330.00
8	Gravel Filter	293	CY	$65.00	$19,045.00	25%	$23,806.25
9	Reinforced Structural Concrete	254	CY	$450.00	$114,300.00	25%	$142,875.00
10	RipRap (R-5 Assumed)	222	CY	$70.00	$15,540.00	25%	$19,425.00
11	Reinforced Concrete Pipe, 48"	200	LF	$175.00	$35,000.00	25%	$43,750.00
12	Trash Racks	3	EA	$1,200.00	$3,600.00	25%	$4,500.00
13	Manhole Grate (24" x 24")	1	EA	$1,000.00	$1,000.00	25%	$1,250.00
14	Sluice Gate, Operator, and Appurtenances (12" x 12")	1	EA	$50,000.00	$50,000.00	25%	$62,500.00
15	Drill Grout Holes (3.25" dia. assumed, in rock)	343	LF	$30.00	$10,290.00	25%	$12,862.50
16	Grouting Holes	343	LF	$16.50	$5,659.50	25%	$7,074.38
17	Erosion & Sediment Control	1	LF	$1,000.00	$1,000.00	25%	$1,250.00
18	Mob and Demob	1	LS	$9,000.00	$9,000.00	25%	$11,250.00
19	Bonds	1	LS	$11,500.00	$11,500.00	25%	$14,375.00

Sub-Total (not including bonds)= $647,296.88

Total Construction Cost, Rounded = $860,000

Assumptions:
All excavated material is soil
All disposal is local (within) 1/4 mile and no fee
Fill material purchased, no borrow area

Real Estate Land Acquisition Value	=	$12,000.00	25%	$15,000.00
Real Estate Admin (1/5 of $490,000)			=	$98,000.00

Total Real Estate Cost, Rounded = $113,000

Planning, Engineering, and Design (PED) = $103,200.00

Total PED Cost, Rounded = $100,000

Construction Management (S&A) = $68,800.00

Total S&A Cost, Rounded = $70,000

TOTAL COST of Construction, Real Estate, PED, & S&A = $1,143,000.00

Note: Consistent with RE assumption, no Relocations Costs have been included

PROJECT: Streets Run 905B, Detention Basin/Dam
LOCATION: Baldwin, PA
COST LEVEL: August 2003
COST ESTIMATE STAGE: Recon Study
SITE: US Steel

Estimated By: RJB
Checked By: CRC
Last Updated: 8/26/2003

This estimate includes costs for one detention basin/dam only!

	Item Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Cost
1	Clearing and Grubbing	3	Acres	$4,000.00	$12,000.00	25%	$15,000.00
2	Excavation ((Cutoff Trench)Local Disp.), Soil	2,059	CY	$15.00	$30,885.00	25%	$38,606.25
3	Foundation Excavation, Soil	3,684	CY	$15.00	$55,260.00	25%	$69,075.00
4	Structure Excavation, Soil	30	CY	$15.00	$450.00	25%	$562.50
5	Emergency Spillway Excavation, Soil	0	CY	$15.00	$0.00	25%	$0.00
6	Embankment Fill	23,812	CY	$12.00	$285,744.00	25%	$357,180.00
7	Sand Filter	552	CY	$57.00	$31,464.00	25%	$39,330.00
8	Gravel Filter	293	CY	$65.00	$19,045.00	25%	$23,806.25
9	Reinforced Structural Concrete	254	CY	$450.00	$114,300.00	25%	$142,875.00
10	RipRap (R-5 Assumed)	222	CY	$70.00	$15,540.00	25%	$19,425.00
11	Reinforced Concrete Pipe, 48"	200	LF	$175.00	$35,000.00	25%	$43,750.00
12	Trash Racks	3	EA	$1,200.00	$3,600.00	25%	$4,500.00
13	Manhole Grate (24" x 24")	1	EA	$1,000.00	$1,000.00	25%	$1,250.00
14	Sluice Gate, Operator, and Appurtenances (12" x 12")	1	EA	$50,000.00	$50,000.00	25%	$62,500.00
15	Drill Grout Holes (3.25" dia. assumed, in rock)	343	LF	$30.00	$10,290.00	25%	$12,862.50
16	Grouting Holes	343	LF	$16.50	$5,859.50	25%	$7,074.38
17	Erosion & Sediment Control	1	LF	$1,000.00	$1,000.00	25%	$1,250.00
18	Mob and Demob	1	LS	$9,000.00	$9,000.00	25%	$11,250.00
19	Bonds	1	LS	$11,500.00	$11,500.00	25%	$14,375.00
					Sub-Total (not including bonds)=		$850,296.88
					Total Construction Cost, Rounded =		**$860,000**

Assumptions:
All excavated material is soil
All disposal is local (within) 1/4 mile and no fee
Fill material purchased, no borrow area

Real Estate Land Acquisition Value	=	$15,000.00	25%	$18,750.00
Real Estate Admin (1/5 of $490,000)			=	$98,000.00
Total Real Estate Cost, Rounded =				**$117,000**

Planning, Engineering, and Design (PED)	=	$103,200.00
Total PED Cost, Rounded =		**$100,000**

Construction Management (S&A)	=	$68,800.00
Total S&A Cost, Rounded =		**$70,000**

TOTAL COST of Construction, Real Estate, PED, & S&A = $1,147,000.00

Note: Consistent with RE assumption, no Relocations Costs have been included

PROJECT: Streets Run 905B, Detention Basin/Dam
LOCATION: Baldwin, PA
COST LEVEL: August 2003
COST ESTIMATE STAGE: Recon Study
SITE: Brentwood Road

Estimated By: RJB
Checked By: CRC
Last Updated: 8/26/2003

This estimate includes costs for one detention basin/dam only!

	Item Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Cost
1	Clearing and Grubbing	4	Acres	$4,000.00	$15,000.00	25%	$18,750.00
2	Excavation ((Cutoff Trench)Local Disp.), Soil	2,059	CY	$15.00	$30,885.00	25%	$38,606.25
3	Foundation Excavation, Soil	3,684	CY	$15.00	$55,260.00	25%	$69,075.00
4	Structure Excavation, Soil	30	CY	$15.00	$450.00	25%	$562.50
5	Emergency Spillway Excavation, Soil	0	CY	$15.00	$0.00	25%	$0.00
6	Embankment Fill	23,812	CY	$12.00	$285,744.00	25%	$357,180.00
7	Sand Filter	552	CY	$57.00	$31,464.00	25%	$39,330.00
8	Gravel Filter	293	CY	$65.00	$19,045.00	25%	$23,806.25
9	Reinforced Structural Concrete	254	CY	$450.00	$114,300.00	25%	$142,875.00
10	RipRap (R-5 Assumed)	222	CY	$70.00	$15,540.00	25%	$19,425.00
11	Reinforced Concrete Pipe, 48"	200	LF	$175.00	$35,000.00	25%	$43,750.00
12	Trash Racks	3	EA	$1,200.00	$3,600.00	25%	$4,500.00
13	Manhole Grate (24" x 24")	1	EA	$1,000.00	$1,000.00	25%	$1,250.00
14	Sluice Gate, Operator, and Appurtenances (12" x 12")	1	EA	$50,000.00	$50,000.00	25%	$62,500.00
15	Drill Grout Holes (3.25" dia. assumed, in rock)	343	LF	$30.00	$10,290.00	25%	$12,862.50
16	Grouting Holes	343	LF	$16.50	$5,659.50	25%	$7,074.38
17	Erosion & Sediment Control	1	LF	$1,000.00	$1,000.00	25%	$1,250.00
18	Mob and Demob	1	LS	$9,000.00	$9,000.00	25%	$11,250.00
19	Bonds	1	LS	$11,500.00	$11,500.00	25%	$14,375.00

Sub-Total (not including bonds)= $854,046.88

Total Construction Cost, Rounded = $870,000

Assumptions:
All excavated material is soil
All disposal is local (within) 1/4 mile and no fee
Fill material purchased, no borrow area

Real Estate Land Acquisition Value = $18,750.00 25% $23,437.50

Real Estate Admin (1/5 of $490,000) = $98,000.00

Total Real Estate Cost, Rounded = $121,000

Planning, Engineering, and Design (PED) = $104,400.00

Total PED Cost, Rounded = $100,000

Construction Management (S&A) = $69,600.00

Total S&A Cost, Rounded = $70,000

TOTAL COST of Construction, Real Estate, PED, & S&A = $1,161,000.00

Note: Consistent with RE assumption, no Relocations Costs have been included

PROJECT: Streets Run 905B, Detention Basin/Dam
LOCATION: Baldwin, PA
COST LEVEL: August 2003
COST ESTIMATE STAGE: Recon Study
SITE: Dupont

Estimated By: RJB
Checked By: CRC
Last Updated: 8/26/2003

This estimate includes costs for one detention basin/dam only!

	Item Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Cost
1	Clearing and Grubbing	4	Acres	$4,000.00	$17,000.00	25%	$21,250.00
2	Excavation ((Cutoff Trench)Local Disp.), Soil	2,059	CY	$15.00	$30,885.00	25%	$38,606.25
3	Foundation Excavation, Soil	3,684	CY	$15.00	$55,260.00	25%	$69,075.00
4	Structure Excavation, Soil	30	CY	$15.00	$450.00	25%	$562.50
5	Emergency Spillway Excavation, Soil	0	CY	$15.00	$0.00	25%	$0.00
6	Embankment Fill	23,812	CY	$12.00	$285,744.00	25%	$357,180.00
7	Sand Filter	552	CY	$57.00	$31,464.00	25%	$39,330.00
8	Gravel Filter	293	CY	$65.00	$19,045.00	25%	$23,806.25
9	Reinforced Structural Concrete	254	CY	$450.00	$114,300.00	25%	$142,875.00
10	RipRap (R-5 Assumed)	222	CY	$70.00	$15,540.00	25%	$19,425.00
11	Reinforced Concrete Pipe, 48"	200	LF	$175.00	$35,000.00	25%	$43,750.00
12	Trash Racks	3	EA	$1,200.00	$3,600.00	25%	$4,500.00
13	Manhole Grate (24" x 24")	1	EA	$1,000.00	$1,000.00	25%	$1,250.00
14	Sluice Gate, Operator, and Appurtenances (12" x 12")	1	EA	$50,000.00	$50,000.00	25%	$62,500.00
15	Drill Grout Holes (3.25" dia. assumed, in rock)	343	LF	$30.00	$10,290.00	25%	$12,862.50
16	Grouting Holes	343	LF	$16.50	$5,659.50	25%	$7,074.38
17	Erosion & Sediment Control	1	LF	$1,000.00	$1,000.00	25%	$1,250.00
18	Mob and Demob	1	LS	$9,000.00	$9,000.00	25%	$11,250.00
19	Bonds	1	LS	$11,500.00	$11,500.00	25%	$14,375.00

Sub-Total (not including bonds)= $856,546.88

Total Construction Cost, Rounded = $870,000

Assumptions:
All excavated material is soil
All disposal is local (within) 1/4 mile and no fee
Fill material purchased, no borrow area

Real Estate Land Acquisition Value = $21,250.00 25% $26,562.50

Real Estate Admin (1/5 of $490,000) = $98,000.00

Total Real Estate Cost, Rounded = $125,000

Planning, Engineering, and Design (PED) = $104,400.00

Total PED Cost, Rounded = $100,000

Construction Management (S&A) = $69,600.00

Total S&A Cost, Rounded = $70,000

TOTAL COST of Construction, Real Estate, PED, & S&A = $1,165,000.00

Note: Consistent with RE assumption, no Relocations Costs have been included

PROJECT: Streets Run 905B, Detention Basin/Dam
LOCATION: Baldwin, PA
COST LEVEL: August 2003
COST ESTIMATE STAGE: Recon Study
SITE: Glass Run

Estimated By: RJB
Checked By: CRC
Last Updated: 8/26/2003

This estimate includes costs for one detention basin/dam only!

	Item Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Cost
1	Clearing and Grubbing	3	Acres	$4,000.00	$12,000.00	25%	$15,000.00
2	Excavation ((Cutoff Trench)Local Disp.), Soil	2,059	CY	$15.00	$30,885.00	25%	$38,606.25
3	Foundation Excavation, Soil	3,684	CY	$15.00	$55,260.00	25%	$69,075.00
4	Structure Excavation, Soil	30	CY	$15.00	$450.00	25%	$562.50
5	Emergency Spillway Excavation, Soil	0	CY	$15.00	$0.00	25%	$0.00
6	Embankment Fill	23,812	CY	$12.00	$285,744.00	25%	$357,180.00
7	Sand Filter	552	CY	$57.00	$31,464.00	25%	$39,330.00
8	Gravel Filter	293	CY	$65.00	$19,045.00	25%	$23,806.25
9	Reinforced Structural Concrete	254	CY	$450.00	$114,300.00	25%	$142,875.00
10	RipRap (R-5 Assumed)	222	CY	$70.00	$15,540.00	25%	$19,425.00
11	Reinforced Concrete Pipe, 48"	200	LF	$175.00	$35,000.00	25%	$43,750.00
12	Trash Racks	3	EA	$1,200.00	$3,600.00	25%	$4,500.00
13	Manhole Grate (24" x 24")	1	EA	$1,000.00	$1,000.00	25%	$1,250.00
14	Sluice Gate, Operator, and Appurtenances (12" x 12")	1	EA	$50,000.00	$50,000.00	25%	$62,500.00
15	Drill Grout Holes (3.25" dia. assumed, in rock)	343	LF	$30.00	$10,290.00	25%	$12,862.50
16	Grouting Holes	343	LF	$16.50	$5,659.50	25%	$7,074.38
17	Erosion & Sediment Control	1	LF	$1,000.00	$1,000.00	25%	$1,250.00
18	Mob and Demob	1	LS	$9,000.00	$9,000.00	25%	$11,250.00
19	Bonds	1	LS	$11,500.00	$11,500.00	25%	$14,375.00

Sub-Total (not including bonds)= $850,296.88

Total Construction Cost, Rounded = $860,000

Assumptions:
All excavated material is soil
All disposal is local (within) 1/4 mile and no fee
Fill material purchased, no borrow area

Real Estate Land Acquisition Value = $15,000.00 25% $18,750.00

Real Estate Admin (1/5 of $490,000) = $98,000.00

Total Real Estate Cost, Rounded = $117,000

Planning, Engineering, and Design (PED) = $103,200.00

Total PED Cost, Rounded = $100,000

Construction Management (S&A) = $68,800.00

Total S&A Cost, Rounded = $70,000

TOTAL COST of Construction, Real Estate, PED, & S&A = $1,147,000.00

Note: Consistent with RE assumption, no Relocations Costs have been included

APPENDIX B

Actions That Can Be Taken by Local Authorities to Help Reduce Flooding

Flooding Problems

The primary factors contributing to flooding problems along Streets Run include urbanization, uncontrolled runoff, inadequate drainage facilities, floodplain development, and channel degradation due to erosion, sedimentation, and encroachments. The upper reaches of the basin upstream of the intersection of Willock and Delwar Roads are highly developed with approximately 75% of the land occupied by residential and commercial development. In many cases, this development contributes uncontrolled stormwater runoff to the basin. Near the intersection of Streets Run Road and Prospect Road, Streets Run passes under a series of two bridges. The stream alignment through these bridges contributes to backwater flooding upstream. Several other locations have undersized bridges and culverts that contribute to flooding. For example, the culvert under the WHEMCO site in Hays cannot pass the 1% (100-year) flood discharge. Flooding has been experienced along Streets Run near the intersection of Streets Run Road and Brentwood Road. A tributary entering Streets Run at this location contributes to the flooding of several commercial and residential structures in this area. Downstream of this location to the City of Pittsburgh corporate limits, out of bank flows cause flooding of Streets Run Road. Frequent flooding is experienced in the reach near the confluence of the Elm Leaf Park tributary and Streets Run. The culverts under the CSX rail line and Streets Run Road have experienced blockage due to woody debris contributing to flooding of several low lying structures along Streets Run Road. Development in the floodplain, particularly within the City of Pittsburgh corporate limits, contributes to damages experienced during flood events. In several locations, the capacity of the Streets Run channel has been reduced due to channel degradation.

Potential Solutions

Much of the urbanization with the basin occurred prior to implementation of stormwater management facilities and regulations. Because the upper basin is already highly developed, there are no suitable locations available for effective stormwater management facilities that would significantly mitigate for existing development. Enforcement of existing stormwater and floodplain regulations will ensure that future development does not further contribute to flooding problems. Preparation of a storm water management plan for the Streets Run watershed in accordance with Act 167 could be used to further strengthen and standardize stormwater management practices throughout the basin.

A realignment of Streets Run near Prospect Road combined with bridge removal and/or replacement could reduce flooding in the immediate vicinity upstream of this reach. Bridge and culvert replacements with more hydraulically efficient structures could be used throughout the watershed to reduce backwater flooding problem areas.

As shown in this report, stormwater detention dams would provide some reduction in flood elevations. Although engineeringly feasible, the use of detention dams to mitigate existing flooding problems may not be cost effective. Because of development within the watershed, the number of suitable sites that could reduce runoff while minimizing impacts to existing facilities (e.g. structures, roads, utilities) is limited. It would be difficult to control enough drainage area

to significantly reduce flooding. The valleys are steep and narrow, which limits the available volume for storing water resulting in relatively high stormwater retention dams.

Structural channel modifications can be an effective tool for reducing flood elevations. A concrete channel is currently being studied by PADEP within the City of Pittsburgh corporate limits to provide flood protection in the lower reaches of Streets Run. Channel restoration could be considered upstream of this area to achieve further benefits. In several locations, encroachments and sedimentation have reduced the hydrologic capacity of Streets Run. Although not economically justifiable for Federal action, cleaning of the channel and restoration would provide some limited reduction in flood elevations.