Utah Division of Emergency Management
Flood Hazard Programs

Guidance Document
Determining a BFE in an A Zone

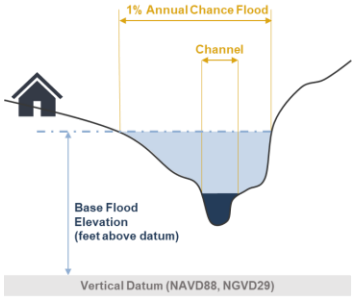
Introduction

Base Flood Elevations (BFEs) are used to evaluate development in the floodplain and are a key component of floodplain management requirements as part of the National Flood Insurance Program (NFIP).

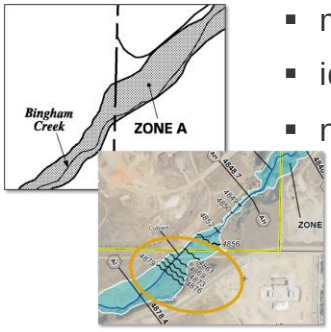
Approximate "A Zones" are areas on a FEMA Flood Insurance Rate Map (FIRM) not studied by detailed hydrologic/hydraulic methods. These areas are shown as "Zone A" without a BFE identified on the FIRM or in the Flood Insurance Study (FIS). Determining the BFE in these areas can be challenging. This guidance has been developed to assist Utah floodplain managers navigate the various requirements and options available to determine the BFE in an A Zone.

What is a BFE?

The Base Flood Elevation (BFE) is the elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year. In other words, it is the expected height of water during the 1%-annual-chance flood event.



BFEs are:

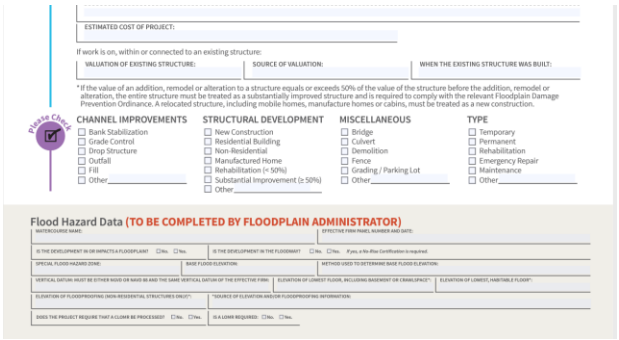


- mapped at 1-foot intervals,
- identified on FIRMs for AE and VE zones, and
- not typically developed and/or mapped for:
  - A zones,
  - older floodplain maps, and
  - some Base Level Engineering (BLE) maps

What are BFEs used for?

BFEs are used in floodplain management to determine the minimum elevation for structures to be elevated or flood-proofed to according to federal and local regulations to prevent damage during a 1%-annual-chance flood event. Several floodplain management forms require the BFE, such as:

- Floodplain Development Permits,
- Elevation Certificates,
- No-Rise Certifications,
- Map Amendments and Revisions (LOMA/LOMR/LOMR-F/CLOMR), and
- other local floodplain management ordinances.



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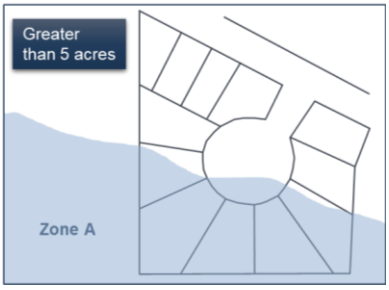
When are BFEs required in A zones?

Communities participating in the NFIP are required to review development permits for new construction or substantial improvements to determine if they are **reasonably safe from flooding** in A zones [44 CFR 60.3(b)(4)].

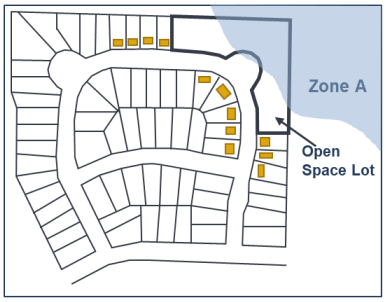
Depending on the proposed development, a BFE may be required and may have limitations on acceptable BFE determination methods. Proposed developments **larger than 50 lots or 5 acres**, whichever is lesser, **require a BFE**.

Proposed 76-lot subdivision

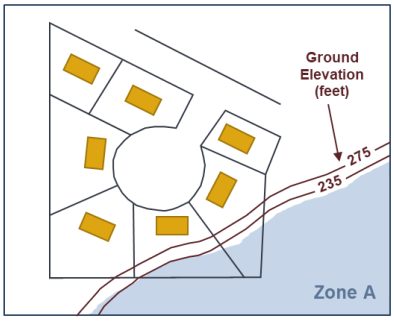


Proposed 6.7 ac subdivision

The BFE may not be required if the floodplain is contained entirely within an open space lot and/or the building sites are clearly outside of the A zone area.



Floodplain contained in open space



Steep slope from building site to floodplain

If the proposed development is **smaller than 50 lots or 5 acres**, the **BFE is not required**, unless specified by local ordinance. However, communities are still responsible for determining whether the proposed building sites will be reasonably safe from flooding. Without an estimated BFE, the floodplain manager would need significant local knowledge of flooding risks at the proposed development.

Additionally, determining the BFE where not required does have **advantages** such as:

- reduction of future losses,
- consistent application of floodplain management regulations,
- potential for lower flood insurance costs, and
- eligibility for credits under the Community Rating System.

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What methods are available to determine the BFE?

Either **detailed** or **simplified** methods will be used, depending on available data, the development size, and additional local ordinance.

If the development is **greater than 50 lots or 5 acres** and/or local ordinance specifies, **detailed methods** must be used to determine the BFE.

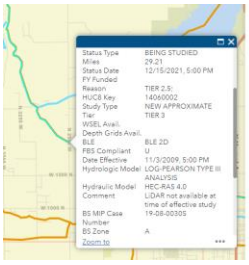
If the development is **smaller than 50 lots or 5 acres**, **simplified methods** can be used. However, if data is available, a detailed method should be used even if it is not required.

Data Requirements and Sources for Detailed Methods

Specific data is required to use each of the detailed methods:

Method	All Methods	1D Cross Section Interpolation	2D WSE Contour Interpolation	2D WSE Grid Extraction
Required Data	Streamline 1%-annual-chance SFHA	S_XS, or other XS's with WSE data (i.e., shapefile, report, map) **OR** 1D HEC-RAS Model (v. 3 or later)	S_BFE, or other WSE contour data (i.e., shapefile, report, map)	2D WSE output grid (i.e., geotiff)

The required data may be available for request from FEMA if the A zone is "model-backed." Use the CNMS Viewer to identify if FEMA has model backup for the A zone. Look for a model version in the "Hydraulic Model" field. To request data from FEMA [insert how Jamie would like to coordinate this].



If FEMA does not have model back-up, reach out to other federal, state, and local agencies to inquire if studies have been completed which may have required a BFE be developed.

Data Requirements and Sources for Simplified Methods

Specific data is required to use the simplified methods:

Method	Profile Data Extrapolation	Contour Interpolation
Required Data	• Detailed Study 1%-annual-chance profile • Streamline • 1%-annual-chance SFHA	• 1%-annual-chance SFHA (digitized if paper) • Georeferenced topographic Map

Effective model data can be downloaded from FEMA Map Service Center. USGS topographic maps can be downloaded from the Utah Geospatial Resource Center's Topographic Map page.

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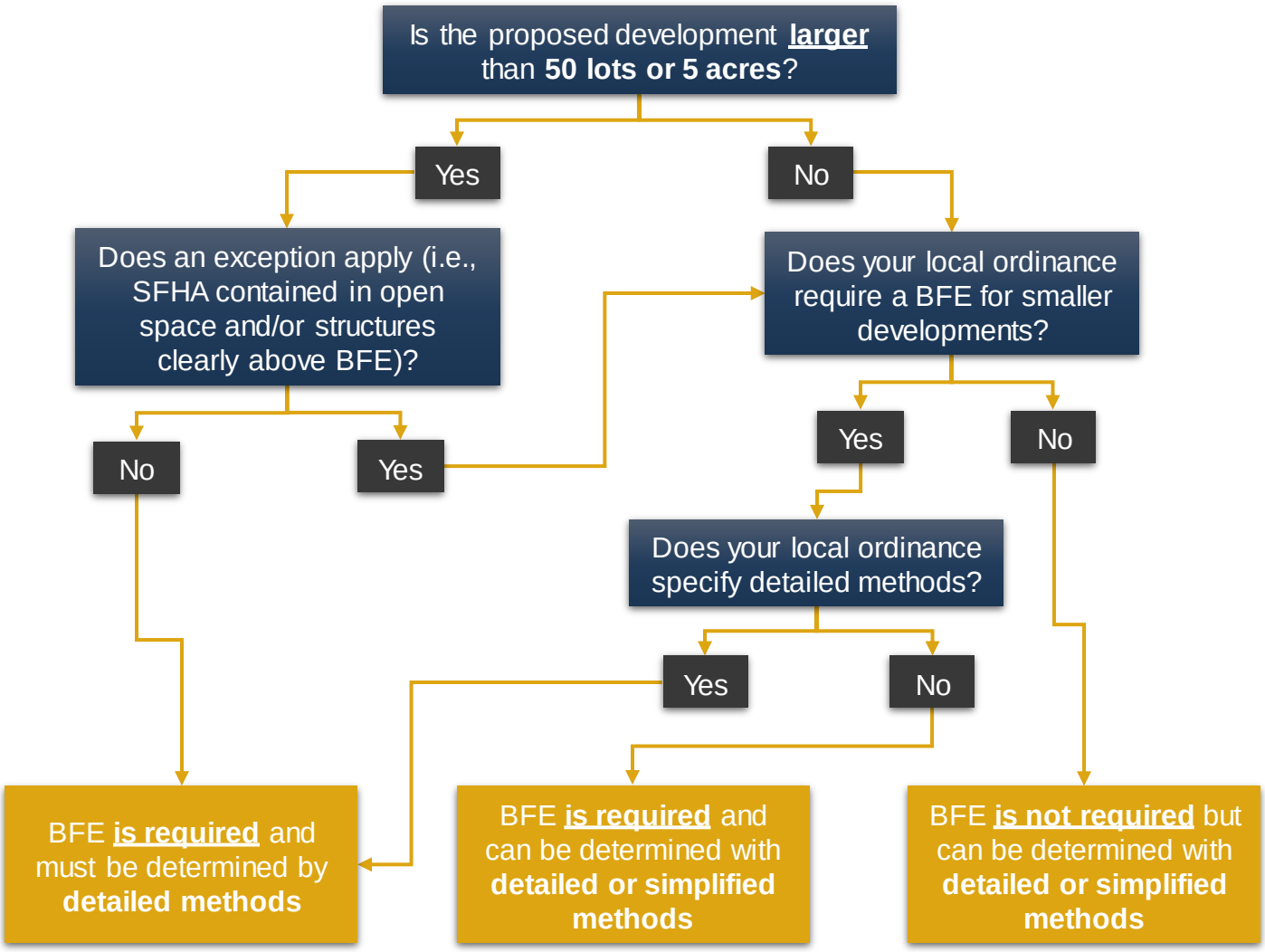
A Zone – BFE Requirement Flow Chart

Base Flood Elevations (BFEs) are used to evaluate development in the floodplain and are a key component of floodplain management requirements as part of the National Flood Insurance Program (NFIP).

Communities participating in the NFIP are required to review development permits for new construction or substantial improvements to determine if reasonably safe from flooding in A zones [44 CFR 60.3(b)(4)]. Depending on the proposed development, a BFE may be required and may have limitations on acceptable BFE determination methods.

Use the flow chart below to determine if a BFE is required to be determined and by what methods:



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A Zone – BFE Development Method Flow Chart

Base Flood Elevations (BFEs) are used to evaluate development in the floodplain and are a key component of floodplain management requirements as part of the National Flood Insurance Program (NFIP). There are several methods available to develop BFEs in A zones from various data sources.

Once it has been determined that a BFE is required and whether detailed or simplified methods are acceptable, available data is evaluated to identify applicable methods.

Use the flow chart below to identify the best BFE determination method for each development/substantial improvement. It is recommended to begin with "Detailed Methods" (even if not required) to ensure the best data available is used.

Detailed Methods

What is the best available data source you have access to?

- Back-up data from effective FEMA study
- Back-up data from FEMA prelim, restudy, or BLE
- Study from Federal, State, or Local Agency
- Backup data from previously determined BFE through detailed methods
- Combination of the above sources → Develop BFE from all sources, use highest value
- None of the above

What type of back-up data is included?

- S_XS, or other XS with WSE data (i.e., shapefile, report, map) → 1D Cross Sections in GIS
- 1D HEC-RAS Model (v. 3 or later) → 1D HEC-RAS Model
- S_BFE, or other WSE contour data (i.e., shapefile, report, map) → 2D Model Contours in GIS
- 2D WSE output grid (i.e., geotiff) → 2D Grids in GIS
- Combination of the above → Use preferred detailed method
- None of the above

Is a detailed method preferred or required?

- Preferred
- Required → Require Applicant to Develop BFE according to FEMA's Technical Guidance and Standards

Simplified Methods

Is proposed development within 500 feet upstream of a Detailed Study with developed 100-yr Profile?

- Yes / No

Is the Limit of Detailed Study free from:
1. Changes in channel characteristics
2. Backwater effects
3. Slope breaks

- Yes → Profile Extrapolation
- No

Is Contour Interpolation Applicable?
- Floodplain conforms to contour shape
- Difference b/t floodplain elevations on either side < ½ contour interval

- Yes → Contour Interpolation
- No