

DRAFT Working Example

Electric Generating Plant Units 1 & 2

Integrated Assessment for External Flooding

Response to Request for Information Pursuant to Title 10 of the Code of Federal Regulations
50.54(f) Regarding Recommendation 2.1 of the enclosure to SECY-11-0093,
“Recommendations for Enhancing Reactor Safety in the 21st Century, the Near-Term Task
Force Review of Insights from the Fukushima Dai-ichi Accident”

September 2013

Comment [NRCstaff1]:

High-level staff feedback:

Staff believes the example is well-done and provides a useful example of the types of information that would support an integrated assessment for a relatively “simple” situation. No “show-stoppers” were identified.

Staff has provided feedback throughout the document, mostly in the form of editorial and other suggestions that staff believe would improve clarity and reduce the potential need for RAIs if such an example were to be submitted (typically through asking for clarification rather than asking for additional details). Some suggestions are also intended to point out areas where less information (or information in a different or potentially more efficient format) would suffice (e.g., through use of tables rather than text). Staff found that the figures added in this latest version were very helpful and improved clarity.

Note about intent of comments:

Prior to NEI “taking action” on any comments provided in this document, staff would like to discuss the comments during a public meeting with NEI to understand if NEI has any concerns and to offer clarification as needed. NRC staff does not expect that any of the comments provided in this example should result in a large amount of work to respond to. If a comment suggests a lot of work, staff would like to discuss and ensure NEI understands the staff’s intent.

Note about structure of staff feedback:

Staff comments are roughly grouped into three categories:

- Editorial comments: These comments generally provide editorial suggestions for improving consistency and clarity of the text. These edits should be made at NEI’s discretion.
- Questions: These comments draw attention to questions staff had when reviewing the document.
- Suggestions: These comments reflect areas where staff believes the example can be improved using the provided suggestions. These suggestions should be implemented at NEI’s discretion.

The comments in the document are “color-coded” to distinguish between editorial comments, questions, and suggestions.

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Acronyms and Abbreviations

AOP	Abnormal Operating Procedure
ASCE	American Society of Civil Engineers
CFR	Code of Federal Regulation
CLB	Current Licensing Basis
EPP	Emergency Preparedness Procedure
Fig.	Figure
ft.	feet
FHRR	Flooding Hazard Reevaluation Report
gpm	gallons per minute
ISG	Interim Staff Guidance
LIP	Local Intense Precipitation
Mwt	Megawatts Thermal
MCR	Main Control Room
NTTF	Near Term Task Force
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PRA	Probability Risk Assessment
PWR	Pressurized Water Reactor
QA	Quality Assurance
SSC	System, Structures and Components
WSE	Water Surface Elevation

Comment [NRCstaff2]: Editorial:
The following acronyms appear in the text but not in this list:

- FWR: flood walkdown report
- NDE: nominal design elevation
- NWS: National Weather Service
- USGS: United States Geological Survey

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Preface

The following Integrated Assessment example intends to meet the guidance established in the Japan Lessons-Learned Directorate (JLD) – Interim Staff Guidance (ISG) 2012-05, “Guidance for Performing the Integrated Assessment for External Flooding.” This Integrated Assessment example analyzes a “simple” case where a nuclear power plant site was reevaluated for flooding hazards using NRC NTTF Recommendation 2.1 (Enclosure 2 of the March 12, 2012 10 CFR 50.54(f) letter), and the results of the Flooding Hazards Reevaluation Report (FHRR) determined the current design basis for flooding events was exceeded with relation to two flood causing mechanisms. One of those flood causing mechanisms at the plant site now generates an enveloping scenario that governs the flood controlling parameters at the site which are evaluated in this integrated assessment. The reevaluated flood parameters involve a slight water level increase above the current design basis flooding elevation, with ~~n~~o manual actions are required.

Strategies included in this example do not necessarily represent endorsed actions for a particular event, but rather focus on the level of detail required to describe and justify the adequacy of a proposed external flood simple example.

1.0 Overview

Following the accident at the Fukushima Dai-ichi nuclear power plant resulting from the 2011 Great Tohoku Earthquake and tsunami, the Nuclear Regulatory Commission (NRC) established the Near-Term Task Force (NTTF) and tasked it with conducting a systematic and methodical review of NRC processes and regulations to determine whether improvements are necessary.

The resulting NTTF report concludes that continued U.S. nuclear plant operation does not pose an imminent risk to public health and safety and provides a set of recommendations to the NRC. The NRC directed the staff to determine which recommendations should be implemented without unnecessary delay (Staff Requirements Memorandum [SRM] on SECY-11-0093).

The NRC issued its request for information pursuant to 10 CFR 50.54(f) on March 12, 2012, based on the following NTTF flood-related recommendations:

- Recommendation 2.1: Flooding
- Recommendation 2.3: Flooding

Enclosure 2 of the NRC 10 CFR 50.54(f) letter addresses Recommendation 2.1 for the following purposes:

1. To gather information with respect to NTTF Recommendation 2.1, as amended by the SRM associated with SECY-11-0124 and SECY-11-0137, and the Consolidated Appropriations Act, for 2012 (Pub Law 112-74), Section 402, to reevaluate seismic and flooding hazards at operating reactor sites.

Comment [NRCstaff3]: Editorial: Here and in other places in the document, the text indicates that NTTF Rec. 2.1 was “used” to reevaluated hazards. The flood hazards are reevaluated using present-day guidance and methods as directed by the 50.54(f) letter (which was part of the response to the NTTF recommendations).

Comment [NRCstaff4]: Editorial: Consider changing to: “results in”

Comment [NRCstaff5]: Editorial: Also, holders of construction permits.

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2. To collect information to facilitate NRC's determination if there is a need to update the design basis and systems, structures, and components (SSCs) important to safety to protect against the updated hazards at operating reactor sites.
3. To collect information to address Generic Issue 204 regarding flooding of nuclear power plant sites following upstream dam failures.

Recommendation 2.1 (Enclosure 2 of the NRC 10 CFR 50.54(f) letter) contains a "Requested Information" section detailing two items being requested from each licensed reactor site. The first requested item is the Flooding Hazard Reevaluation Report (FHRR), which has already been submitted to the NRC by the Electric Generating Plant Units 1 & 2 (Units 1 & 2).

The second requested item of Recommendation 2.1 is an Integrated Assessment (IA) report. Enclosure 2 of the NRC 10 CFR 50.54(f) letter addresses the situation in which an Integrated Assessment should be provided and the information the Integrated Assessment should contain.

An Integrated Assessment report should be developed for plants where the current design basis floods do not bound the reevaluated hazard for all flood causing mechanisms, and the report should include the following:

- a. Description of the integrated procedure used to evaluate integrity of the plant for the entire duration of flood conditions at the site
- b. Results of the plant evaluations describing the controlling flood mechanisms and its effects, and how the available or planned measures will provide effective protection and mitigation. Discuss whether there is margin beyond the postulated scenarios.
- c. Description of any additional protection and/or mitigation features that were installed or are planned, including those installed during the course of reevaluating the hazard. The description should include the specific features and their functions.
- d. Identify other actions that have been taken or are planned to address plant-specific vulnerabilities.

The FHRR for Units 1&2 reveals the current design basis floods do not bound all reevaluated flood causing mechanisms at the plant site, and, therefore, this report represents the Integrated Assessment required by NTTF Recommendation 2.1. The FHRR determined two flood causing mechanisms – 1) [LIP](#) [Local intense precipitation](#) (LIP) using Probable Maximum Precipitation (PMP) methods and 2) Dam Breaches and Failures– exceed the current design basis for flooding at the plant site. [The LIP/PMP analysis generated the bounding flood elevation at the plant site \(hereinafter, LIP will be referred to as "PMP"\).](#)

2.0 Integrated Assessment Procedure

The [Site licensee](#) did not prepare a specific procedure for the development of this Integrated Assessment (IA). The content for this IA report was developed to meet the requirements of NTTF Recommendation 2.1 and follow the guidance set forth by the NRC in the Japan Lessons-Learned Project Directorate (JLD) - Interim Staff Guidance (ISG)-2012-05, "Guidance for Performing the Integrated Assessment for External

Comment [NRCstaff6]: Editorial: Note earlier comment distinguishing between the NTTF recommendations, the 50.54(f) letter (which made the request for the hazard reeval and IA), and present-day guidance and methods (used for doing the hazard reeval).

Comment [NRCstaff7]: Editorial: The text throughout the example is not consistent with respect to the use of the terms LIP and PMP. Staff preferences is to use LIP (rather than PMP).

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Flooding," Revision 0. Section 8 of JLD-ISG-2012-05 was followed in documenting the analyses and results of this IA. Specifically, the methodologies are described to demonstrate the effectiveness of flood protection features and systems at the plant and any modeling performed to evaluate the overall flood protection capability.

3.0 Peer Review

An independent peer review of this IA was performed to provide assurance of the determined scope, employed methodologies, technical adequacy of input parameters, flood protection analyses, and consistency with the guidance of JLD-ISG-2012-05. Attachment 1 to this Integrated Assessment provides the necessary information regarding the peer review, as required by JLD-ISG-2012-05, Appendix B.

Given the simplistic nature of this Units 1 & 2 IA, the peer review was not provided by a team of independent reviewers. Rather, the peer review consisted of one qualified technical reviewer providing consultation and input regarding the scope of the IA, methodologies employed, input parameters utilized, plant configurations considered in the IA, and the adherence of the IA to JLD-ISG-2012-05.

Since the Units 1 & 2 IA consists of a simple comparison between reevaluated flood elevations and the plant elevation with a result of no important to safety structures, systems, or components (SSCs) being challenged by external flood water, the peer review was comprised of one qualified reviewer with collective, sufficient expertise in all areas considered within the IA. Notably, the peer reviewer has sufficient expertise in hydrology, structural engineering, and environmental protection strategies. The desired objectives of the peer review process were met by having one peer reviewer.

Once the development of the Units 1 & 2 IA was finalized, the IA was provided to the peer reviewer for his/her review. Prior consultation with the peer reviewer only consisted of the desired scope of his review and the objectives he was tasked with accomplishing. Those objectives were derived from Section 4 and Appendix B of JLD-ISG-2012-05. An in-process review of the IA with the peer reviewer was not considered necessary due to the limited review scope and analysis required by the IA for this simple case.

The required information regarding the peer reviewer's credentials, relevant experience, review methodology, findings/comments, and conclusions from his/her Units 1 & 2 IA peer review are described in Attachment 1 to this report.

4.0 Site Information Related to Flooding

The Site consists of 2,000 acres located on a coastal plain bluff on the southwest side of a [x] river. The mouth of the river is approximately 150 river miles from the site. The contributing drainage area of the river at the site is 6,500 square miles, as estimated from digital mapping.

The river basin and its sub-basins, as delineated by the National Weather Service (NWS) and further subdivided into U.S. Geological Survey (USGS) Hydrologic Unit Code (HUC-12) Watershed Boundary Dataset, are shown in the Plants Updated Final Safety Analysis Report (UFSAR) Figure 2.4.

The plant consists of two, pressurized water reactors -- Units 1&2 -- that began commercial operation in April 1986 and May 1987, respectively. Two additional reactors, Units 3 & 4, are new nuclear power

Comment [NRCstaff8]: Editorial: Here and throughout the document, consider changing to "SSCs important to safety"

Comment [NRCstaff9]: Question/clarification needed: What is meant by "environmental protection strategies"?

Comment [NRCstaff10]: Editorial: The second paragraph of this section seems to suggest an in-process review, whereas this paragraph suggests a late stage review.

Comment [NRCstaff11]: Editorial: When hazard information is not directly needed to provide context and is not specifically requested by the IA ISG, consider using references to specific sections/pages of the flood hazard reevaluation report rather than repeating text.

Comment [NRCstaff12]: Suggestion: Correct this text as the NWS does not delineate river basis.

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generating units under construction and are located adjacent to the current Units 1 & 2 operating plant site. Units 3 & 4 will be located west of and adjacent to the existing Units 1 & 2 as shown in Units 3 & 4 UFSAR Figure 1.1. The combined license (COL) under 10 CFR 52 for Units 3 & 4 was issued by the NRC in 2012. The March 12, 2012 10 CFR 50.54(f) letter excludes 10 CFR 52 plants from the information requested by stating, "For combined license (COL) holders under 10 CFR 52, the issues in NTTF Recommendation 2.1 and 2.3 regarding seismic and flooding reevaluations and walkdowns are resolved."

The Electric Generating Plant Units 1 & 2 is a plant site not subjected to flooding from the nearby streams and the river (including postulated dam break scenarios). The normal water elevation of the river is approximately 80 feet from mean sea level (msl).

Since the site was originally licensed to construct four units, the Units 3 & 4 site area was included in the grading plan during the construction of Units 1 & 2. The Units 3 & 4 area was rough-graded to the plan, which included a drainage ditch south- southwest of the Units 3 & 4 area, designed to accommodate the runoff from the 100-year storm. This ditch also functions as the local Probably Maximum Precipitation (PMP) drainage path for the Units 3 & 4 area during storms and a postulated PMP event.

The site grade elevation for all structures important to safety of all four units is located at nominal design elevation (NDE) 220 feet above mean sea level (msl).

5.0 Hazard Definition -- Controlling Flood Mechanism

Section 5 of JLD-ISG-2012-05 was used to define applicable flood mechanisms to Units 1 & 2 and identify the bounding flood parameters. No flood hazards exist for the Units 1 & 2 site resulting from the FHRR. For each postulated flood hazard mechanism, the flood surface elevation is below the Units 1 & 2 power block floor elevation containing the SSCs important to safety. However, the controlling flood mechanism analyzed in the Units 1 & 2 FHRR that yields the highest flood elevation is the local intense PMP event at the Units 1 & 2 site.

5.1 Local Intense Precipitation

JLD-ISG-2012-05, Section 5.2 provides describes flood parameters to consider from the results of the FHRR. Local Intense Precipitation (LIP) is the PMP and the controlling flood mechanism for the Units 1 & 2 site. The Units 1 & 2 current design basis calculation determined the LIP flood elevation to be 219.1 feet msl. The FHRR for the Units 1 & 2 PMP/LIP was recalculated with a higher 1-hour rainfall intensity to correspond with the assumed 1-hour rainfall intensity utilized in the COL application for Units 3 & 4. The LIP reevaluation for Units 1 & 2 accounted for a LIP duration of 6 hours and reported a finalized increase in flood height of 0.2 feet. Therefore, the Units 1 & 2 current design basis has a LIP flood height of elevation 219.1 feet msl and a reevaluated flood height of 219.3 feet msl, accounting for beyond design basis rainfall intensity.

This reevaluated LIP flood height with the updated rainfall event provides 0.3 feet of margin between the reevaluated flood height (219.3 feet msl) and the lowest elevation of the openings into the Units 1 & 2 power block structures, systems, and/or components (219.6 feet msl).

The Units 1 & 2 power block was designed and constructed to have a floor NDE of 220 feet msl. During the recent site survey for the FHRR, the lowest power block floor elevation was measured to actually be 219.6 feet msl, accounting for settlement (discussed below in Section 6.1). From the

Comment [NRCstaff13]: Suggestion: Here and throughout the document, provide reference to a vertical datum such as NGVD-29 or NAVD88

Comment [NRCstaff14]: Suggestion: Replace with a more accurate word choice (e.g., the licensee planned to have four units at the site").

Comment [NRCstaff15]: Editorial: Consider changing to: "...during storms, up to and including a postulated LIP event."

Comment [NRCstaff16]: Suggestion: When giving numerical values, consider providing references (e.g., references to section/page of flood hazard reevaluation report)

Comment [NRCstaff17]: Suggestion: Consider developing a table such as the following to compare the flood scenario parameters for each mechanism and show the bounding conditions.

Flood scenario parameter	Mechanism: LIP	Mechanism: Dam failure (hydrologic)	Bounding scenario
Flood height	Ex entry: 219.3 ft (# ft above site grade)		
Wind waves and surge			
Sediment deposition and erosion	Ex entry: N/A (see section # of FHRR)		
Adverse weather conditions			
.			
.			
.			

It is recognized that, for this example, such a table is probably "overkill." However, because this is an example that would be used for broader applications, showing such a table is useful because it offers clarity in definition of the bounding scenario. Use of such a table may also serve to reduce the amount of explanation/text that is required in this section.

Comment [NRCstaff18]: Suggestion: Delete sentence or expand/clarify.

For example, replace text in this paragraph with something such as the following:
"The reevaluation of certain flood hazards (LIP and dam failure) exceeded the current design basis for the site. This section demonstrates that the controlling reevaluated hazard in the Units 1 & 2 FHRR is the LIP event. In subsequent sections of this evaluation, it is shown that the reevaluated flood hazards does not exceed the grade of the Units 1 & 2 site and no SSCs important to safety are impacted by the reevaluated flood hazard."

Comment [NRCstaff19]: Editorial: Note suggested changes in this paragraph.

Comment [NRCstaff20]: Editorial: Clarify meaning of this. Perhaps "overall" is a better term?

Comment [NRCstaff21]: Editorial: Use "water surface elevation" rather than "flood height"

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results of the FHRR, a 0.3 feet APM exists between the peak flood height during the LIP event and the lowest SSC floor elevation important to safety. Therefore, important to safety SSCs at the plant are not in a flooded condition during a LIP event.

The LIP for Units 1 & 2 was analyzed for use in the FHRR considering a plant site configuration that would generate the highest flood elevation. The high flood water configuration at Units 1 & 2 would include a double row Vehicle Barrier System (VBS) around the Units 1 & 2 power block perimeter and would be during the Units 3 & 4 construction phase period.

After the construction phase for Units 3 & 4 was initiated, a second perimeter VBS row was added and security features were implemented at Units 1 & 2, and the effects of LIP on site drainage were again evaluated. From a LIP analysis standpoint, the construction phase of Units 3 & 4 is more onerous than the operational phase of Units 3 & 4 because permanent site drainage features to be installed at the plant site after construction of Units 3 & 4 are not in existence during the Units 3 & 4 construction phase. The VBS rows were added at different times so that currently there are two VBS rows surrounding the Units 1 & 2 power block. The newer VBS row is primarily located outside the older VBS row but not at all locations.

All changes to the Units 3 & 4 construction site drainage design and configuration are controlled appropriately under the Units 1 & 2 operational impact program requiring full evaluations of the proposed changes to the protection and operability of Units 1 & 2.

Units 1 & 2 is subject to tropical storms, heavy rains, and hurricanes. Units 1 & 2 procedure 1234-B, "Severe Weather Checklist," provides instructions for preparing the plant to withstand the effects of a severe weather event such as a hurricane, tornado, or heavy rain event. No manual actions are relied upon for plant preparation as a component of this checklist. Entry into this checklist is performed for the following conditions:

- A tornado warning issued for either the County or for the River Site,
- Weather anticipated that will result in a Notification of Unusual Event in accordance with the Plant Emergency Plan,
- Or as deemed necessary by the Shift Manager

Preparation in advance of adverse weather conditions is governed by site procedures, which require plant shutdown as a precaution when appropriate. No in-room water detection systems are relied upon for external flooding in the Units 1 & 2 licensing basis, and no such systems are required due to important to safety SSCs being located at an elevation above all postulated flood heights. Access to the Ultimate Heat Sink, the Nuclear Service Cooling Water (NSCW) system, is maintained throughout the duration of the LIP flood event as the intake structures and pumps to the NSCW are located at or above the site plant grade – assumed to be 219.6 feet msl.

Access roads to the power block structures will be flooded during the LIP event, as they are located at 218.5 feet msl (0.8 feet below LIP flood water elevation). However, the power block structures are not flooded from the LIP event due to an available 0.3 feet margin between the power block floor elevation and the LIP flood water elevation. The assumed LIP has not historically endured at its maximum rate (19.2 inches/hour) for a duration (calculated to be a six-hour maximum duration) which would require transporting equipment and/or relief to staffing personnel located at the structures important to safety during a LIP flood event. However, the access roads never reach an impassable

Comment [NRCstaff22]: Question: It was not entirely clear why this information was included in this example. Can it be replaced with a reference to the hazard report to reduce amount of text/descriptions required?

Comment [NRCstaff23]: Suggestion: Provide examples or an explanation of what is done to prepare the plant.

Comment [NRCstaff24]: Suggestion: Add name of agency issuing the warning

Comment [NRCstaff25]: Suggestion: Consider whether this "trigger" is appropriate given that, since 2007, the NWS has used a polygon-based warning system that focuses on the storm location and size, not political boundaries such as counties.

Comment [NRCstaff26]: Question: What is meant by this?

Comment [NRCstaff27]: Question: Are there specific weather conditions that can be referenced here? It is not clear what is meant by this statement.

Comment [NRCstaff28]: Editorial: Clarify elevations associated with the intake structure. For example, what portion (e.g., pumps/pump motors) are located above grade and what portions are below grade.

Comment [NRCstaff29]: Editorial: Consider using terminology such as "estimated" rather than "assumed" when elevations are known based on, for example, a survey.

Comment [NRCstaff30]: Question: What is the relevance of this statement in light of the integrated assessments objective to evaluate total plant response to the reevaluated hazard?

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state during the LIP event. Thus, if additional personnel need to access the Units 1 & 2 power block buildings during a local intense PMP, transport along the roads via regularly-used vehicles is achievable.

Units 1 & 2 can remain in all operational plant modes independent of postulated flood heights and durations at the site, and, therefore, changes in operational mode do not affect the plant's ability to remain dry and keep important to safety SSCs protected. Plant modes may present open entry points to power block buildings that are normally closed, but no entry point will allow flood water into the building during a LIP event due to all entry points being 0.8 feet above the highest local intense PMP flood elevation of 219.3 feet msl.

5.2 Dam Failures

The Units 1 & 2 FHRR revealed that, in addition to LIP, the dam failure reevaluation yielded a flood elevation higher than the current design basis. Dam breach flooding resulting from dam failure with coincident wave run-up yielded a maximum flood elevation at the site of 178.1 feet msl. The current design basis provides a flood elevation resulting from dam failure of 168 feet msl. See Table 3-3 for the reevaluated flood elevations related to each flood causing mechanism.

Despite the reevaluated flood height of 178.1 feet msl from dam failures including coincident wave run-up, the floor elevation of 219.6 feet msl of important to safety structures and openings at the site provides 41.5 feet of available margin above the resultant flood water and wind-driven wave run-up from the reevaluated dam failure flood causing mechanism.

The current design basis being exceeded for the flood elevation from the reevaluated dam failure flooding mechanism at the Units 1 & 2 site provides a basis for performing this IA in accordance with the March 12, 2012 10 CFR 50.54(f) letter. However, the parameters generated from the dam failure flood causing mechanism do not present the enveloping case for external flood evaluation at the Units 1 & 2 site. The flood scenario demonstrated by the reevaluated PMP at Units 1 & 2 remains the controlling flood parameters to evaluate at this site. The PMP flood elevation exceeds the dam failure flood elevation by 41.2 vertical feet, which causes the PMP flooding parameters to bound all flood water increases and coincident effects generated by the dam failure scenario. Therefore, the PMP event at Units 1 & 2 will be used to evaluate the protection capability of flood protection features in this IA.

Units 1 & 2 can remain in all operational modes during a worst-case dam failure scenario with all important to safety SSCs being protected from flooding. In the most vulnerable of plant mode configurations, no flood water or associated effects challenge the important to safety SSCs, as all entry ways into power block buildings and access roads remain at least 40.4 feet above flood water.

6.0 Critical Plant Elevations and Equipment Protection

6.1 Settlement of Units 1 & 2 Power Block Structures

Section 2.5.4 of the Units 1 & 2 UFSAR addresses the predicted heave and settlement of the Units 1 & 2 power block area during the initial excavation through the construction of the facility. A heave-and-settlement monitoring program existed during the entire construction and has been maintained during the operational period as described in Section 2.5.4.1 of the Units 1 & 2 UFSAR. Currently,

Comment [NRCstaff31]: Suggestion: Provide clarification on the following:
The first sentence of this paragraph indicates that access roads will be flooded (by 0.8ft of water). However this sentence and the next indicates that roads will not be impassable. Provide a basis for this conclusion (e.g., provide a reference describing the depth of water that can be passed by all (or certain types of) vehicles).

Comment [NRCstaff32]: Suggestion: Consider expanding or clarifying this discussion of modes, which is currently a bit vague (note: Section 1.3 of the IA ISG discussed scope with respect to plant modes).

Perhaps a table such as the following can help facilitate such a discussion without adding text:

Mode	Discussion of flood impacts	Discussion of mode-specific vulnerabilities	Configuration controls in place
.	.	.	.
.	.	.	.
.	.	.	.

It is recognized that, for this example, such a table is probably "overkill." However, because this is an example that would be used for broader applications, showing such a table is useful because it offers clarity in the kind of information expected.

Comment [NRCstaff33]: Suggestion: This section does not address all flood scenario parameters (e.g., debris, erosion). Because the flood is so far below grade it is not expected that most parameters would have any impact here. However, for completeness (and since this is an example that will be used by licensees for more generic applications), it is suggested that this section mention all parameters. Note the earlier comments that suggested the use of a table to convey information about flood scenario-parameters without adding additional text (note: entries in the table may be "n/a" due to flood below grade).

Comment [NRCstaff34]: Editorial: Table cross-reference needs to be updated.

Comment [NRCstaff35]: Question: Why is this detailed discussion provided? Is it to offer a background understanding of the effects of settlement?

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the settlement monitoring program data are collected and reported to the NRC at a reduced frequency (annually) because settlement of the structures has essentially ceased. During the excavation period, the heave at selected depths below the excavation resulting from the removal of the overburden was recorded. From the obvious measured heave data, corrected for depth and loading effects, an average heave of approximately 1.8 inches was determined for the excavation floor in the power block area.

Comment [NRCstaff36]: Editorial: Awkward word choice. Perhaps "available" would be better?

Measured settlements attributed to backfilling of the excavations are not reported in the UFSAR. Units 1 & 2 UFSAR Figure 2.5.4-1 presents estimated settlements for power block structures with a maximum settlement of 4.2 inches (0.35 feet). The maximum measured total settlement at the power block structures reported in the Plant Report on Settlement, August 1986, was 3.6 inches (0.3 feet). These values, along with the calculated differential settlements, are within the allowable limits.

The soil column between the bedrock and the Blue Bluff Marl (BBM) clay, the competent foundation layer, is approximately 1,000 feet deep. The power block excavation extends down, about 90 feet, to the BBM. The BBM is typically from 60 feet to 70 feet thick. Some of the power block structures are founded on and in the BBM, and some are founded in the backfill. Depending on the foundation loading and other factors, the measured settlements vary within the expected range.

As a result of the settlement, the nominal design elevations (NDE) are not the actual elevations of the structures. As part of the preparation of the Flooding Hazard Reevaluation Report (FHRR), a survey was performed to confirm the actual elevations of floors at NDE 220 feet msl. The minimum elevation reported in the recent survey was elevation 219.6 feet msl, which is located on the Unit 1 Auxiliary Building floor at the base of the north wall. For the purposes of this IA, the NDE of 220 feet msl, the elevation of the grade level structures, is established as elevation 219.6 feet msl, which is the lowest of any of the settlements in the UFSAR and the results of the recent survey.

JLD-ISG-2012-05, Section 5.3 provides for consideration of certain critical plant elevations and the manner by which plant equipment could be subjected to flooding. The relevant Units 1 & 2 plant nominal design elevations and the assumed, actual power block floor elevation are in Table 6-1 below:

Table 6-1 Critical Plant Design Elevations

Units 1 & 2 Power Block Plant Level	Nominal Design Elevation (feet msl)	Measured Elevation (feet msl)
Power Block Unfinished Plant Grade	219.0	-
Power Block Finished Plant Grade	219.5	-
Power Block SSCs Finished Floor	220.0	219.6
Power Block Buildings Entry Ways (bottom elevation)	220.5	

Comment [NRCstaff37]: Editorial: The paragraph below and the figure show the bottom of entry ways at 220.1

Comment [NRCstaff38]: Suggestion: Consider tabulating this information to reduce the amount of text that is required. Consistent with Section 5.3 of the IA ISG, a table such as the following may be useful:

SSC (or group of SSCs)	Critical elevation	Flood protection features or systems used to protect SSCs	Manner by which equipment could be subject to flooding (if applicable)
.	.	Ex: protected by elevation of power block entryways	.
.	.	.	.

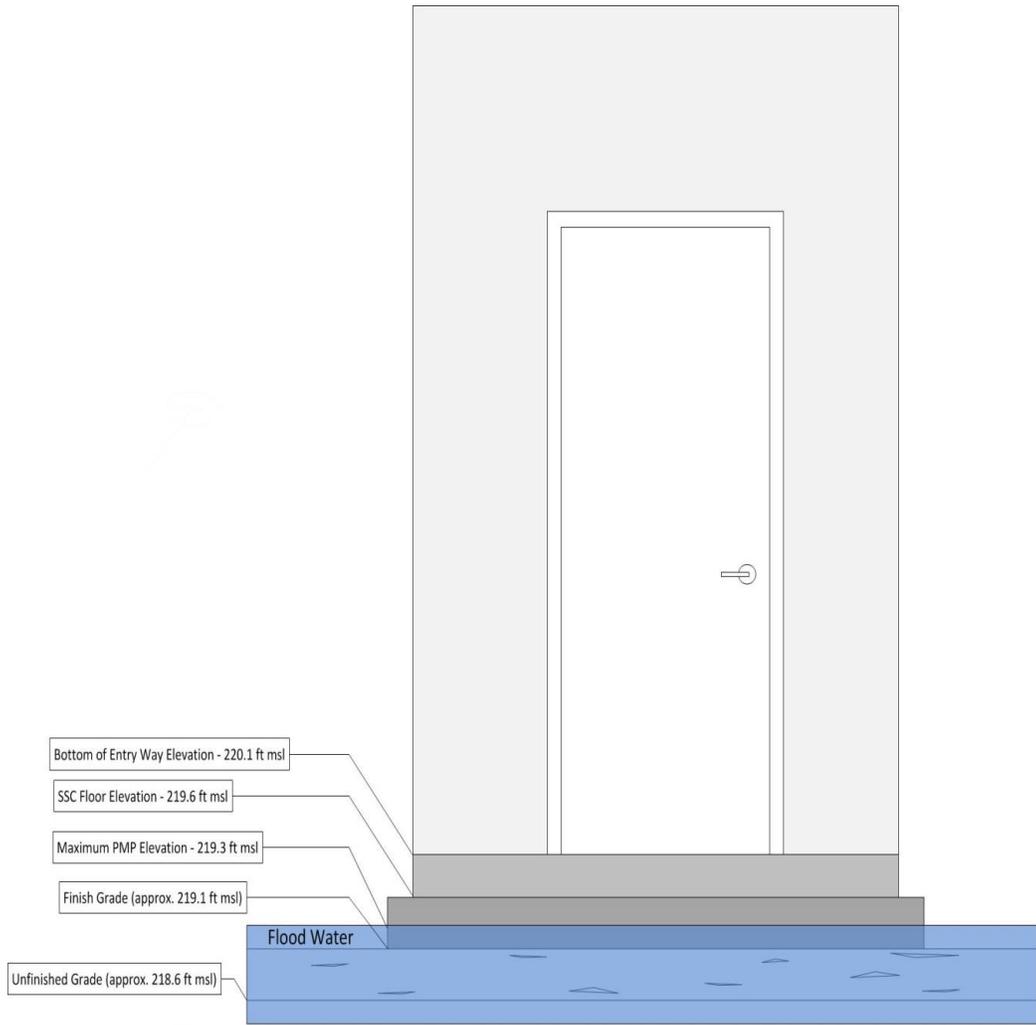
The power block floors are elevated from finished plant grade by horizontal concrete slabs separating the levels of each building. From the field surveys conducted at the plant in preparation of the Units 1 & 2 FHRR, the lowest power block floor elevation reported was actually 219.6 feet msl. All critical elevations of important to safety SSCs and associated equipment is at or above the reevaluated minimum Units 1 & 2 power block floor elevation of 219.6 feet msl, which is above the bounding flood elevation of 219.3 feet msl. The power block finish plant grade is six inches above the unfinished

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power block grade due to a six-inch layer of concrete. This concrete finished plant grade covers the plant site between all Units 1 & 2 power block buildings. Additionally, each access way/door into the safety-related power block structures have a bottom elevation six inches above the floor elevation. Accounting for similar settlement as that measured in the power block floor, the lowest entry way elevation in the plant would be assumed to be 220.1 feet msl. Therefore, flood protection features or systems used to protect each piece of equipment, the manner by which the equipment could be subjected to flooding, and potential pathways for ingress of water are non-existent at Units 1 & 2. See Figure 6-1 below.

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Figure 6-1 Elevation View of Units 1 & 2 Power Block Building (entry-way detail)



Comment [NRCstaff39]: Editorial: Consider the following format for conveying this information (e.g., using standard symbols for WSE):

Entry Way Elevation (220.1 ft)

SSC Floor Elevation (219.6 ft)

PMP (219.3 ft)

Finish Grade (219.1 ft)

Unfinished Grade (218.6 ft)

6.2 Current Design Basis Flood Elevations

Comment [NRCstaff40]: Editorial: Consider moving this information earlier in the report.

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The current design basis flood elevations from various flood causing mechanisms (except the LIP flooding) are listed in Table 6-2 below and are taken from Section 2.4 of the Units 1 & 2 UFSAR. For Flooding in Streams and Rivers and Dam Failure analyses, the Units 1 & 2 current licensing basis considers all pertinent associated effects such as wind speeds and wave run-up with the Probable Maximum Flood (PMF). The FHRR reevaluated dam breach flooding with coincident wave run-up, which yielded a maximum flood elevation of 178.1 feet msl – 41.5 feet below the lowest SSC floor elevation of 219.6 feet msl. Additionally, the groundwater level at the site has historically been measured to be less than 162.0 feet msl, and the maximum potential groundwater level is estimated to be 165.0 feet msl – 54.6 feet below the floor elevation of important to safety structures at the site. A comparison of elevation values between the Units 1 & 2 current design basis flood mechanisms and the reevaluated flood elevations from the Units 1&2 FHRR are shown in Table 6-3 below.

Table 6-2 Current Design Basis Flood Elevations

Flood Causing Mechanism	Flood Elevation (msl)	Flood Elevation coincident with Wind Wave (msl)	Source
Local Intense Precipitation (PMP)	(1)	N/A	(1)
Flooding in Streams and Rivers	138 feet	165 feet	Units 1 & 2 UFSAR Sections 2.4.3.4 and 2.4.3.6
Upstream Dam Failures	141 feet	168 feet	Units 1 & 2 UFSAR Sections 2.4.4.2 and 2.4.4.3
Storm Surge and Seiche	N/A	N/A	Units 1 & 2 UFSAR Section 2.4.5
Tsunami	N/A	N/A	Units 1 & 2 UFSAR Section 2.4.6
Ice Induced Flooding	N/A	N/A	Units 1 & 2 UFSAR Section 2.4.7
Channel Diversion	N/A	N/A	Units 1 & 2 UFSAR Section 2.4.9

- (1) The Units 1 & 2 UFSAR provides the simplified methodology for determining the PMP flood height but it does not report the value. Section 1.2.1 of the Units 1 & 2 FHRR provides the current PMP analysis methodology and results.

Table 6-3 Current Design Basis and Reevaluation Flood Elevations

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Flood Causing Mechanism	Current Design Basis Flood Elevation	Reevaluation Flood Elevation	Reevaluation Flood Delta From Design Basis	Reevaluation Flood Delta from SSC (219.6 ft msl)
Local Intense Precipitation (LIP)	219.1 ft msl	219.3 ft msl	+0.2 ft	-0.3 ft
Flooding in Streams and Rivers	165 ft msl	151 ft msl	-14 ft	-68.6 ft
Dam Failures	168 ft msl	178.1 ft msl	+10.1 ft	-41.5 ft
Storm Surge and Seiche	N/A	N/A	N/A	N/A
Tsunami	N/A	N/A	N/A	N/A
Ice Induced Flooding	N/A	N/A	N/A	N/A
Channel Diversion	N/A	N/A	N/A	N/A

7.0 Evaluation of Flood Protection Features

Units 1 & 2 SSCs important to safety cannot reach a flooded state as indicated by the FHRR for both the design basis and reevaluated flood-causing mechanisms, but there are site characteristics engineered into the design of the plant to facilitate drainage and divert water away from Units 1 & 2. The Units 1 & 2 FWR also credited certain sub-grade flood protection features to protect against groundwater seepage into below-ground, important to safety SSCs. For those groundwater flood protection features mentioned below, the IA requirements are not applicable if not challenged by external flooding mechanisms. None of the flood protection features described with applicable flood protection evaluation methodology in JLD-ISG-2012-05, Appendix A are utilized as external flood protection features for Units 1 & 2 important to safety SSCs. See Figure 7-1 for a sub-surface depiction between two of the power block buildings at Units 1 & 2.

7.1 Site Topography and site grading

The Units 1 & 2 power block area is on a high plateau and is not in the path of any adjacent watershed. The topography and site grading is such that the runoff is directed away from the power block by a combined system of culverts and open ditches to natural drainage channels. The system has been evaluated to ensure that flooding of important to safety equipment would not occur as a result of the flood controlling parameters at the site. The highest flood level from the flood controlling parameters is 219.3 feet msl, which is 0.3 feet below the lowest floor elevation in the Units 1 & 2 power block area.

7.1.1 Performance Criteria

Comment [NRCstaff41]: Suggestion: This section was hard to follow. Consider adding "roadmap" text to this introductory section to help the reader. For example:
"This section describes the flood protection features credited at [site x]. This section is broken down by flood protection feature type: site topography and site grading (section 7.1); site drainage (section 7.2); and incorporated flood protection (section 7.3). Associated with each flood protection feature type are three subsections:

- Performance criteria: This subsection describes...
- Flood protection evaluation: This subsection describes...
- Flood protection performance justification: This subsection describes..."

It would also be helpful to add some high level overview text so the reader better understands "what's coming." The following is provided as an example of the type of text that would be helpful:
"The site is protected from external flooding by site topography and site grading. While a site drainage system is in place at the site, it is not a credited flood protection features and an evaluation of it was not performed as part of the integrated assessment. Incorporated barriers at the site are located below grade and are credited for protection from groundwater. Because surface water is not estimated to infiltrate beyond a depth of [x], these features are not expected to be challenged by surface water and are thus not evaluated as part of the integrated assessment. Additional details associated with each flood protection feature type as well as any associated evaluations performed (or justification for evaluations not performed) are provided in the subsections below."

Comment [NRCstaff42]: Editorial: note addition of text to account for alterations to natural topography.

Comment [NRCstaff43]: Editorial: Consider the following to improve this description: By definition, the power block area is contained in one or more watersheds. There are no gaps between watersheds. Watersheds are separated by watershed divides.

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The performance criteria listed in Section 6.2 and evaluation information in Section 8.2.2 of JLD-ISG-2012-05 as well as related methodology of Appendix A are not applicable for a site topography evaluation as the natural elements composing site elevation protect important to safety SSCs at the site grade elevation when APM exists above the controlling site flood elevation. No failure modes exist for site topography at the plant site. Heave and settlement monitoring of Units 1 & 2 will continue for the life of the plant.

7.1.2 Flood Protection Evaluation

The lowest measured important to safety structure floor elevation at Units 1 & 2 is located at 219.6 feet msl. All external entry ways into structures/buildings important to safety are 0.5 feet above the structure's floor elevation – assumed to be a minimum elevation of 220.1 feet msl for purposes of this evaluation. These potential external water ingress points remain 0.8 feet above the controlling flood water elevation, which provides inherent protection to the important to safety structures, systems, and components from external flooding.

7.1.3 Flood Protection Performance Justification

Units 1 & 2 site topography, as a flood protection feature, provides a minimum important to safety SSC floor elevation of 219.6 feet msl, which yields 0.3 feet reliable, available margin above the bounding water elevation of 219.3 feet msl. JLD-ISG-2012-05, Section 6.3 provides required information that is not applicable to evaluating the site topography of Units 1 & 2.

7.2 Site Drainage Features

While the site yard drainage system is designed and constructed to effectively divert surface water away from the Units 1 & 2 power block, the site drainage features of the Units 1 & 2 site were assumed to be 100 percent blocked in the Units 1 & 2 FHRR. Blocking the site drainage features to prevent their functionality helps generate the maximum flood elevation of 219.3 feet msl at the plant site. Therefore, an evaluation of the site yard drainage system as a flood protection feature is not required.

7.2.1 Performance Criteria

Because the site yard drainage system is not intended to be credited as a reliable flood protection system, the criteria of JLD-ISG-2012-05, Section 6.2 and related methodology of Appendix A are not applicable.

7.2.2 Flood Protection Evaluation

This section is not applicable as the site drainage system is not credited to drain water away from the Units 1 & 2 power block SSCs during an event with the bounding flooding parameters at the plant site. Given the site drainage system is credited for being 100% blocked during a bounding flood event, the evaluation for that feature is not applicable for purposes of this IA.

7.2.3 Flood Protection Performance Justification

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Because the Units 1 & 2 site drainage system is not credited as a reliable flood protection feature, justification of its performance is not applicable in this IA. JLD-ISG-2012-05, Section 6.3 requires evaluation information that is not applicable to a flood protection feature not credited to function in a flood scenario.

7.3 Incorporated Flood Protection Features

Incorporated flood protection features are permanent, passive barriers and include walls, wall penetration seals, and waterstops at Units 1 & 2. These credited flood protection features in the Units 1 & 2 licensing basis are located well below 219.6 feet msl and protect against groundwater seepage into the buildings with important to safety SSCs. There are no incorporated flood protection features to protect important to safety SSCs against above-grade, external flood water and associated effects in the Units 1 & 2 licensing basis.

No surface ingress points at the plant site exist to allow the bounding flood water at the site to flood sub-grade, important to safety SSCs, such as below-ground cables and important to safety equipment areas.

Underground, safety-related tunnels connecting rooms in separated safety-related structures exist as a conduit for cabling and system piping. The tunnels are covered by compacted, load-bearing competent site soil, and no interim entry points into the tunnel system exist between buildings. The entry points into those tunnels exist within safety-related structures at or above the floor elevation of, at least, 219.6 feet msl – which is protected from the controlling flood elevation with available margin. There are no other entry points or penetrations outside of the structures into safety-related tunneling at the site.

7.3.1 Concrete Walls

Certain exterior concrete walls were credited in the Units 1 & 2 FWR as a flood protection feature. Every wall inspected as a flood protection feature is located in a power block building room located at a sub-grade elevation at or below historical groundwater elevations (162.0 feet msl) at the site. No exterior concrete walls are challenged by external flooding from the bounding flood water elevation. All credited concrete walls are, at least, 39.6 feet below the floor elevation of SSCs important to safety.

7.3.1.1 Performance Criteria

Because there are no above-grade concrete walls credited for the protection of SSCs important to safety against external flooding, the criteria of JLD-ISG-2012-05, Section 6.2 and related methodology of Appendix A are not applicable.

The below-grade concrete walls credited as flood protection features within the Units 1 & 2 FWR are located at elevations a minimum of 39.1 feet below the finished plant grade. However, the maximum estimated groundwater table elevation of 165.0 feet msl would challenge a portion of sub-surface concrete walls with hydrostatic loading.

All exterior, sub-surface concrete walls for the Units 1 & 2 power block structures are a minimum of 24 inches thick and are applied with waterproofing media up to plant grade

Comment [NRCstaff44]: Question: Are any SSCs important to safety located below grade? The discussion in this section seems to indicate that there are SSCs in sub-grade locations. However, elsewhere in the text it seems to be suggested that all SSCs important to safety are located above the max water surface elevation. For example, Section 8.0 includes the following text: "Units 1 & 2 is a plant with all SSCs important to safety constructed above the maximum estimated flood stage."

Comment [NRCstaff45]: Editorial: To reduce the amount of information/text included in this example, consider compressing the sections on walls, seals, and waterstops into a single section titled something like "subgrade walls, seals, and waterstops." Because much of the same discussion is repeated for each feature, staff believes it is reasonable to compress the sections.

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elevation. Either a waterproofing membrane or a chemical waterproofing treatment was applied to the exterior of the concrete walls.

The six-inch concrete slab that creates the finished plant grade between power block buildings has a 0.95 water runoff coefficient, which translates to 5% of all flood water standing on top of finished plant grade will infiltrate into the soil adjacent to sub-grade walls of the power block buildings – minimizing any hydrostatic loading that may occur from a rise in elevation of the groundwater table. With a maximum 0.2 feet (equal to 2.4 inches) of standing water above finished plant grade from the controlling flood event at Units 1 & 2, the rate of sub-surface infiltration of flood water adjacent to exterior concrete walls would be too minimal to affect the amount of groundwater hydrostatic loading against any portion of the exterior, sub-surface concrete walls.

7.3.1.2 Flood Protection Evaluation

Evaluation of the below-grade concrete walls is not applicable due to those walls being subjected to minimal, additional hydrostatic loading during the bounding flood event. The groundwater table elevation would be negligibly affected by the potential infiltration of external flood water at Units 1 & 2.

7.3.1.3 Flood Protection Performance Justification

No concrete walls located at or above site grade are credited to protect important to safety SSCs at Units 1 & 2 from external flooding. As a result, performance justification for these non-credited features, as described in JLD-ISG-2012-05, Section 6.3, is not applicable.

Additionally, the below-ground concrete walls in direct contact with the groundwater table would not realize additional hydrostatic loading from the infiltration of flood water due to the height of flood water above finished plant grade being minimal, the 6 hour duration of the bounding flood event, and the vertical distance the water would need to travel to reach the static groundwater table (at least 54.1 feet).

7.3.2 Penetration Seals

Certain sub-grade wall penetration seals were credited in the Units 1 & 2 FWR as flood protection features. Every wall penetration seal inspected as a flood protection feature is located in a power block building room located on a sub-grade floor at or below historical groundwater elevations at the site (162.0 feet msl). No penetration seals are challenged by external flooding from the bounding flood water elevation at the site. Additionally, there are no penetrations through exterior walls or building foundational basemats into the soil below the historical high groundwater level.

7.3.2.1 Performance Criteria

Because there are no above-grade penetration seals credited for the protection of important to safety SSCs against external flooding, the criteria of JLD-ISG-2012-05, Section 6.2 and related methodology of Appendix A are not applicable to those seals.

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For the below-grade penetration seals, the Units 1 & 2 FWR credits those seals as groundwater flooding protection features. However, for those seals to be challenged by the groundwater table, the groundwater elevation would have to rise beyond the maximum assumed groundwater level at the plant site (assumed to be 165.0 feet msl based on actual historical recorded values).

With respect to below-grade penetration seals into exterior concrete walls being challenged by surface flood water infiltration into the sub-surface, the realized maximum surface water level above finished plant grade to propagate through the soil would be 0.2 feet. Given the duration of the bounding flood parameters to be 6 hours, the 0.2 feet of standing flood water above grade to infiltrate the soils below, and the minimum assumed distance (54.1 feet) for the surface water at finish grade to travel to reach the high groundwater elevation, the effects of water percolating through the soils and adjacent to power block structure penetration seals are negligible. Those same effects would not add hydrostatic pressure to the seals due to the seals existing above the maximum assumed groundwater level (which is 3 feet above the actual recorded maximum groundwater elevation).

7.3.2.2 Flood Protection Evaluation

Evaluation of the below-grade penetration seals is not applicable due to those seals being subjected to minimal, additional hydrostatic loading during the bounding flood event. The groundwater table elevation would be negligibly affected by the potential infiltration of external flood water at Units 1 & 2.

7.3.2.3 Flood Protection Performance Justification

No penetration seals located within buildings at or above site grade are credited to protect important to safety SSCs at Units 1 & 2 from external flooding. As a result, performance justification for these non-credited features, as described in JLD-ISG-2012-05, Section 6.3, is not applicable.

Additionally, the below-grade penetration seals through power block exterior walls are located at elevations above the maximum assumed groundwater table elevation. The seals are only subjected to surficial flood water that does not drain on the surface, but rather infiltrates the sub-surface while traveling to the groundwater table located at an elevation beneath the seal(s).

7.3.3 Waterstops

Waterstops embedded in exterior wall or floor construction joints of the Units 1 & 2 power block buildings, or in seismic gaps below the groundwater table elevation, are credited flood protection features in the Units 1 & 2 licensing basis. The FWR considered the waterstops in inspections of the incorporated concrete wall barriers.

The waterstops are in place below 219.6 feet msl to protect against groundwater seepage into sub-grade SSCs. One waterstop is provided at each construction joint below 170 feet msl, except in the nuclear service cooling water towers where two waterstops are provided at each construction joint below 220 feet msl. Two waterstops are provided at each seismic separation

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gap below 170 feet msl, and one waterstop is provided at each seismic gap located between 170 feet msl and 220 feet msl. No waterstops are challenged by external flooding from the bounding flood water elevation at the site.

7.3.3.1 Performance Criteria

Because there are no above-grade waterstops credited for the protection of important to safety SSCs against external flooding through seismic gaps or construction joints, the criteria of JLD-ISG-2012-05, Section 6.2 and related methodology of Appendix A are not applicable to those waterstops.

For the below-grade waterstops, the Units 1 & 2 FWR credits those waterstops as groundwater flooding protection features. However, the maximum estimated groundwater table elevation of 165.0 feet msl would challenge those waterstops located in seismic separations joints beneath that elevation with hydrostatic loading.

There are two waterstops located in the Units 1 & 2 power block seismic separation joints below 170.0 feet msl, which provide a protection redundancy against groundwater hydrostatic pressure against those seismic joints. The likelihood of groundwater infiltration through the seismic joints and past two waterstops is minimal as the waterstops each have 65 pounds per square inch (psi) of tensile strength (approximately 150 feet of flood water column).

7.3.3.2 Flood Protection Evaluation

The sub-surface waterstops located in power block structure seismic separation joints provide demonstrated protection from in-seepage of groundwater into the joints (as inspected and documented in the Units 1 & 2 FWR). Additionally, there is a maximum 0.2 feet (equal to 2.4 inches) of standing water above finished plant grade from the controlling flood event at Units 1 & 2. The rate of sub-surface infiltration of flood water adjacent to sub-surface waterstops would be too minimal to affect the amount of groundwater hydrostatic loading against any portion of the waterstops in the seismic separation joints. Furthermore, the maximum additional hydrostatic pressure added to the groundwater table from the surficial water infiltration during a bounding flood event would be negligible.

7.3.3.3 Flood Protection Performance Justification

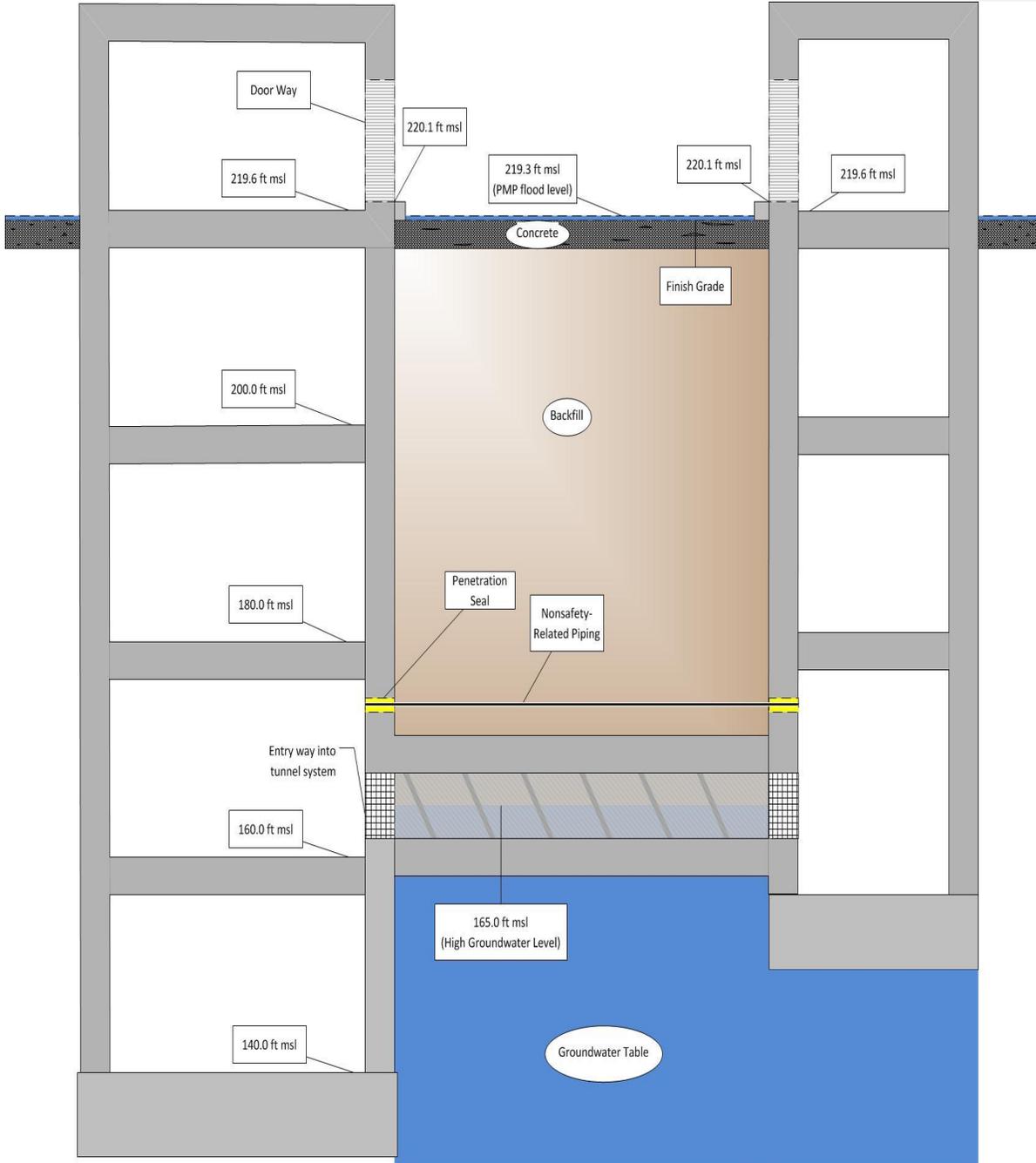
There are no waterstops embedded within seismic gaps or construction joints at or above site grade. There is varying margin between each waterstop and site grade, but no external flooding challenges the waterstops because they are below-ground. However, the below-grade waterstops in direct contact with the groundwater table would not realize additional hydrostatic loading from the infiltration of flood water due to the height of flood water above finished plant grade being minimal (maximum 0.2 feet), the 6 hour duration of the bounding flood event, and the vertical distance the water would need to travel to reach the static groundwater table (at least 54.1 feet).

Figure 7-1 Elevation View of Units 1 & 2 Subsurface at Power Block

Comment [NRCstaff46]: Editorial: Consider using standard symbols for depicting the (normal) groundwater table to show the interface between saturated and unsaturated zones.

Comment [NRCstaff47]: Suggestion: Show the location of waterstops in this figure.

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8.0 Units 1 & 2 Evaluation Results

The current Units 1 & 2 design basis high flood water elevation of 219.1 feet msl was exceeded by 0.2 feet in the Units 1 & 2 FHRR bounding external flooding scenario, which prompted the development of this IA as required in NTTF Recommendation 2.1 (Enclosure 2 to the March 12, 2012 10 CFR 50.54(f) letter).

As indicated above, the Units 1 & 2 controlling flood scenario parameters derived from the FHRR are generated from the local intense PMP with a maximum flood elevation of 219.3 feet msl. For these controlling flood parameters at the Units 1 & 2 site, the reevaluated flood height is 0.3 feet below the lowest important to safety SSC floor elevation of 219.6 feet msl. Given the FHRR indicates 0.3 feet APM, the Units 1 & 2 site can continue to be classified as a site not susceptible to flooding of SSCs important to safety from any postulated flood hazard mechanism. Therefore, Units 1 & 2 is protected from external flooding by site topography and design, and not reliance upon flood protection features or mitigation measures.

The site FWR performed in accordance with NTTF Recommendation 2.3 verified the effectiveness of the Units 1 & 2 flood protection features and determined that no additional or enhanced flood protection features are necessary to be implemented at Units 1 & 2. The flood walkdown inspections confirm that the plant is protected from reevaluated flood hazard mechanisms.

Units 1 & 2 is a plant with all SSCs important to safety constructed above the maximum estimated flood stage, and therefore the safety-related SSCs, including rooms important to safety, do not require in-room water detection systems specific for external flooding. Thus, water detection and warning systems are not relied upon in the licensing basis for protection against external floods. The Units 1 & 2 FHRR does not identify any severe weather conditions that would impair support functions necessary to achieve safe shutdown of the units.

APM exists for all flood hazard mechanisms between the Units 1 & 2 important to safety SSC floor elevations and flood water peak elevations. Units 1 & 2 can operate in all plant modes throughout site flooding durations without important to safety SSCs being challenged, so that changes in operational mode do not affect the plant's ability to remain dry and keep important to safety SSCs protected.

9.0 Mitigation Capability

Units 1 & 2 is not in a flooded state from the controlling flood parameters determined by the FHRR performed in accordance with NTTF Recommendation 2.1 of the 10 CFR 50.54(f) March 12, 2012 letter. Units 1 & 2 has reliable margin between the lowest important to safety SSC floor elevation and the maximum external flood elevation generated by controlling flood parameters at the plant site. JLD-ISG-2012-05, Section 7 does not apply to this IA because an evaluation of mitigation capability is not required for sites that have demonstrated that flood protection is reliably provided with margin available with respect to SSCs important to safety.

Additionally, no temporary active measures or manual actions are required to protect Units 1 & 2 important to safety SSCs from external flooding by any potential flooding mechanism. JLD-ISG-2012-05, Appendix C is not applicable to this IA because no evaluation of manual actions to protect against flooding is needed. The instructed documentation of JLD-ISG-2012-05, Sections 8.2.3, 8.3, and 8.4 also do not apply to this Units 1 & 2 IA.

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Electric Generating Plant Units 1 & 2

Attachment 1

Integrated Assessment for External Flooding

Peer Review

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A.1 Peer Review

A.1.1 Peer Review Process

Preparer's Note

Pursuant to JLD-ISG-2012-05, "Guidance for Performing the Integrated Assessment for External Flooding," Revision 0, Section 4 and Appendix B.3, "Peer Review Documentation," state how this Peer Review Attachment meets the objectives of a successful peer review by first describing the peer review process utilized to meet the requirements of JLD-ISG-2012-05, Appendix B.

A.1.2 Peer Reviewer/Peer Review Team

Preparer's Note

The name and credentials (e.g. training, experience, expertise, capabilities and background information) of the peer reviewer or members of the peer review team would be provided in this section – consistent with the requirements of Appendix B.3 of JLD-ISG-2012-05.

Additionally, describe how the peer review team member(s) met the reviewer attributes and were independent from the preparation, review, and supervision of the IA report development in this section of the Attachment, in accordance with JLD-ISG-2012-05, Appendix B.1 and B.3.

A.1.3. Findings and Comments

Preparer's Note

Consistent with JLD-ISG-2012-05, Appendix B.3, provide the key findings, observations, and/or comments made by the peer review team member(s) in this section of the Peer Review Attachment along with the how the comments were dispositioned for inclusion in the final IA report.

A.1.4. Conclusions

Preparer's Note

In this section of the Peer Review Attachment, state the peer review team's overall conclusions of its review with regard to the completeness, accuracy of input information and reported results, technical bases, and the alignment of the IA report with the guidance of JLD-ISG-2012-05.