FLOOD INSURANCE STUDY

TOWN OF ACTON, MAINE
YORK COUNTY

DECEMBER 5, 1984

Federal Emergency Management Agency

COMMUNITY NUMBER - 230190

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FLOOD INSURANCE STUDY
TOWN OF ACTON, MAINE

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Acton, York County, Maine, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert Acton to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

This Flood Insurance Study was prepared by compiling pertinent information for the flood hazard areas in the Town of Acton from existing technical and/or scientific data originally prepared by the Soil Conservation Service (SCS) and others for purposes other than the National Flood Insurance Program (NFIP). This existing data was reviewed by FEMA prior to its use in the development of this Flood Insurance Study to ensure compliance with NFIP accuracy requirements.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these federally-supported studies are based. These criteria take precedence over the minimum federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3. In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the Soil Conservation Service during the course of the Flood Hazard Analyses for the Little Ossipee River and Balch Pond in the Towns of Acton, Newfield, and Shapleigh. The Soil Conservation Service report was completed in September 1977.

1.3 Coordination

On June 26, 1984, the results of the study were reviewed at a final CCO meeting attended by representatives of FEMA, the Town of Acton, and the SCS.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Acton, York County, Maine. The area of study is shown on the Vicinity Map (Figure 1).

The Little Ossipee River was studied by detailed methods for its entire length within the corporate limits. Flooding from Balch Pond was also studied in detail. The areas studied by detailed methods were selected based upon the extent and validity of available existing hydrologic and hydraulic data.

Hansen Pond, Great East Lake, and the Salmon Falls River were studied by approximate methods. Approximate methods of analysis were used to study all remaining areas having a potential flood hazard that did not have available scientific or technical data.

2.2 Community Description

The Town of Acton is located in the western portion of York County in southwestern Maine. It is bordered by the Town of Newfield to the north, the Town of Shapleigh to the east, the Town of Sanford to the southeast, the Town of Lebanon to the south, the Town of Milton, New Hampshire, to the southwest, and the Town of Wakefield, New Hampshire, to the west.

The headwaters of the Little Ossipee River are located in Carroll County, New Hampshire; the river has a drainage area of 185 square miles at its confluence with the Saco River in East Limington, Maine. The Little Ossipee River begins at the outlet of Balch Pond, located in Newfield, and flows east through the Towns of Acton, Shapleigh, Limerick, and Waterboro on the way to its confluence in East Limington.

There are numerous lakes and ponds in the Little Ossipee River watershed, the largest of which in Acton is Balch Pond. It is estimated that temporary flood storage provided by the lakes reduces peak flows on the Little Ossipee River by approximately 25 percent at its confluence.

Acton is situated in the Southern Interior Climatic Zone and has average daily temperatures ranging from approximately 21 degrees Fahrenheit (°F) in January to 70°F in July. The average annual precipitation is approximately 44 inches and includes the water equivalent of 90 inches of snow.

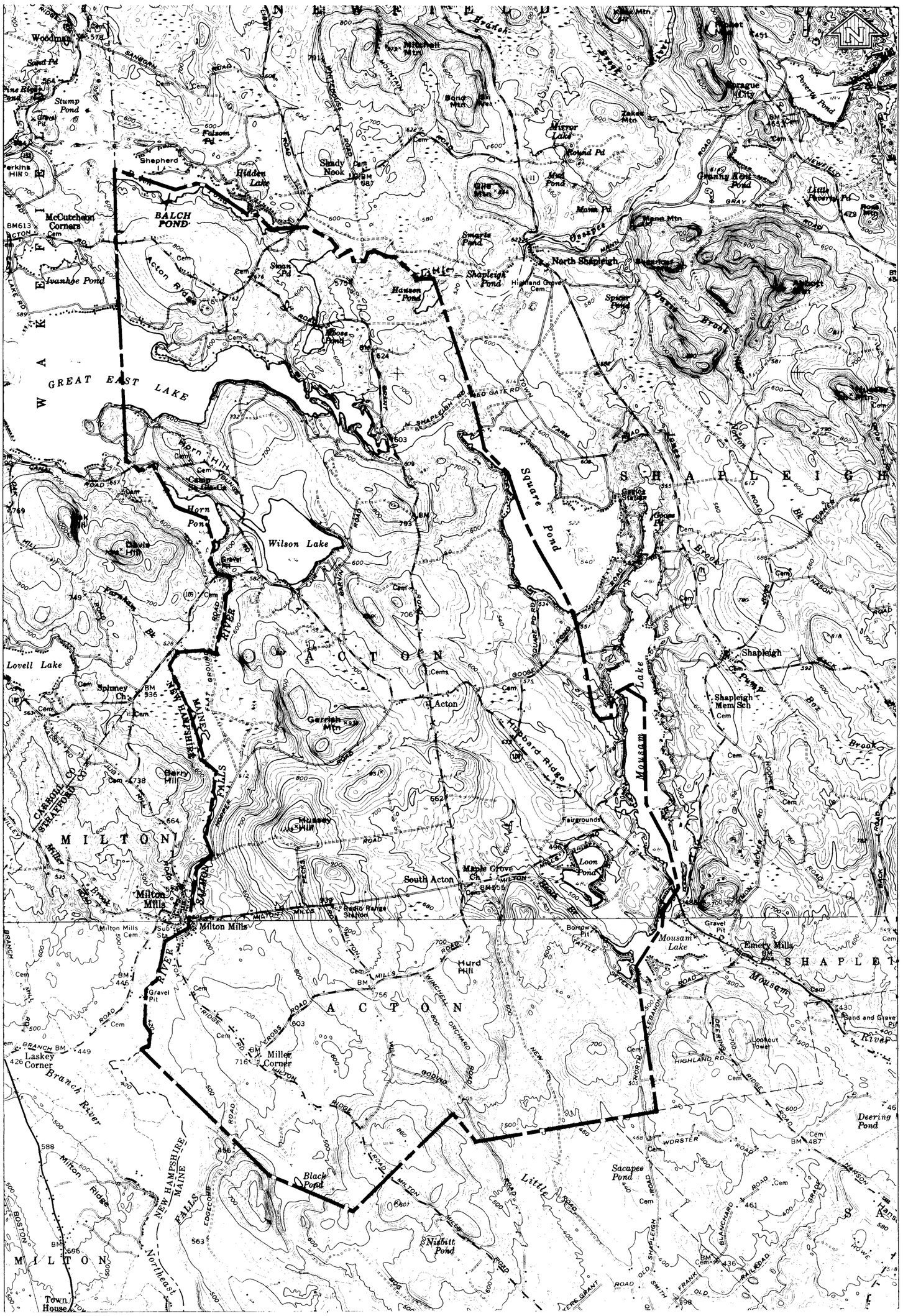


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF ACTON, ME
(YORK CO.)

APPROXIMATE SCALE

1 0 1 2 3 MILES

VICINITY MAP

Woodland and water-based recreation areas dominate the flood plain of the Little Ossipee River, and there are no urban centers located adjacent to the flood plain; however, significant developmental pressures exist for the construction of permanent and seasonal homes within the flood plain area (Reference 1).

The soils of the Little Ossipee River watershed consist of the Scio-Buxton association, the AuGres-Deerfield association, the Windsor-Hinckley association, the Hermon-Lyman association, and the Skerry-Ridgebury-Becket association. Ratings for soil suitability can be found in the Soil Suitability Guide for Land Use Planning in Maine (Reference 2).

2.3 Principal Flood Problems

Acton is experiencing an increase in urbanization, and developmental pressures are expected to continue increasing in the study area. Urbanization within the watershed increases the flood hazard by increasing the rate and amount of runoff. Encroachment into the flood plain by land filling and other developments constricts the flow and reduces the storage of floodwaters. This in turn increases flood depths and the area flooded upstream.

Minor flooding occurs almost annually in the Acton area due to snowmelt and ice jams on the Little Ossipee River. Areas flooded include wooded and open lowlands, roads, and bridges. The flood of record occurred in March 1936 and had a peak discharge of 8,530 cubic feet per second (cfs) at the Little Ossipee Flowage Dam in Limerick and Waterboro. This flood was generated from approximately 4 inches of rain over a two day period and further complicated by high antecedent moisture conditions, snow cover, and ice laden streams. The recurrence interval of the flood was estimated to be slightly in excess of 100 years. There are no available records of any flood damage in the study area (Reference 3).

A U. S. Geological Survey (USGS) gaging station is located on the Little Ossipee River near South Limington and had a period of record of 42 years. The highest recorded discharge (5,760 cfs) at the gage occurred in March 1977. The USGS gaging station was discontinued in September 1982 (Reference 4).

2.4 Flood Protection Measures

A 10-foot high earthfill dam with a steel and concrete spillway is located at the outlet of Balch Pond. If adequately maintained, the dam provides safe passage of flood flows.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency and peak elevation-frequency relationships for the flooding sources studied in detail affecting the community.

For the Little Ossipee River, flood flows for the 10-, 50-, 100-, and 500-year floods were computed from an analysis of stream hydraulics, soil cover, land use, and rainfall data using the SCS TR-20 computer program (Reference 5). A 24-hour duration storm and normal antecedent moisture conditions were used.

The USGS gage (No. 01066500) located on the Little Ossipee River near South Limington has a period of record of 36 years. The computed discharges correlated favorably with a log-Pearson Type III analysis of the gage data (Reference 6).

A summary of drainage area-peak discharge relationships for the Little Ossipee River is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
LITTLE OSSIPEE RIVER					
At Balch Pond Road	14.0	250	470	550	760

Peak elevations for Balch Pond were computed by routing flood flows through the pond. A summary of peak elevation-frequency relationships for Balch Pond is shown in Table 2, "Summary of Stillwater Elevations."

TABLE 2 - SUMMARY OF STILLWATER ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
BALCH POND	559.1	559.7	559.9	560.5

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the riverine flooding source studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Topographic data were obtained from 10 surveyed valley and bridge cross sections and from USGS topographic maps (References 7 and 8). Where feasible, transposed cross sections were used to reduce the number of surveyed cross sections. Field surveys were obtained during the summer of 1975. Only those features in the flood plain at the time of the surveys were considered in the computations.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the SCS WSP-2 computer program (Reference 9). Starting water-surface elevations for the Little Ossipee River were obtained from the Flood Insurance Study for the Town of Newfield (Reference 10). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Roughness coefficients (Manning's "n") used in the hydraulic computations were assigned on the basis of field inspection. The channel "n" values for the Little Ossipee River ranged from 0.015 to 0.057, and the overbank "n" values ranged from 0.060 to 0.100.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are, therefore, considered valid only if hydraulic structures, in general, remain unobstructed and if channel and overbank conditions remain essentially the same as ascertained during this study.

All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD); elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing flood plain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the Little Ossipee River, the 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps and aerial photographs (Reference 7, 8, and 11). The 100- and 500-year flood boundaries for Balch Pond were delineated using the same topographic maps and aerial photographs.

For the areas studied by approximate methods, the boundary of the 100-year flood was delineated using the Flood Hazard Boundary Map for Acton (Reference 12).

The 100- and 500-year flood plain boundaries are shown on the Flood Boundary and Floodway Map (Exhibit 2). In cases where the 100- and 500-year flood plain boundaries are close together, only the 100-year flood plain boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on flood plains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood plain is

divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodway in this study is presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodway presented in this study was computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations are tabulated at selected cross sections for the stream segment for which a floodway is computed (Table 3).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. In cases where the floodway and 100-year flood plain boundaries are either close together or collinear, only the floodway boundary has been shown. Portions of the floodway widths for the Little Ossipee River extend beyond the corporate limits.

The area between the floodway and 100-year flood plain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain developments are shown in Figure 2.

The floodway in this report is recommended to local agencies as a minimum standard that can be adopted or that can be used as a basis for additional studies.

5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail in the Town of Acton.

5.1 Reach Determinations

Reaches are defined as sections of flood plain that have relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY	INCREASE
Little Ossipee River								
A	5,150	60	233	2.7	530.9	530.9	531.9	1.0
B	5,300	69	148	4.3	532.7	532.7	533.7	1.0
C	10,100	53	178	3.1	549.7	549.7	550.7	1.0

[1]Feet above corporate limits
[2]This width extends beyond corporate limits

TABLE 3

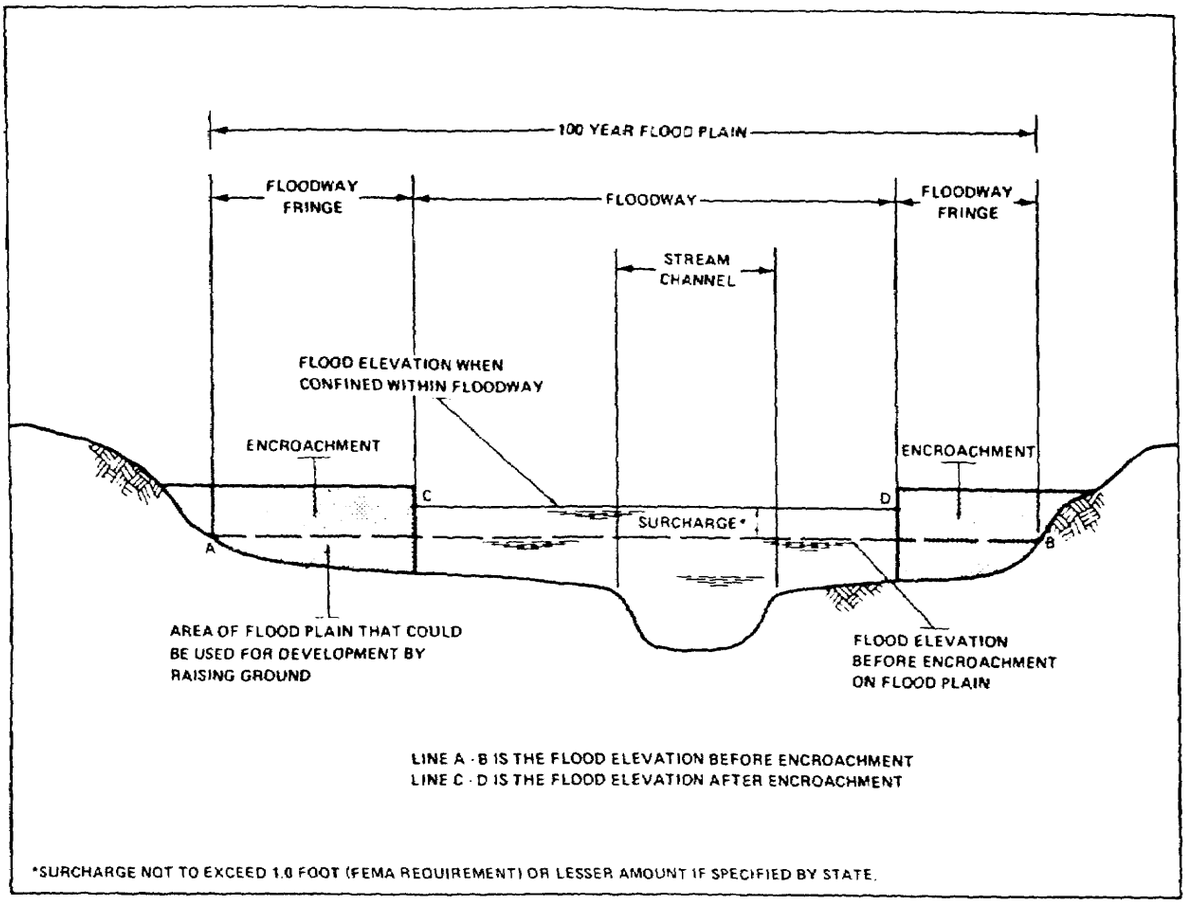
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF ACTON, ME

(YORK CO.)

FLOODWAY DATA

LITTLE OSSIPEE RIVER



FLOODWAY SCHEMATIC

Figure 2

may not have a variation greater than that indicated in the following tabulation for more than 20 percent of the reach:

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The location of the reach determined for the riverine flooding source of the Town of Acton is shown on the Flood Profiles (Exhibit 1) and summarized in Table 4.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Little Ossipee River Reach 1	01,02	-1.5	-0.2	+0.6	015	A3	Varies
Balch Pond Reach 1	01	-0.8	-0.2	+0.6	010	A2	560

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF ACTON, ME
(YORK CO.)

FLOOD INSURANCE ZONE DATA

LITTLE OSSIPEE RIVER-BALCH POND

In lacustrine areas, reaches are limited to the distance for which the 100-year flood elevation does not vary more than 1.0 foot. Using these criteria, one reach was required for the lacustrine flooding source of the Town of Acton. The location of this reach is shown on the Flood Insurance Rate Map (published separately) and summarized in Table 4.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations rounded to the nearest one-half foot, multiplied by 10, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, it is rounded to the nearest whole foot.

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF, and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

Zone A: Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.

Zones A2 and A3: Special Flood Hazard Areas inundated by the 100-year flood; with base flood elevations shown, and zones subdivided according to FHFs.

Zone B: Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- or 500-year floods by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding; not subdivided.

Flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding sources studied in detail in the community are shown in Table 4.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town of Acton is, for insurance purposes, the principal result of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevations. Base flood elevation lines show the locations of the expected whole-foot water-surface elevation of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

6.0 OTHER STUDIES

This Flood Insurance Study was prepared by compiling existing hydrologic and hydraulic technical and scientific data prepared by the SCS and other organizations originally for purposes other than the NFIP. The data was identified as the best available at the time of compilation of this Flood Insurance Study and should depict the general conditions of the flooding sources with relative accuracy. FEMA performed a cursory review and accepted the data as valid for purposes of this Flood Insurance Study and the NFIP. However, if better information is known to exist or has been developed since the date of this report, the information should be immediately forwarded to the Natural and Technological Hazards Division, Federal Emergency Management Agency (Regional Director, Region I Office, J. W. McCormack Post Office and Courthouse Building, Room 462, Boston, Massachusetts 02109) for consideration for revision of this study.

Flood Insurance Studies for the Towns of Newfield, Shapleigh, and Sanford are currently being prepared (References 10, 13, and 14). The results of those studies will be in exact agreement with the results of this study.

The SCS completed a Flood Hazard Analyses for the Little Ossipee River in the Towns of Acton, Newfield, and Shapleigh in September 1977 (Reference 1). This study was based on the data in the SCS report.

A Flood Hazard Boundary Map has been published for the Town of Acton (Reference 12). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

This study is authoritative for purposes of the Flood Insurance Program, and the data presented here either supersede or are compatible with previous determinations.

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, Regional Director, Region I Office, J. W. McCormack Post Office and Courthouse Building, Room 462, Boston, Massachusetts 02109.

8.0 BIBLIOGRAPHY AND REFERENCES

1. U. S. Department of Agriculture, Soil Conservation Service, Flood Hazard Analyses, Little Ossipee River, Towns of Acton, Newfield and Shapleigh, York County, Maine, Orono, Maine, September 1977.

2. State of Maine, Cooperative Extension Service, Miscellaneous Publication 667, Soil Suitability Guide for Land Use Planning in Maine, Orono, Maine, February 1967, Revised February 1975.

3. U. S. Department of the Interior, Geological Survey, Water-Supply Paper 798, The Floods of March 1936, Washington, D. C., 1937.

4. U. S. Department of the Interior, Geological Survey, Water Resources Data for Maine, Washington, D. C., 1975.

5. U. S. Department of Agriculture, Soil Conservation Service, Technical Release No. 20, Computer Program, Project Formulation, Hydrology, Washington, D. C., 1965.

6. U. S. Department of the Interior, Geological Survey, Open-File Report 75-292, A Technique for Estimating the Magnitude and Frequency of Floods in Maine, Washington, D. C., 1975.

7. U. S. Department of the Interior, Geological Survey, 15-Minute Series Topographic Maps, Scale 1:62,500, Contour Interval 20 Feet: Wolfeboro, Maine, 1942; Newfield, Maine, 1942; Buxton, Maine, 1942; Sebago Lake, Maine, 1942.

8. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 20 Feet: Newfield, Maine-New Hampshire, 1958.

9. U. S. Department of Agriculture, Soil Conservation Service, Technical Release No. 61, WSP-2 Computer Program, Washington, D. C., May 1976.

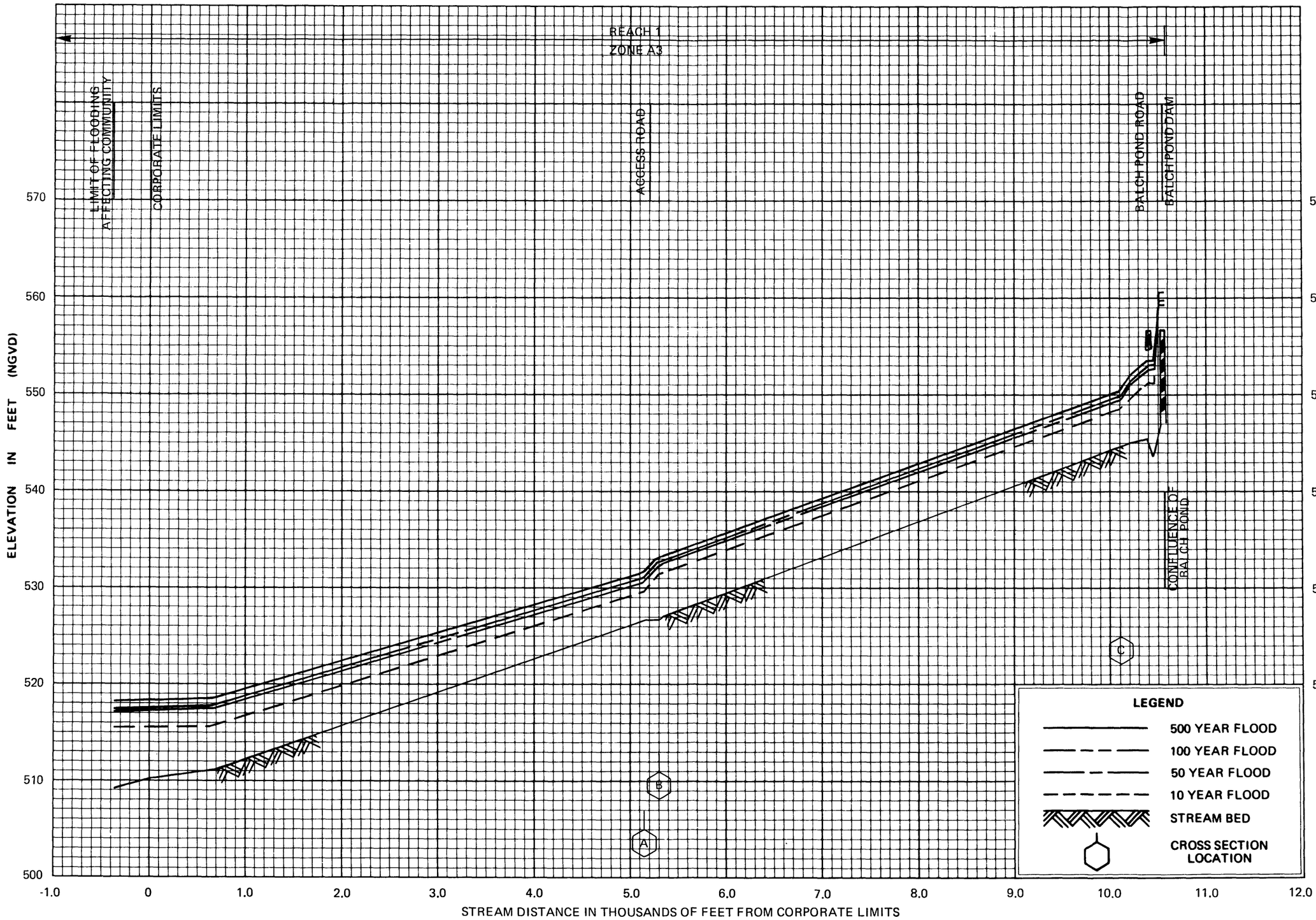
10. Federal Emergency Management Agency, Flood Insurance Study, Town of Newfield, York County, Maine (Unpublished).

11. U. S. Department of Agriculture, Soil Conservation Service, Aerial Photographs, ELB Series, Scale 1:20,000: Acton, Maine, May 1962.

12. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Town of Acton, York County, Maine, June 23, 1975, Revised August 31, 1979.

13. Federal Emergency Management Agency, Flood Insurance Study, Town of Shapleigh, York County, Maine (Unpublished).

14. Federal Emergency Management Agency, Flood Insurance Study, Town of Sanford, York County, Maine (Unpublished).



FLOOD PROFILES

LITTLE OSSIPEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF ACTON, ME
(YORK CO.)

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