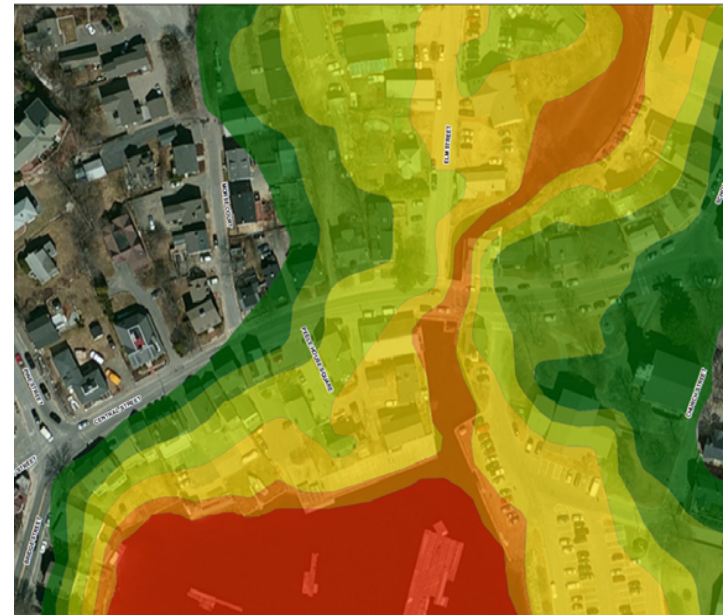


Preparation of Flood Contingency Plans

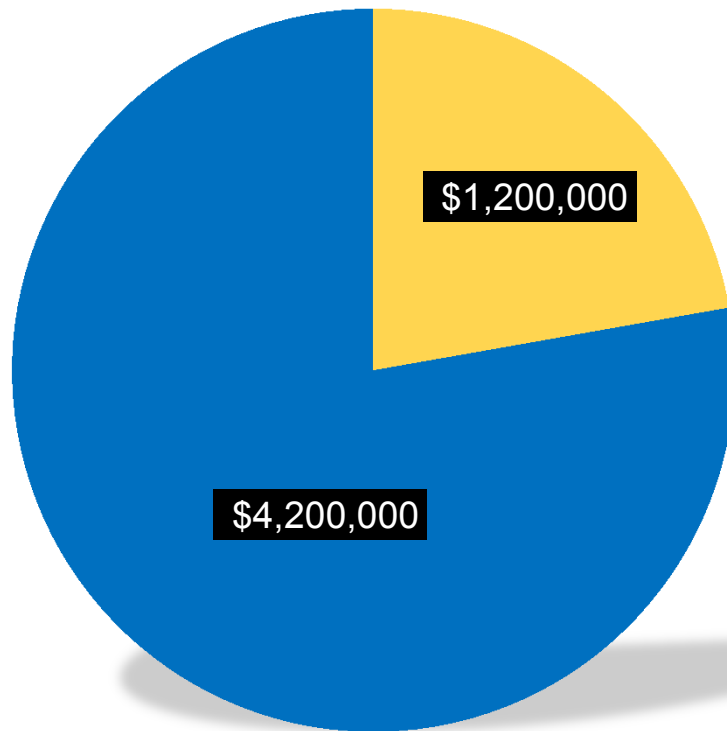
October 21, 2015

Joe Canas, P.E., LEED AP, CFM

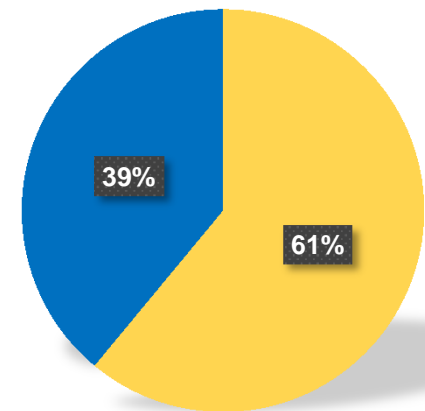


Why it's important

Average Gross Losses from Flood (1989-1999)



118 Losses Due to Flood Emergency Response



■ Effective Plans
■ Ineffective Plans

Source: FM Global

Why it's important

Probability of Flood Occurring at Least Once in SFHA		
Period of Time	50-Year Flood	100-Year Flood
10 years	18%	10%
15 years	26%	14%
20 years	33%	18%
25 years	39%	22%
30 years	45%	26%

Source: FM Global

Plan Elements

- 1 Identify objectives
- 2 Identify implementation personnel
- 3 Evaluate flood risk
- 4 Identify evacuation routes
- 5 Identify specific tasks
- 6 Other considerations

Plan Elements

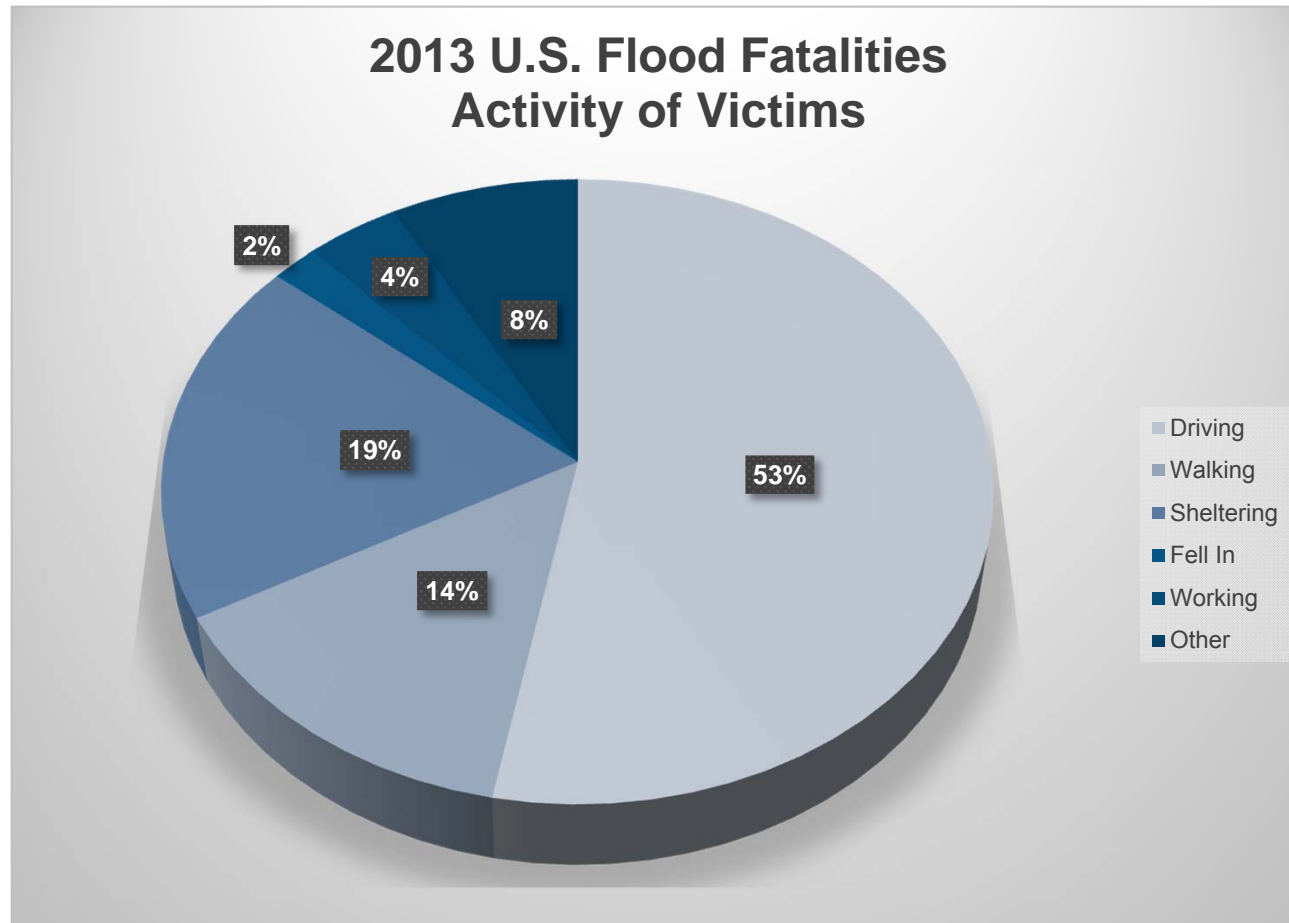
- 1 Identify objectives
- 2 Identify implementation personnel
- 3 Evaluate flood risk
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- 5 Identify specific tasks
- 6 Other considerations

Plan Objectives

- **Protect life and property**
- **Prepare for downtime**
- **Minimize clean up duration**
- **Maximize resiliency**

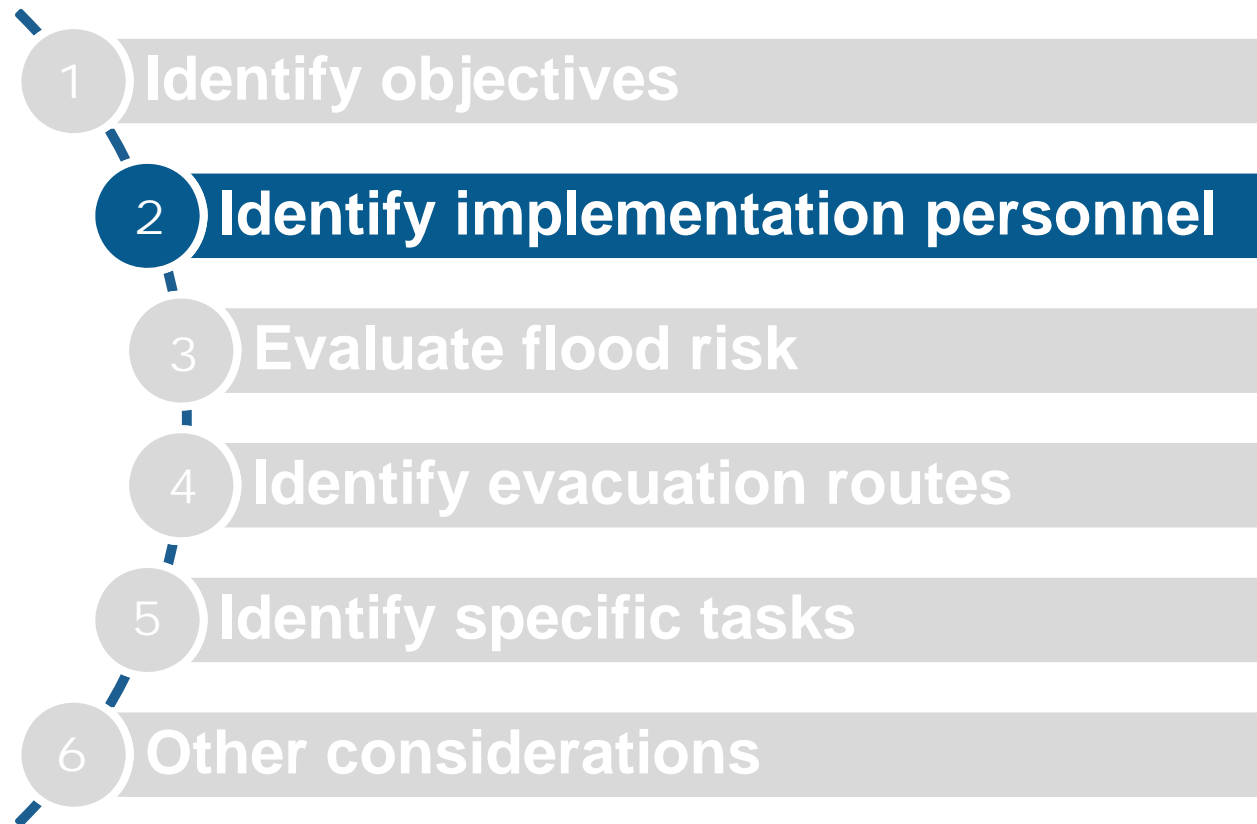


Something to keep in mind...



Source: NOAA

Plan Elements

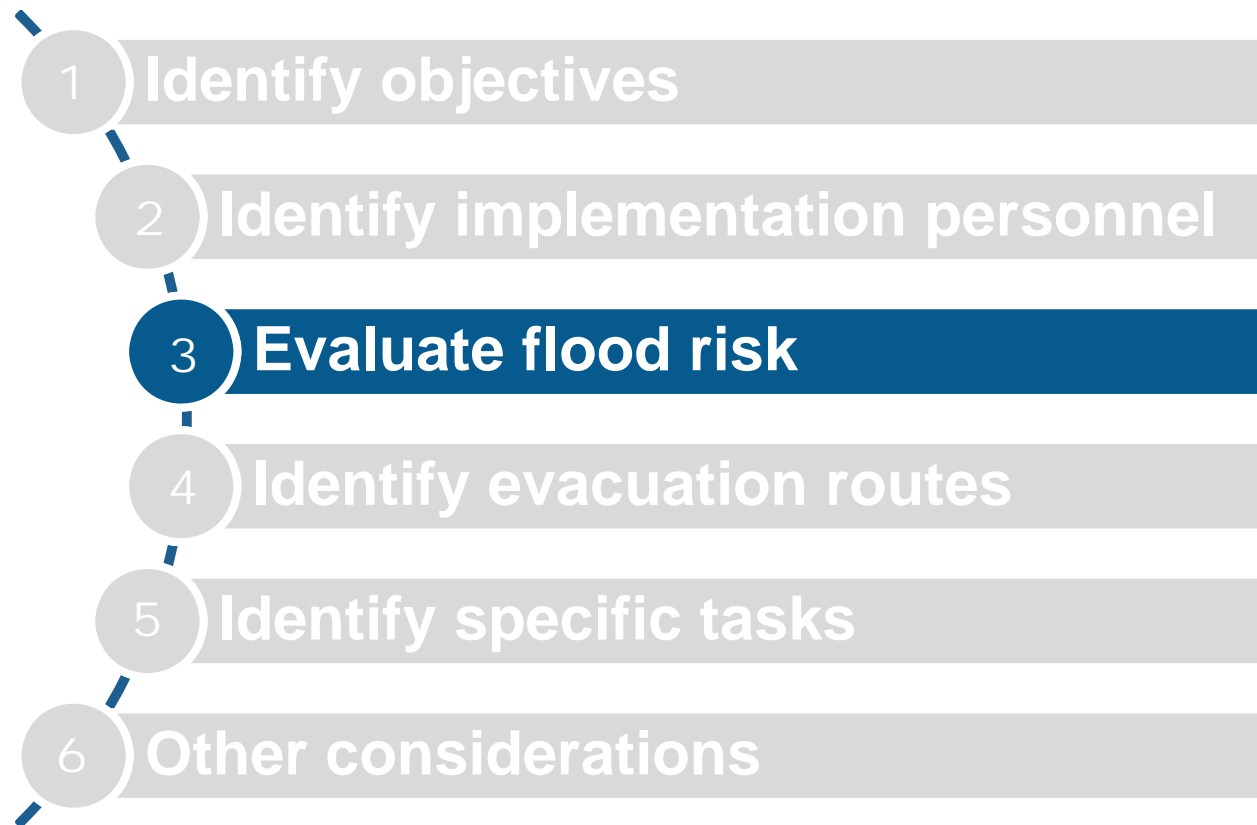


Implementation Personnel

- **Primary person responsible for implementing the plan**
- **Alternate person responsible for implementing the plan**
- **Delegate responsibility to implement specific portions of the plan**
- **Consider personnel safety, well-being and relief of personnel**
- **Provide contact numbers for primary and alternate contacts, police, EMS, fire, and emergency operations**



Plan Elements

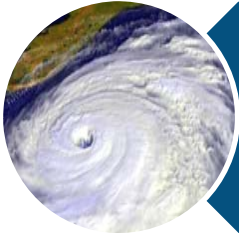


Flooding Sources

- **Check FIRM**
- **Review aerial mapping**
- **Groundwater infiltration**
- **Ground reconnaissance**
 - Plugged storm sewers
 - Other obstructions
 - Hidden surprises!



Warning times



Tropical Storms/Hurricanes
Days in advance

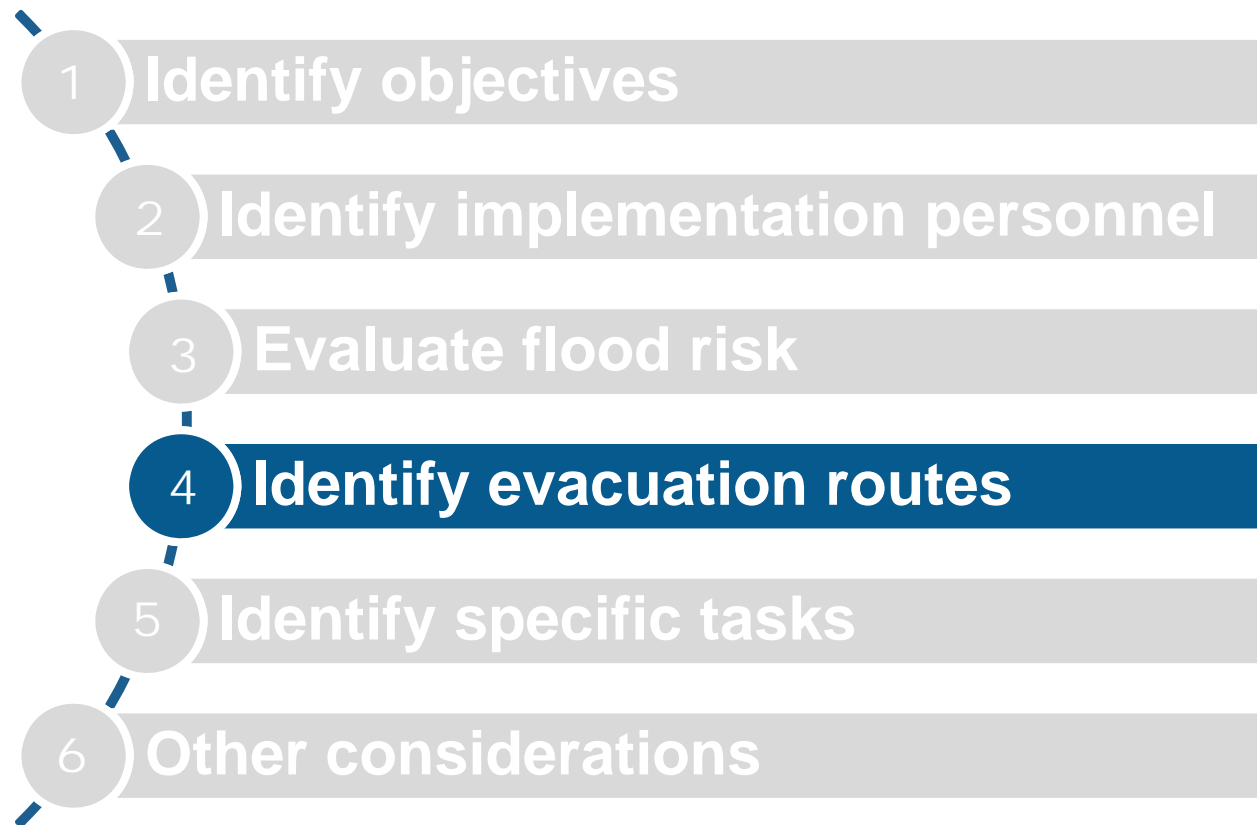


Large Rivers
Days in advance



Small Streams
Very little warning

Plan Elements



Evacuation Routes

- **Identify routes to and from the facility**
- **Coordinate with local emergency plans**
- **Preference is for immediate access to dry land**
- **Short sections may possibly be bridged**

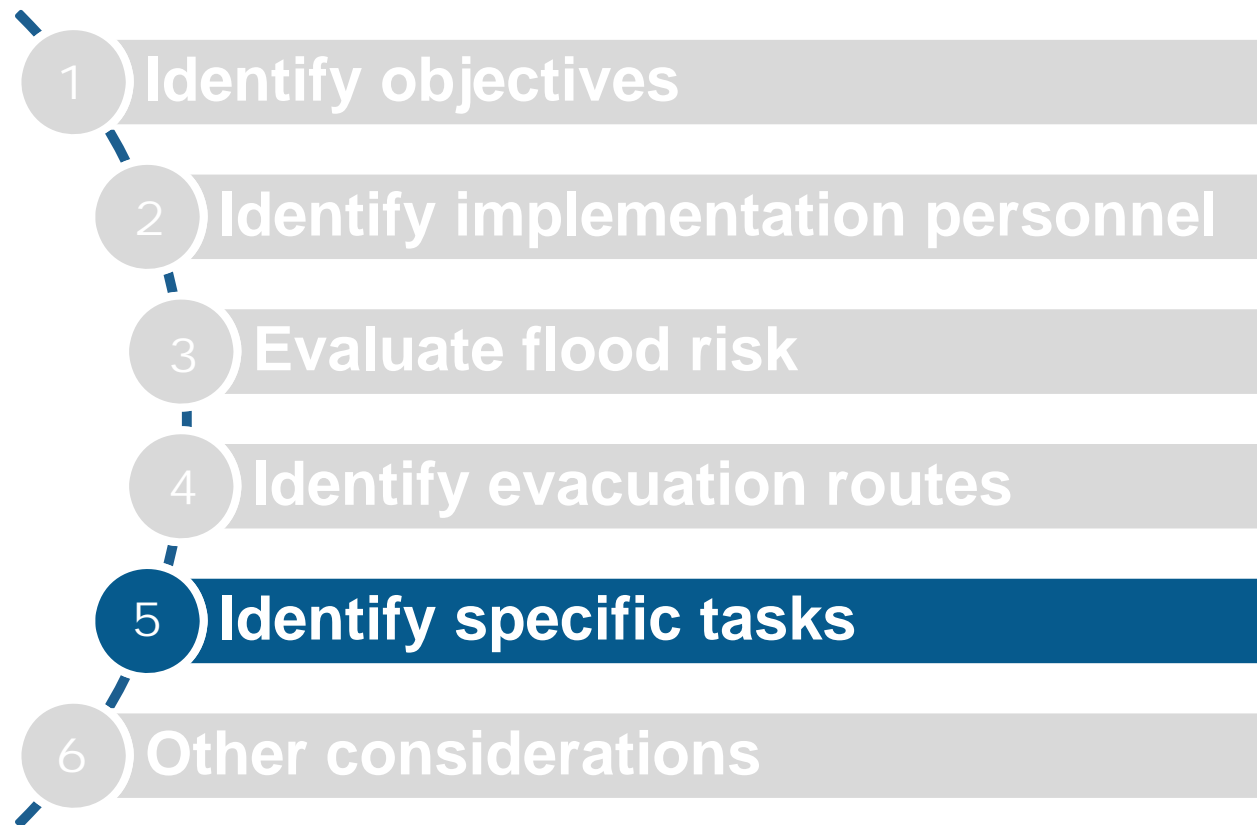


Evacuation Routes

- **Consider if emergency access is required**
- **Mode of transportation?**
- **Consider vulnerable populations**



Plan Elements



Specific Tasks

- **Educate facility users**
- **Plan update schedule**
- **Ensure supplies are adequate**
- **Ensure human intervention flood items are available, accessible, and serviceable**
- **Review evacuation routes**
- **Test generators**



Potential Strategies

■ Non-Residential

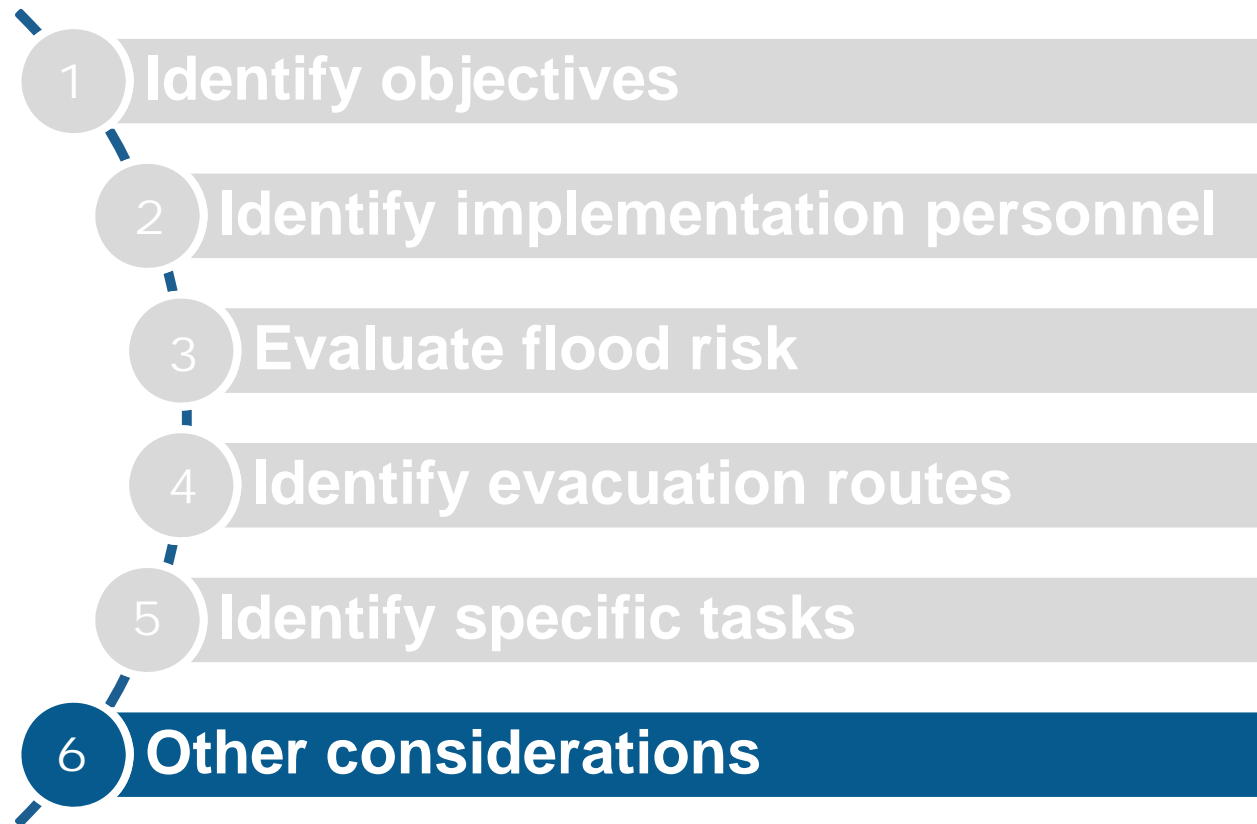
- Permanent flood barriers
- Raise equipment above flood levels
- Temporary barriers
- Move high-value stocks and supplies to higher ground or floors
- Organize actions into individual steps
- Cover all time periods
- Have adequate clean up resources on hand
- Regular training

Potential Strategies

■ Residential

- Discourage sheltering in place
- Temporary flood barriers
- Raise equipment above flood levels
- Organize actions into individual steps
- Cover all time periods
- Have adequate clean up resources on hand
- Regular training
- Keep residents informed

Plan Elements



Special Considerations

■ Construction

- Stockpiling of materials
- Location of equipment
- Anchoring of materials

■ Material storage

- Hazardous
- Buoyant
- Flammable
- Expansive
- Corrosive

■ Coordination with local Emergency Operations Plan

Keys to success

- **Identify roles and responsibilities**
- **Shut down and isolate electrical equipment**
- **Raise and or relocate key equipment and materials**
- **Minimize water infiltration**
- **Plans to take care of employees**
- **Post-flood repair and business recovery**
- **Regular training**
- **Regular updates**

