

# External Flooding PRA Walkdown Guidance Overview

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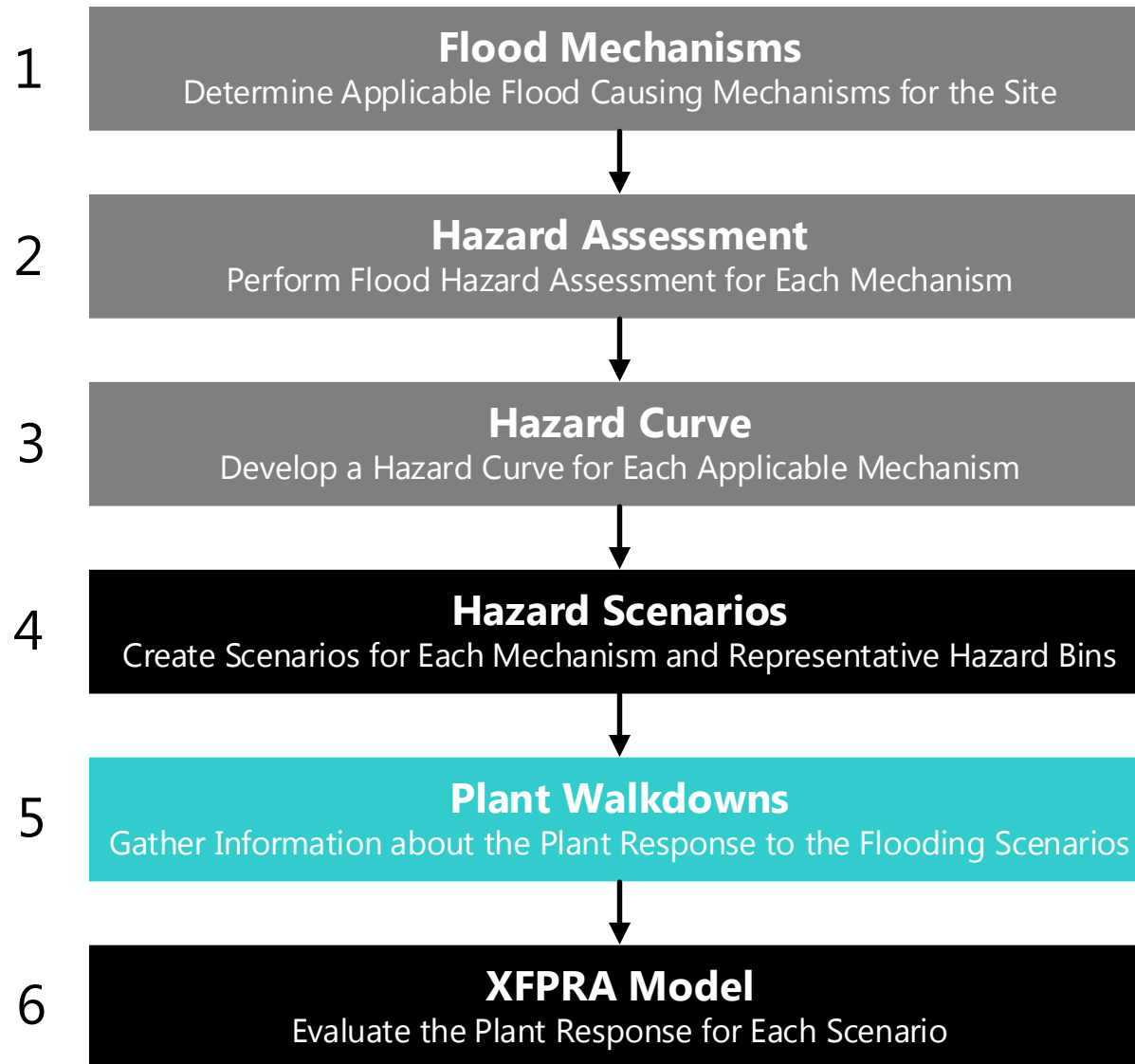




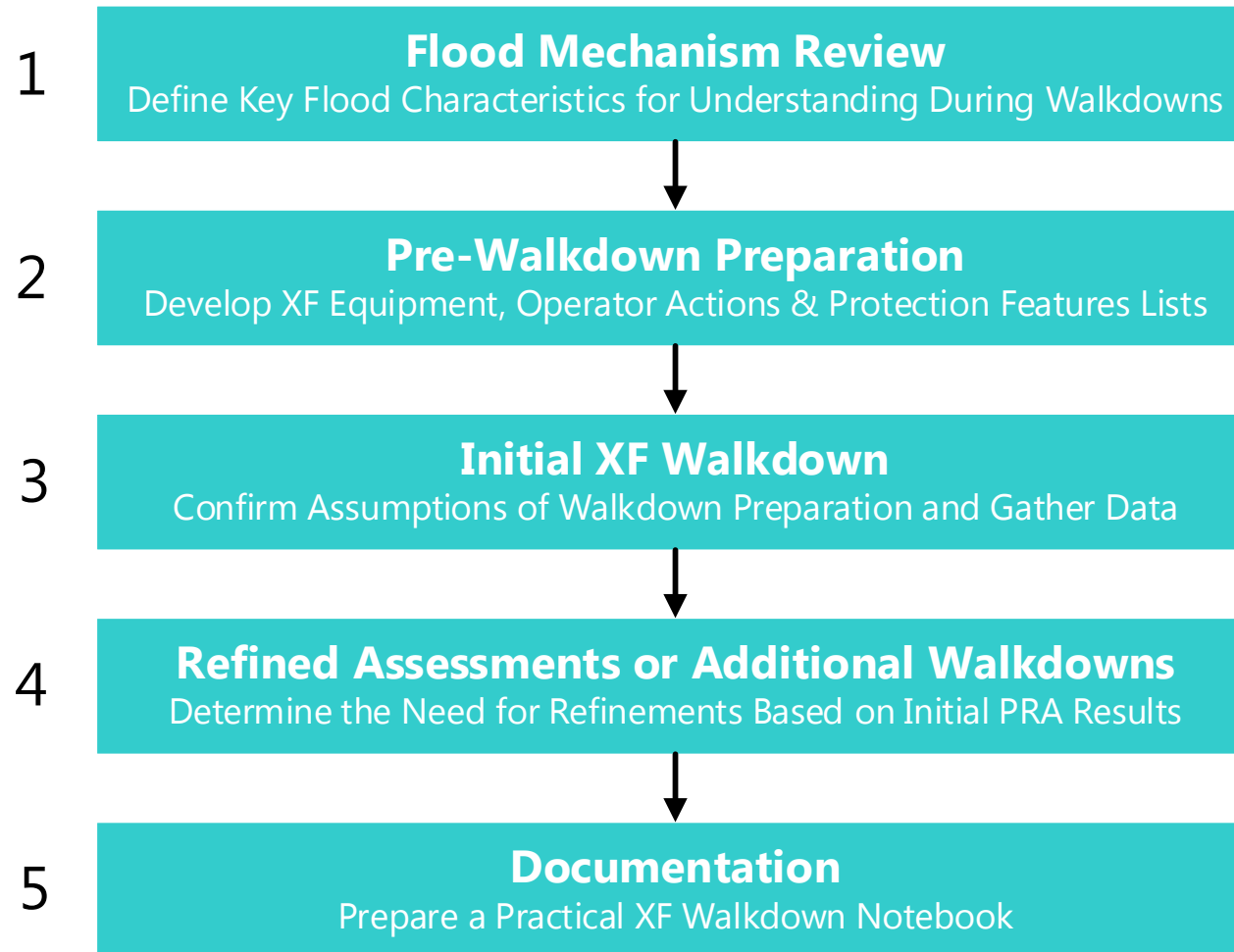
# External Flooding PRA Process Overview

PRA Modeling and Walkdowns

# Process Flowchart



# Walkdown Process Flowchart



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# Understanding Flooding Scenarios

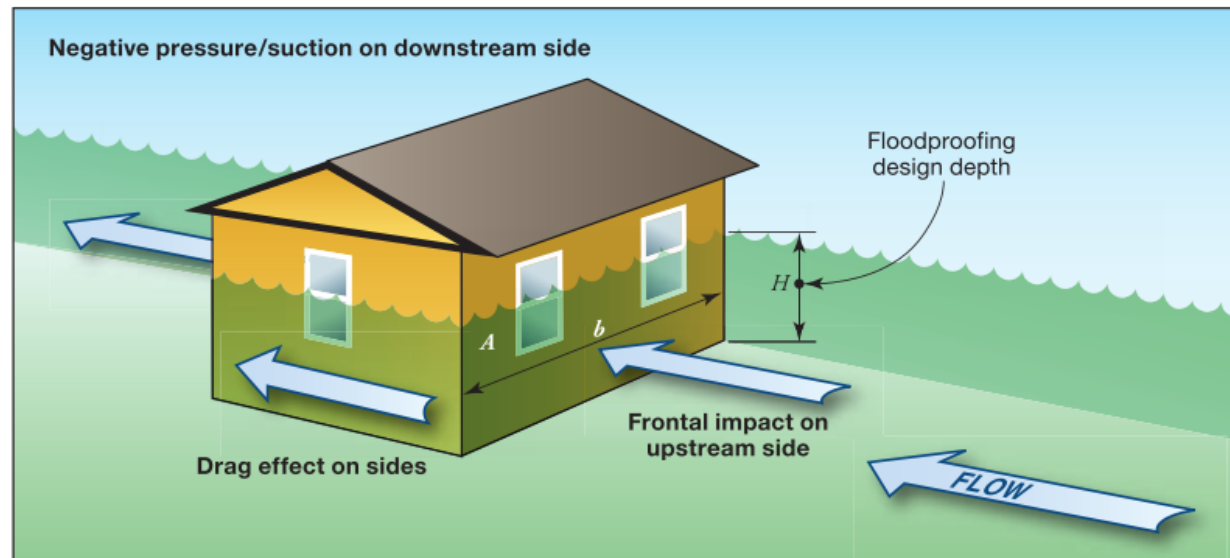
## Key Flood Parameters

# Define Mechanisms Applicable to Site

- Local Intense Precipitation
- Flooding in Streams and Rivers
- Dam Failure
- Storm Surge
- Seiche
- Tsunami
- Ice-Induced Flooding
- Channel Migration
- Combined Effects

# Understanding Key Flood Parameters

- Sources for Flood Analysis
- Defining and Interpreting Key Flood Parameters
- Characterizing Associated Effects
- Developing Flood Scenarios





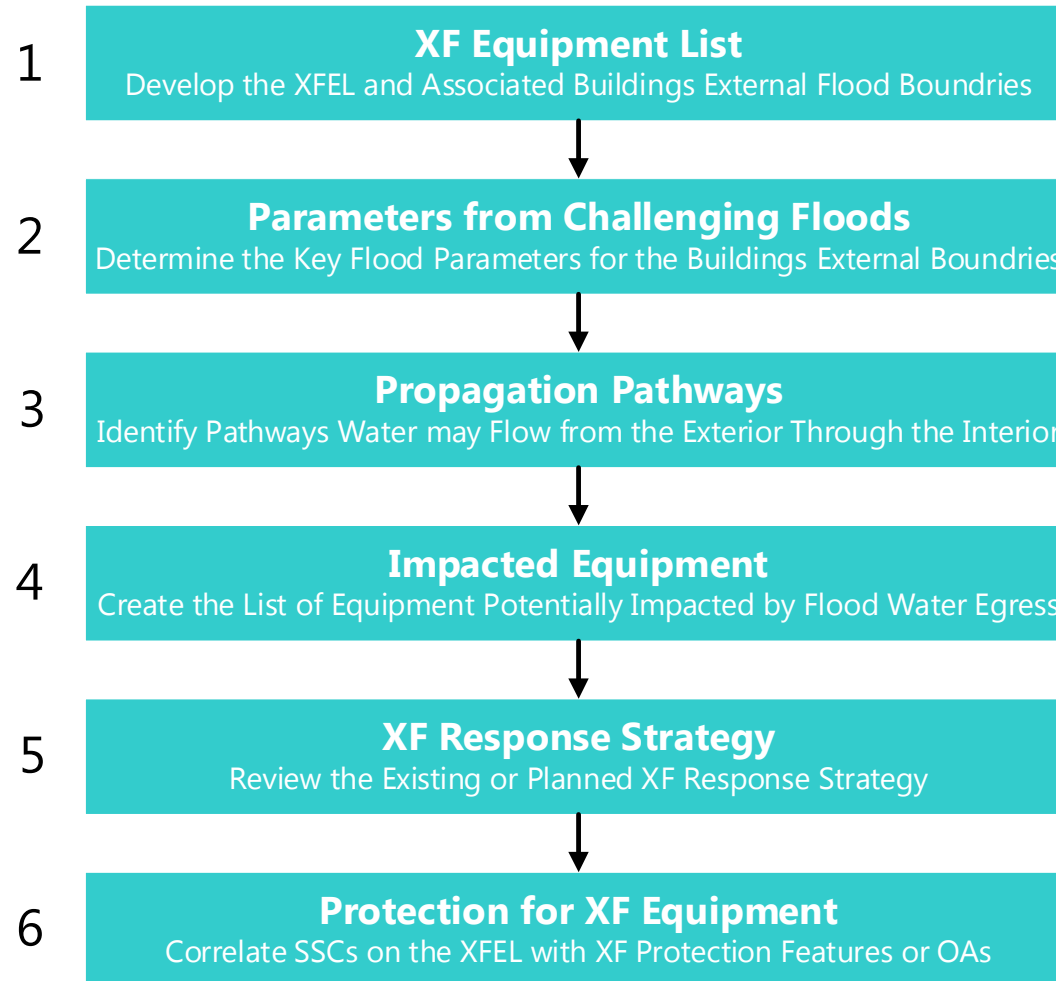


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# Pre-Walkdown Preparation

Information for a Successful Walkdown

# Process Flowchart



# Utilizing Previously Completed Walkdowns

- Rec. 2.3 Walkdowns
  - Provides information on Flood Protection Features
  - Location, critical height and condition of seals
  - Available Physical Margin Assessment for all FPF
- Considerations Before Using
  - Focused on confirming design/licensing basis commitments
  - Limited walkdowns to design/licensing basis flood heights
  - Did not consider failure modes or collect data for PRA model development

# Detailed Guidance

- Utilizing Previous Analyses
  - Internal Flooding PRA, IPEEE, MSA, FHRR, Focused Evaluation, etc
- Developing the XFEL
  - Determine risk-significant SSCs, their location and desired state
  - Identify XF boundaries and propagation pathways to determine SSCs susceptible to flooding

Example of XFEL Entries											
Equipment ID	Equipment Description	Associated Flood Mechanism	OSP Dependent?	Flood Susceptible?	Building/Elevation (ft or m)	SSC Elevation (ft or m)	Room or Row/Column	Normal Position	PRA Desired Position	MOV/AOV Failed Position	Permanently Installed?
IA-001	IA Compressor Outlet Valve	LIP	Yes	Yes	Turbine/240	244	TH/12	Open	Open	N/A	Yes
SW-P01A	Service Water Pump A	LIP	No	No	Intake/200	207	IA/14	On	On	N/A	Yes
MFW-P01B	Main Feedwater Pump B	LIP/Riverine Flood	Yes	Yes	Turbine/219	222	TC/8	On	On	N/A	Yes

# Reviewing XF Response Strategy

- Identifying appropriate procedures for each scenario
- Determining XF operator actions required
- Creating an XF Operator Action List

Example of Operator Action Feasibility Walkdown Notes							
Operator Action/ HFE BE	Description	Governing Procedure/ Step	Included in IE HRA?	Action Performance Location	Accessible Location and Environmental Factors	Alternate Paths	Extra Timing Required?
HRAOPER1	Failure to manually isolate Service Water to Turbine Building	EOP-001/4.2	Yes	CCW Room	No effects on action due to High Winds. Access path will remain clear.	Multiple	No
HRAOPER2	Failure to provide alternate cooling to AFW Pumps	EOP-001/6.3	Yes	AFW Pump Room and Turbine Building	Part of this action is performed in the Turbine Building, so access path may be blocked due to debris or action may be hindered due to building or component damage. Pump will be staged in a protected location.	Multiple paths through Turbine Building, only one path into AFW Pump Room	Yes
Install Flood Barrier to Aux. Building	Operator fails to install temporary flood gate for Aux Building	FSG-001/3.4	No	Turbine Building door leading to Aux Building	Pathway should be free of flooding and debris if performed according to procedure during warning time period.	Two paths identified in FSG	No

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# Guidelines for External Flooding Walkdowns

# Guidance for Performing Walkdowns

- Assembling a knowledgeable team
- Performing an exterior site walkdown
- Confirming building ingress pathways
- Performing a detailed walkdown of the protection features
- Confirming interior flood propagation pathways
- Performing a confirmatory walkdown of affected equipment

# Guidance for Performing Refined Walkdowns

- Determining when refined walkdowns are necessary
- Identifying the types of refinements available
  - Detailed inundation/propagation modeling
  - New or modified operator actions
  - Detailed fragility/stability analysis
  - PRA Model updates/changes
- Performing walkdowns to support or confirm differences from refinements



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# Guidelines for Preparing Walkdown Notebook

# Notebook Organization and Overview

- Purpose and Scope
- Walkdown Team Composition
- Summary of Walkdown Findings
- Applicable Flood Mechanisms
- Results of Pre-Walkdown Preparation
- Results of the Walkdown
- Results of Additional Walkdowns

# External Flooding PRA Walkdown Forms

- Summary Form
- Applicable flood causing mechanisms
- Flooding effects
- Visual Inspections
- Functional Testing/Periodic Monitoring
- Activity or Procedure Walk-through/reasonable simulation

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