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Flood Insurance Study, Town of Wendover, Utah, Tooele County

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FLOOD INSURANCE STUDY



TOWN OF
WENDOVER,
 UTAH
 TOOELE COUNTY

NOTICE TO FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

REVISED: JULY 16, 1996



Federal Emergency Management Agency

COMMUNITY NUMBER - 490222

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**FLOOD INSURANCE STUDY
TOWN OF WENDOVER, TOOELE COUNTY, UTAH**

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study revises and updates a previous Flood Insurance Study/Flood Insurance Rate Map for the Town of Wendover, Tooele County, Utah. This information will be used by the Town of Wendover to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP). The information will also be used by local and regional planners to further promote sound land use and floodplain development.

In some States or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are 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 U.S. Army Corps of Engineers, Sacramento District, for the Federal Emergency Management Agency (FEMA), under Interagency Agreement No. IAA-EMW-93-E-4119, Project Order No. 8, of the Limited Map Maintenance Program. This study was completed in November 1994.

1.3 Coordination

The initial Consultation and Coordination Officer (CCO) meeting was held on January 11, 1994, and attended by representatives of FEMA, the State of Utah, the Town of Wendover, and the study contractor.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated areas of the Town of Wendover, Tooele County, Utah.

The areas studied included the fully and partially developed areas within the corporate limits of the Town of Wendover. Due to the complexities of flows, including the interbasin commingling of flood flows, detailed routings were performed on all of the drainages contributing to the floodplain within the study area in order to accurately portray the flood flow distribution and floodplains. Detailed backwater analyses were not performed because of the lack of reliability due to the steep stream gradients. The scope and methods for study were proposed to, and agreed upon, by FEMA and the Town of Wendover prior to the initiation of the study.

2.2 Community Description

The Town of Wendover is located at the westernmost edge of Tooele County at the interstate boundary with Utah. The Town is located along Interstate 80 (I-80), approximately 125 miles west of Salt Lake City, Utah, and 60 miles east of Wells, Nevada.

The Town of Wendover, which was incorporated in 1952, had a population of roughly 500 in 1956. Over the years, the Town's population has grown to approximately 1,200 due to the growth of the gaming industry located in the neighboring community of West Wendover, Nevada.

The Town of Wendover is located on the western edge of the Great Salt Lake Desert next to the Bonneville Salt Flats. The community, which is at an average elevation of 4,300 feet National Geodetic Vertical Datum of 1929 (NGVD), is situated along the southern base of the Silver Island Mountains and is subject to cloudburst flooding. Contributing to the intensity of the flooding is the steepness of the drainage areas, which are located on dry, rocky slopes with little vegetation.

2.3 Principal Flood Problems

The Town has experienced a number of flash floods in the past, none of which would be considered a 100-year flood. The flash floods are caused by cloudburst-type storms that are located over the hills to the north of the Town. These hills, which are composed of steep, rocky surfaces, contribute to the intensity of the runoff through the community. The community is subject to flooding almost every year. The floods that occurred on August 8, 1939, June 3, 1963, May 25, 1987, and August 26, 1987, have been identified as the most severe events in recent history. Post flooding shown in Figures 2, 3, and 4 is the result of flooding in 1987.

Since construction of I-80, the floodplain characteristics downstream of the highway have changed. The flood flows that now reach the Town below the highway used to be a series of natural-basin flows. Now the flood flows, which are less in volume, are more concentrated at their point of outflow. Also, some areas located upstream of I-80 are developing within the natural floodplain, resulting in changes to the flood-flow paths and greater potential flood damage. The typical flood is shallow in depth, but carries a substantial amount of debris due to the exposed soils and steep gradient surfaces. Flooding will originate in the hills, flowing south to I-80. More than half of the flood flows that historically traversed the Town are routed to the east by the highway.



Figure 1. Aria Boulevard Looking North at Interstate 80



Figure 2. Wendover Boulevard Looking Southwest at the Super Saver Service Station



Figure 3. Post-Flood Cleanup of Debris Deposition in Wendover

The remaining flows are funnelled through the underpass at Aria Boulevard heading south, then spread out in a southeasterly direction reinforced by local drainage, until they collect behind the Western Pacific Railroad embankment.

With a large enough event, the railroad is overtopped and the flood flows continue spreading in a south-southeast direction toward the Bonneville Salt Flats.

2.4 Flood Protection Measures

No flood-control structures exist within the Town of Wendover. There is some channel stabilization that is evident within the study area.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods 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 that 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 floodplain 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 that 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); 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 peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

The 100-year peak flows were calculated using a cloudburst-type storm. The data used to compute the rainfall resulting from the cloudburst storm were taken from the National Oceanic and Atmospheric Administration's (NOAA's) Atlas 2 for Utah (Reference 1). A storm lasting 3 hours was used as the 100-year cloudburst-storm event for the drainage areas north of the Town. In the above-mentioned NOAA Atlas, the Town of Wendover is located in Region 2, which covers most of Western Utah. Based on this information, the 100-year May-October rainfall amounts were estimated for the Town of Wendover.

The 3-hour cloudburst storm producing a rainfall depth of 1.78 inches was centered over the contributing 2.5-square-mile drainage area located above I-80. Since the drainage area was so small, this storm did not need to be reduced in area. For the small area south of I-80, a concurrent 3-hour storm producing a rainfall depth of 1.70 inches was used. Because the individual drainage areas are small in size, the storm was distributed

using 5-minute increments. Loss rates used for the Town of Wendover are low. An initial loss of 0.15 inch and a constant loss of 0.15 inch per hour were used to simulate the saturated conditions that are expected in this area.

The computer program HEC-1 (Reference 2) was used with the 100-year cloudburst storm, a selected 5-minute distribution pattern, Snyder's unit hydrograph parameters, and the above loss rates to compute the 100-year cloudburst flood hydrographs for each subbasin that affects the Town of Wendover. These hydrographs were routed and combined using the computer program Xrate (Reference 3). The routings within the floodplain were performed at logical control points that impacted peak flow due to point of entry, storage, and/or flow distribution. Peak flows for various locations throughout the floodplain are provided in Table 1.

Table 1. Summary of Discharges

Flooding Source and Location	100-Year Flow (cubic feet per second)
Aria Boulevard Canyon	
At Canyon Mouth	170
At I-80	260
At Western Pacific Railroad	360
Drainage Along North Side of I-80	
West side of Aria Boulevard	150
Due north of Fourth Street	220
Due north of Ninth Street	360
At Dairy Canyon Creek	1,030

3.2 Hydraulic Analyses

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

Standard backwater analyses were not used to model the flooding sources coming down the mountainsides because the slopes were too great for any reasonable or reliable stream hydraulics. Rather, detailed routing and rating studies were prepared analyzing the distribution of the flow hydrographs through the physical constraints in the upper drainage basin and the community to assess the impact of storage and relative-flow distributions. Some backwater analyses were computed along the north side of I-80 for rating the ponding and flow capacities of the drainage ditches that convey the flood flows to the east. Along I-80, the backwater slopes were flat enough to provide adequate rating data.

This information, along with field assessments, provided the basis for determining the 100-year flood boundaries and corresponding depth data defined as either sheet flow or ponding elevations within the community. No stream profiles were computed.

There are six major and minor drainages north of I-80 (spanning from west of Aria Boulevard to Wendover Peak) that were assessed for this study. These systems, along with the local drainage south of I-80, were routed through a complex and interrelated flow pattern through the community to provide the flow data that resulted in the 100-year floodplain for the Town of Wendover.

All elevations are referenced to the Master Storm Drainage Plan Base Map (Reference 4) provided by the Town of Wendover.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations determined in this study are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to NGVD.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain 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 floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each flooding source studied by detailed methods, the 100-year floodplain boundaries have been delineated on topographic maps at a scale of 1:2,400, with a contour interval of 2 feet (Reference 4), using the depths and elevations determined in the hydraulic analyses.

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 1). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AH, and AO). Small areas within the floodplain 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 floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights.

Because the 100-year flooding is the result of sheet flow and ponding and no identifiable flooding source exists, no floodways were computed for flooding sources studied by detailed methods in the Town of Wendover.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations (BFEs) or depths are shown within this scope.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No BFEs or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100-year floodplain determined by the hydraulic analyses.

7.0 OTHER STUDIES

This study supersedes the Flood Insurance Rate Map for the Town of Wendover, which was published on August 19, 1980 (Reference 5).

This study is authoritative for the purposes of the NFIP; data presented herein either supersede or are compatible with all previous determinations.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting FEMA, Mitigation Division, Denver Federal Center, Building 710, Box 25267, Denver, Colorado 80225-0267.

9.0 BIBLIOGRAPHY AND REFERENCES

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5. Federal Emergency Management Agency, Flood Insurance Rate Map, Town of Wendover, Utah, August 19, 1980.