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March 28, 2017

L-MT-17-015
10 CFR 50.54(f)

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Monticello Nuclear Generating Plant
Docket No. 50-263
Renewed Facility Operating License No. DPR-22

Monticello Nuclear Generating Plant, Mitigating Strategies Flood Hazard Assessment (MSA) Submittal (CAC No. MF7712)

References:

1) NRC Letter, "Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012. (ADAMS Accession No. ML12056A046)

2) NSPM Letter to NRC, "Monticello Nuclear Generating Plant: Response to Post-Fukushima Near-Term Task Force (NTTF) Recommendation 2.1, Flooding - Flood Hazard Reevaluation Report," L-MT-16-024, dated May 12, 2016. (ADAMS Accession No. ML16145A179)

3) NRC Letter, "Coordination of Requests for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events," dated September 1, 2015. (ADAMS Accession No. ML15174A257)

4) NRC Staff Requirements Memorandum, "Staff Requirements - COMSECY-14-0037 - Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards," dated March 30, 2015. (ADAMS Accession No. ML15089A236)

5) Nuclear Energy Institute (NEI) guidance, NEI 12-06, Revision 2, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," dated December 2015. (ADAMS Accession No. ML16005A625)

6) Nuclear Regulatory Commission (NRC), JLD-ISG-2012-01, “Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” Revision 1, dated January 22, 2016. (ADAMS Accession No. ML15357A163)

7) NRC Letter to NSPM, “Monticello Nuclear Generating Plant – Interim Staff Response to Reevaluated Flood Hazards Submitted in Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation (CAC No. MF7712),” dated September 16, 2016. (ADAMS Accession No. ML16248A004)

8) NRC Letter, “Supplemental Information Related to Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) Regarding Flooding Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident,” dated March 1, 2013. (ADAMS Accession No. ML13044A561)

On March 12, 2012, the NRC issued Reference 1 to request information associated with Near-Term Task Force (NTTF) Recommendation 2.1 for Flooding. One of the Required Responses in Reference 1 directed licensees to submit a Flood Hazard Reevaluation Report (FHRR). Northern States Power Company, a Minnesota corporation (NSPM), d/b/a Xcel Energy, submitted the FHRR for the Monticello Nuclear Generating Plant (MNGP), on May 12, 2016 (Reference 2). Per Reference 8, the NRC considers the reevaluated flood hazard to be beyond the current design/licensing basis of operating plants.

Concurrent with the FHRR, NSPM developed and implemented mitigating strategies in accordance with NRC Order EA-12-049, "Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," for the MNGP. In Reference 4, the NRC affirmed that licensees need to address the reevaluated flooding hazards within their mitigating strategies for beyond-design-bases (BDB) external events, including the reevaluated flood hazards. This requirement was confirmed by the NRC in Reference 3. Guidance for performing Mitigating Strategies Assessments (MSAs) is contained in Appendix G of NEI 12-06, Revision 2 (Reference 5). The Reference 5 guidance was endorsed by the NRC in Reference 6.

In Reference 7, the NRC concluded that the reevaluated flood hazards information is suitable for the assessment of mitigating strategies developed in response to Order EA-12-049 for the MNGP.

The Enclosure to this letter provides the MNGP Mitgating Strategies Flood Hazard Assessment (MSA). The new flooding analyses were bounded by the plant design basis flood for all postulated flooding scenarios, with the exception of local intense precipitation (LIP). The MSA evaluated the FLEX strategy implementation during the LIP flooding event. The assessment concluded that the existing FLEX strategies can be successfully implemented as designed. No additional actions or procedural changes are required.

Please contact John Fields, at 763-271-6707, if additional information or clarification is required.

<u>Summary of Commitments</u>

This letter makes no new commitments and no revisions to existing commitments.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on March 28, 2017.

Peter A. Gardner
Site Vice President, Monticello Nuclear Generating Plant
Northern States Power Company - Minnesota

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Monticello Nuclear Generating Plant, USNRC
Resident Inspector, Monticello Nuclear Generating Plant, USNRC

ENCLOSURE

MONTICELLO NUCLEAR GENERATING PLANT

Monticello Mitigating Strategies Flood Hazard Assessment

36 pages to follow

Xcel Energy

Contract No. 00048375

Monticello Mitigating Strategies
Flood Hazard Assessment

CLIENT APP.: N/A

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☒ YES ☐ NO

CLIENT DOCUMENT REFERENCE NUMBER

N/A

TOTAL SHEETS

36

PROJECT DOCUMENT NUMBER

180999.50.2300-03

Table of Contents

List of Acronyms, Abbreviations, and Definitions

Acronyms

AC – Alternating Current
BDB – Beyond Design Basis
CDB – Current Design Basis
cfs – cubic feet per second
DC – Direct Current
EDG – Emergency Diesel Generator
EFT – Emergency Filtration Train
ELAP – Extended Loss of all AC Power
EOP – Emergency Operating Procedure
ERO – Emergency Response Organization
FHRR – Flood Hazard Reevaluation Report
FLEX DB – FLEX Design Basis (flood hazard)
HCVS – Hardended Containment Vent System
HMR – Hydro Metrological Report
LIP – Local Intense Precipitation
LUHS – Loss of Ultimate Heat Sink
MNGP – Monticello Nuclear Generating Plant
MSA – Mitigating Strategies Flood Hazard Assessment
MSFHI – Mitigating Strategies Flood Hazard Information (from the FHRR and MSFHI letter)
NB – not bounded
NGVD29 - National Geodetic Vertical Datum of 1929
NEI – Nuclear Energy Institute
NRC – Nuclear Regulatory Commission
NSPM – Northern States Power Company, a Minnesota corporation
NSRC – National SAFER Response Center
NTTF – Near Term Task Force
PAB – Plant Administration Building
PDG – Portable Diesel Generator
PDP – Portable Diesel Pump
PMF – Probable Maximum Flood
psf – pounds per square foot
RCIC – Reactor Core Isolation Cooling
RHR – Residual Heat Removal
RHRSW – RHR Service Water
RPV – Reactor Pressure Vessel
SBO – Station Blackout
SFP – Spent Fuel Pool
SRV – Safety Relief Valve
SSC – Structure, System, Component
UHS – Ultimate Heat Sink
USAR - Updated Safety Analysis Report
VAC – Volts AC
VDC – Volts DC
WSE – Water Surface Elevation

Definitions

FLEX Design Basis Flood Hazard: the controlling flood parameters used to develop the FLEX strategies for a flood.

1. Executive Summary

FLEX strategies were developed to mitigate an extended loss of all AC power (ELAP) and a loss of normal access to the ultimate heat sink resulting from beyond design bases external events; including design bases flooding events. New flooding analyses were performed in support of developing the Flood Hazard Reevaluation Report (FHRR) for the Monticello Nuclear Generating Plant (MNGP). For all postulated flooding scenarios, except the Local Intense Precipitation (LIP), the new flooding analyses were bounded by the plant design basis flood. The Mitigating Strategies Assessment (MSA) evaluates FLEX strategies to ensure the strategies can successfully be implemented for the Local Intense Precipitation flooding event or to determine if changes are required to the strategies. Based on the evaluation herein, the FLEX strategies can be implemented without change for the Local Intense Precipitation event.

2. Background

2.1 Purpose

On March 12, 2012, the NRC issued Reference 1 to request information associated with Near-Term Task Force (NTTF) Recommendation 2.1 for Flooding. One of the Required Responses in Reference 1 directed licensees to submit a Flood Hazard Reevaluation Report (FHRR). The NRC determined that the reevaluated flood hazard is "beyond the current design/licensing basis of operating plants." Reference 2 was submitted in response to the request in Reference 1 for the MNGP. Subsequent to submittal of the FHRR (Reference 2), the MNGP performed additional more refined flooding analysis for the LIP (Reference 9). Reference 9 uses site specific precipitation inputs in lieu of the applicable HMR methods for determining precipitation inputs, and includes an unsteady flow approach to refine the evaluation of the impacts of water outside of various plant doors.

Concurrent to the flood hazard reevaluation, the MNGP developed and implemented mitigating strategies in accordance with NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," (earlier revision of Reference 4).

In Reference 3, the Commission affirmed that licensees need to address the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis (BDB) external events, including the reevaluated flood hazards. This position was confirmed in Reference 5.

Guidance for performing mitigating strategies flood hazard assessments (MSAs) is provided in Appendix G of NEI 12-06 (Reference 4). For the purpose of the MSA, the NRC determined that the flood hazard information provided in the FHRR is the "Mitigating Strategies Flood Hazard Information" (MSFHI). Appendix G of NEI 12-06, describes the MSA for flooding as containing the following elements:

- Section G.2 – Characterization of the MSFHI
- Section G.3 – Basis for Mitigating Strategies Assessment (MSFHI-FLEX DB Comparison)
- Section G.4.1 – Assessment of Current FLEX Strategies (if necessary)
- Section G.4.2 – Assessment for Modifying FLEX Strategies (if necessary)
- Section G.4.3 – Assessment of Alternative Mitigating Strategies (if necessary)
- Section G.4.4 – Assessment of Targeted Hazard Mitigating Strategies (if necessary)

If a Section G.3 assessment shows that the FLEX Design Basis flood hazard (FLEX DB) completely bounds the reevaluated flood (in the MSFHI), only documentation for Sections G.2 and G.3 are required; assessments and documentation for the remaining sections (G.4.1 through G.4.4) are not necessary. If a

Section G.3 assessment shows that the FLEX DB does not completely bound the MSFHI, then Sections G.4.1 through G.4.4 need to be performed. Sections G.4.1 through G.4.4 are performed sequentially until an acceptable result is received. For example, if the evaluation for Section G.4.1 demonstrates that the existing FLEX strategies can be implemented as designed, then the MSA is considered complete and the results documented.

2.2 Site Description

The site is located within the city limits of the Monticello, Minnesota, on the right bank of the Mississippi River. The plant site occupies an area of approximately 2,150 acres. The topography of the MNGP site is characterized by relatively level bluffs, which rise sharply above the river. Three distinct bluffs exist at the plant site at elevations 920, 930, and 940 ft. Bluffs located approximately a mile north and south of the site rise to 950 ft. Further to the north, the terrain is relatively level with numerous lakes and wooded areas. To the south, west, and east, the terrain is hilly and dotted with numerous small lakes (Reference 6).

The Mississippi River abuts the site to the north and northwest. The flow in the Mississippi River in the vicinity of the plant is unregulated and subject to large variations throughout the year. Normal river level is at elevation 905 ft and the maximum river flood stage was recorded in 1965 at elevation 916 ft. The 1,000-year projected river flood stage is at elevation 921 ft (Reference 6).

The natural grade of the power block is at elevation 930 ft with elevations of the majority of critical structure openings ranging from 931 ft to 935 ft. The floor elevation of the Intake Structure and Screen House is at 919 ft (Reference 10).

Elevations used in this evaluation are in the NGVD29 datum.

3. Overview of FLEX Strategies

FLEX capability is designed to mitigate the consequences of a postulated beyond-design-basis external event coincident with an extended loss of all AC power (ELAP) and a loss of normal access to the ultimate heat sink. NEI 12-06 (Reference 4) outlines an approach for adding diverse and flexible mitigation strategies-or FLEX- that will increase defense-in-depth for beyond-design-basis scenarios to address an ELAP and loss of normal access to the ultimate heat sink (LUHS) occurring simultaneously at all units on a site.

Plant coping capability during a FLEX scenario is divided into three phases:

- Phase 1 (short term phase) – During Phase 1, the plant is coping using installed plant equipment.
- Phase 2 (transition phase) – During Phase 2, coping is extended using portable equipment that is stored on-site.
- Phase 3 (long term phase) – During Phase 3, coping is extended indefinitely using portable equipment that is stored off-site and is deployed to the site.

Time durations for the short term and transition phase are defined based on plant specific or generic analyses, capabilities of the portable on-site equipment, and capabilities for accessing the site to deploy off-site portable equipment following a beyond design bases external event.

FLEX strategies were designed and previously evaluated for the design bases flood external event (i.e., FLEX DB), which for the MNGP is the probable maximum flood (PMF) on the Mississippi River. The PMF is a relatively slow developing event that provide several days to prepare for the event. The FLEX strategy for the PMF is to proactively stage selected FLEX equipment within the flood-protected area before the design basis flood level is reached.

For the LIP, this same warning time does not exist. The assessment of FLEX strategy implementation for the LIP needs to account for the lack of warning time. For evaluation of the potential impact from a LIP to the FLEX strategies it is useful to understand the timeline for implementation of the strategies. For the LIP, similar to other external events, it is assumed that the ELAP occurs at time = 0. As shown in Table 6.1-1 this time period also corresponds with the highest rainfall period; which would be reasonable that the loss of offsite power occurs during the most severe time of the event. In addition, as the LIP event is a 6 hour event, assuming that the ELAP occurs at time = 0 places the maximum subsequent FLEX strategy implementation time coincident with the LIP event.

The timeline for implementation of FLEX strategies is shown in Table 3-1. (Reference 7)

Table 3-1 – Timeline for Implementation of FLEX Strategies

Action Item	Elapsed Time	Action	ELAP Event Time Constraint (Y/N)	Remarks/Applicability
	0	Beyond Design Basis External Event Happens	NA	Plant @100% power.
1	Per C.4-B.09.02.A, Station Blackout	Immediate Operator Actions	NA	Verify HPCI and RCIC start at -47 inches. Dispatch operator to investigate Emergency Diesel Generator.
2	1 hr	Emergency Classification SG1.1- Declare ELAP	Y	In order to ensure that follow-on actions are completed consistent with the timelines identified, a timely decision must be made that the Station Blackout (SBO) condition is an Extended Loss of AC Power (ELAP).
3	2 hr	DC load shed complete	Y	This is a necessary action to ensure safety-related battery power can be extended through Phase 1.
4	Per C.4-B.09.02.A, Station Blackout	Depressurize Reactor using SRVs to a range that will support continued operation of RCIC	N	Reactor depressurization will be secured in a range that will enable continued RCIC operation
5	6 hr	Off-site staffing resources begin to arrive.	NA	NA because not a time constraint; included for reference.
6	6-8 hours	Large Debris Removal	N	Will be performed by augmented personnel.
7	Per C.5-1200, Primary Containment Control	Initiate use of Hardened Containment Vent System	Y	The Hardened Containment Vent System (HCVS) must be opened per the EOPs. The vent is powered by available battery and supplied with Nitrogen from the Alternate Nitrogen System.
8	8 hr	For emergency heat load, provide makeup to SFP	Y	Provide makeup to the SFP using portable FLEX pump.

Table 3-1 – Timeline for Implementation of FLEX Strategies

Action Item	Elapsed Time	Action	ELAP Event Time Constraint (Y/N)	Remarks/Applicability
9	After 8 but before-9.4 hours	Supplement Alternate Nitrogen	Y	Provide additional nitrogen supply to the Alternate Nitrogen System to support continued SRV and Hardened Containment Vent System operation.
10	8-10 hr	Portable diesel driven FLEX pump staged for use	N	The FLEX Portable Diesel Pump (PDP) will be staged after hour 8 and before end of hour 10. Operation of PDP is not needed until start of hour 11.
11	After 10 hr	Provide Battery Room ventilation	Y	Necessary for continued qualification and operation of batteries and equipment. Portable FLEX fans will be available and powered by the FLEX 120 VAC generator and will provide cooling.
12	After 10 hr	Provide RCIC room cooling	N	Necessary for continued qualification and operation of RCIC equipment. Portable FLEX fans will be available and powered by the FLEX 120 VAC generator and will provide cooling.
13	After 10 hr	Provide Main Control Room cooling	N	Necessary for continued Main Control Room habitability. Portable FLEX fans will be available and powered by the FLEX 120 VAC generator and will provide cooling.
14	11 hr or before	Batteries are being repowered using portable FLEX 480 VAC Diesel Generator	Y	Necessary for continued DC power.
15	After 22 hrs	Refuel portable equipment	Y	Phase 2 portable equipment will require refueling no earlier than 22 hrs.

Table 3-1 – Timeline for Implementation of FLEX Strategies

Action Item	Elapsed Time	Action	ELAP Event Time Constraint (Y/N)	Remarks/Applicability
16	25-72 hrs	Supplement on-site equipment with equipment from the National SAFER Response Center (NSRC)	Y	The National SAFER Response Center (NSRC) equipment will provide a reliable backup to the on-site portable equipment for extended operation. It will restore power to a 4160 VAC bus and restore water make up from the UHS per the direction of the fully staffed ERO.

4. Characterization of the MSFHI (NEI 12-06, Revision 2, Appendix G, Section G.2)

The NRC has completed the "Interim Staff Response to Reevaluated Flood Hazards" (Reference 8) to the flood hazards information submitted in the MNGP FHRR. The NRC staff has concluded that the licensee's reevaluated flood hazard information is suitable for the assessment of mitigating strategies developed in response to Order EA-12-049. The summary of the reevaluated flood hazard (i.e., MSFHI) parameters was provided in Reference 8. The following flood-causing mechanisms were considered as part of the FHRR:

- Local Intense Precipitation
- Streams and Rivers
- Failure of Dams and Onsite Water Control/Storage Structures
- Storm Surge
- Seiche
- Tsunami
- Ice-Induced Flooding
- Channel Migrations/Diversions

Table 2 in the Enclosure to Reference 8 indicates that the following are the flood hazards for use in the MSA.

Mechanism	Stillwater Elevation	Waves/Runup	Reevaluated Flood Hazard
Local Intense Precipitation	935.8 ft NGVD29	Minimal	935.8 ft NGVD29

Note 1 to Table 2 in the Enclosure to Reference 8 states that: "the licensee is expected to develop flood event duration parameters and applicable flood associated effects to conduct the MSA. The staff will evaluate the flood event duration parameters (including warning time and period of inundation) and flood associated effects during its review of the MSA."

Subsequent to submittal of the FHRR (Reference 2), the MNGP performed additional more refined flooding analysis for the LIP (Reference 9). Reference 9 uses site specific precipitation inputs in lieu of the applicable HMR methods for determining precipitation inputs, and includes an unsteady flow approach to better quantify the impacts of water outside of various plant doors. The results from Reference 9 are consistent with the flood hazards in Table 2 in the Enclosure to Reference 8.

5. Basis for Mitigating Strategies Assessment (NEI 12-06, Revision 2, Appendix G, Section G.3)

FLEX strategies were developed to mitigate an extended loss of all AC power resulting from an external event; including design bases flooding events. As described in the FHRR (Reference 2), Section 3, “Comparison of Current Design Basis and Reevaluated Flood Hazard,” the only non-bounded flood mechanism is the LIP. The LIP is considered non-bounded because it is not included in the MNGP CDB.

As described above, subsequent to submittal of the FHRR (Reference 2), the MNGP performed additional more refined flooding analysis for the LIP (Reference 9). Reference 9 uses site specific precipitation inputs in lieu of the applicable HMR methods for determining precipitation inputs, and includes an unsteady flow approach to better quantify the impacts of water outside of various plant doors. Table 5-1 summarizes the results of the flood hazard reevaluation for the revised LIP calculation (Reference 9). With the exception of the change in methodology for determining precipitation inputs and the use of an unsteady flow approach, all assumptions, inputs, and methods are the same as those described in Section 2.1 of Reference 2.

Table 5-1 – Local Intense Precipitation

Flood Scenario Parameter		Plant Design Basis Flood	FLEX DB Flood Hazard	MSFHI	MSFHI Bounded (B) or Not Bounded (NB) by FLEX DB
Flood Level and Associated Effects	1. Maximum Stillwater Elevation (ft NGVD29)	LIP was not specifically addressed in the USAR.	FLEX strategies did not include LIP as it is not within the MNGP design basis	935.72	NB
	2. Maximum Wave Run-up Elevation (ft NGVD29)			See Note 2	N/A
	3. Maximum Hydrodynamic/Debris Loading (psf)			See Note 3	N/A
	4. Effects of Sediment Deposition/Erosion			See Note 4	N/A
	5. Concurrent Site Conditions			See Note 5	N/A
	6. Effects on Groundwater			See Note 6	N/A
Flood Event Duration	7. Warning Time (hours)			See Note 7	N/A
	8. Period of Site Preparation (hours)			See Note 8	N/A
	9. Period of Inundation (hours)			See Note 9	NB
	10. Period of Recession (hours)			See Note 10	NB
Other	11. Plant Mode of Operations			See Note 11	N/A
	12. Other Factors			See Note 12	N/A

Additional notes, "N/A" justifications (why a particular parameter is judged not to affect the site), and explanations regarding the bounded/non-bounded determination.

1. None
2. Consideration of wind-generated wave action for the LIP event is not explicitly required in NUREG/CR-7046, ANS-2.8 or the 50.54(f) letter. Furthermore, wave runup is considered negligible due to limited flood depths and fetch.
3. Hydrodynamic loading was not considered plausible due to surface water flow direction is not towards the buildings. Debris impact loading was not considered plausible due to limited velocities and flood depths.
4. Due to limited velocities, and short duration of flooding, sediment deposition and erosion is not considered to have an effect on the LIP flood levels.
5. High winds and hail could coincide with the LIP event. Section 6 evaluates performing actions to implement FLEX strategies that require going outside the plant. Environmental conditions would be considered prior to personnel being directed to move between locations.
6. Due to relatively short duration of the LIP event, surcharge to groundwater is not considered.
7. Warning time is not credited in the flood protection strategy (since only permanent/passive measures are used for the LIP flood) and, therefore, was not considered as part of the analysis.
8. SSCs important to safety are protected by means of permanent/passive measures and, therefore, site preparation was not considered as part of the analysis.
9. The period of inundation varies throughout the site; the time that the water surface elevation exceeds the height of opening for plant access doors is provided in Table 6.1-2.
10. The time for water to recede from the site varies by site location. Once the flood waters recede below finished floor elevation it would take approximately 2 to 4 hours for flood waters to completely recede from areas near the plant access doors. Figures 6.1-1 through 6.1-3 show water surface elevations throughout the site at 1 hour, 2 hours, and 4 hours, respectively.
11. There are no limitations on plant modes of operation prior to, or during, the LIP event.
12. There are no other factors applicable to this flood causing mechanism.

6. Assessment of Current FLEX Strategy (NEI 12-06, Revision 2, Appendix G, Section G.4.1)

The assessment of the ability to implement the FLEX strategies during a LIP focuses on the following:

- Robustness of Plant Equipment (Section 6.2).
  The robustness of plant equipment is evaluated to confirm that SSCs are capable of withstanding the LIP.
- Actions performed by plant personnel (Section 6.3).
  Potential impacts to timing of operator actions are evaluated.
- FLEX Portable Equipment Storage (Section 6.4).
  The location of the FLEX Storage Buildings is evaluated for potential impact from the LIP.
- Deployment of Portable Equipment (Section 6.5).
  The deployment of FLEX portable equipment during and following the LIP event is evaluated. Considerations in the evaluation include deployment of the FLEX equipment from the storage building to the staging location; access to connection points, deployment of cables and hoses; and qualifications of the portable equipment.

6.1 LIP Timeline

Section 6.1 identifies the assumption with bases for the timing of the ELAP concurrent with the LIP per Reference 4, Appendix G. In addition, Section 6.1 describes the impacts from the LIP that will be used for evaluation of the FLEX strategies.

As described above, FLEX strategies were initially designed for the design bases flood external event, which for the MNGP is the probable maximum flood (PMF) on the Mississippi River. The PMF is a relatively slow developing event that provides several days to prepare for the event. For the LIP, warning time is not credited. Thus, the assessment of FLEX strategy implementation for the LIP needs to account for an absence of warning time.

The LIP event is not expected to cause an ELAP. For the LIP, similar to other external events, it is assumed that the ELAP occurs at time = 0. As shown in Table 6.1-1 this time period also corresponds with the time period of the highest precipitation rate. It is reasonable to assume that the loss of offsite power occurs during the most severe time of the LIP event. In addition, as the LIP event is a 6 hour event, assuming that the ELAP occurs at time = 0 places the maximum subsequent FLEX strategy implementation time coincident with the LIP event.

The updated LIP calculation for the MNGP is provided in Reference 9; which describes the inputs, assumptions, methodology, and results. The timelines for the cumulative precipitation and precipitation rates during the LIP are shown in Table 6.1-1. The precipitation rate is determined by dividing the change in cumulative precipitation by the change in time duration.

Table 6.1-1, Precipitation Cumulative Precipitation and Rates

Time Duration	Cumulative Precipitation (inches)	Precipitation Rate (inches/hour)
5 min	4.5	54
15 min	7.2	16.2
30 min	10.2	12.0
1 hr	13.2	6.0
6 hr	20.6	1.5

Figures 6.1-1, 6.1-2, and 6.1-3 show water depths at various times during the LIP event. Water levels shown in Figures 6.1-1 through 6.1-3 are extracted from the Reference 9 analysis results. Figure 6.1-1 shows the water depths at 1 hour into the event, Figure 6.1-2 shows the water depths at 2 hours into the event, and Figure 6.1-3 shows the water depths at 4 hours into the event.

Figure 6.1-1, Water Depths During LIP at One Hour

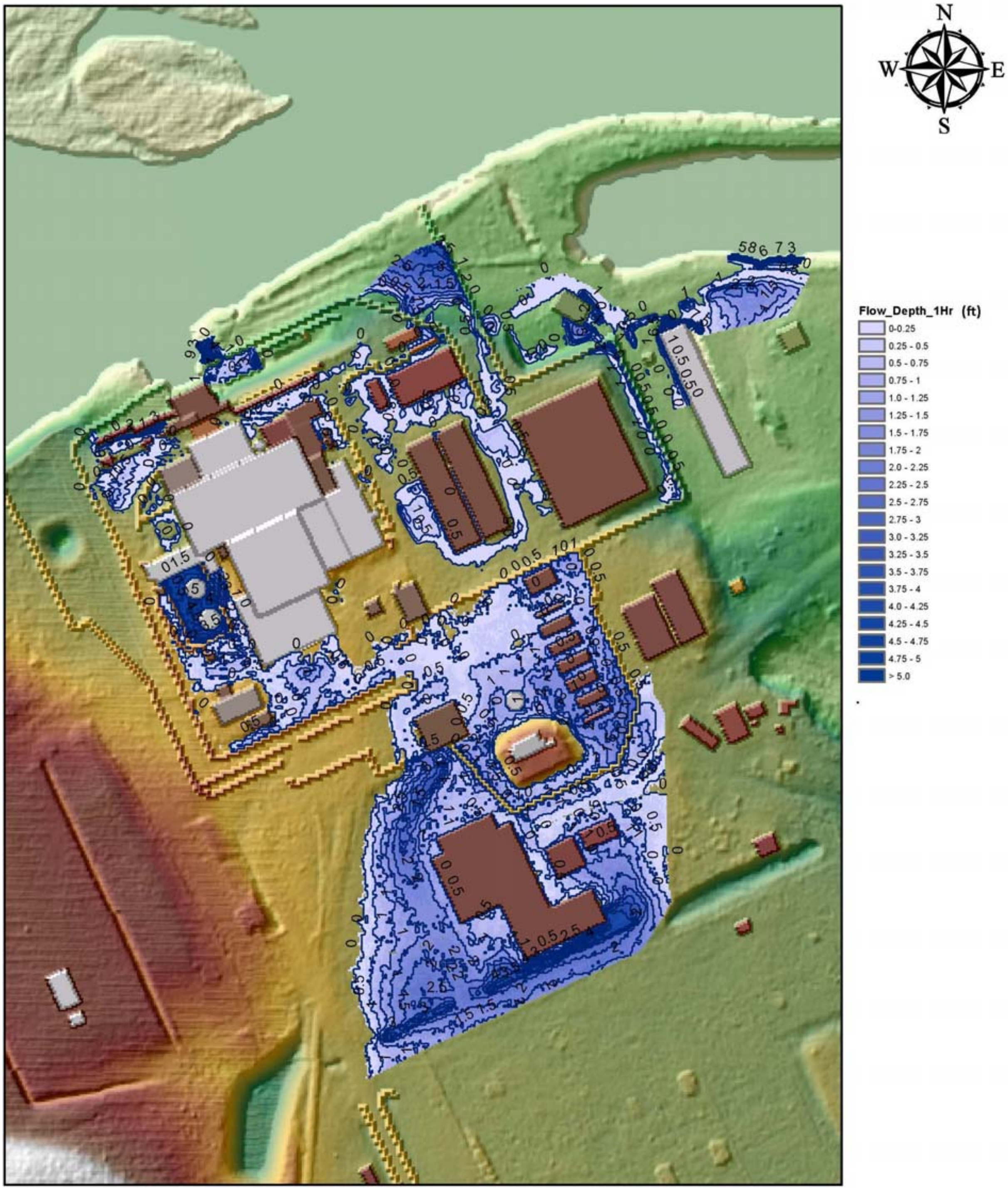


Figure 6.1-2, Water Depths During LIP at Two Hours

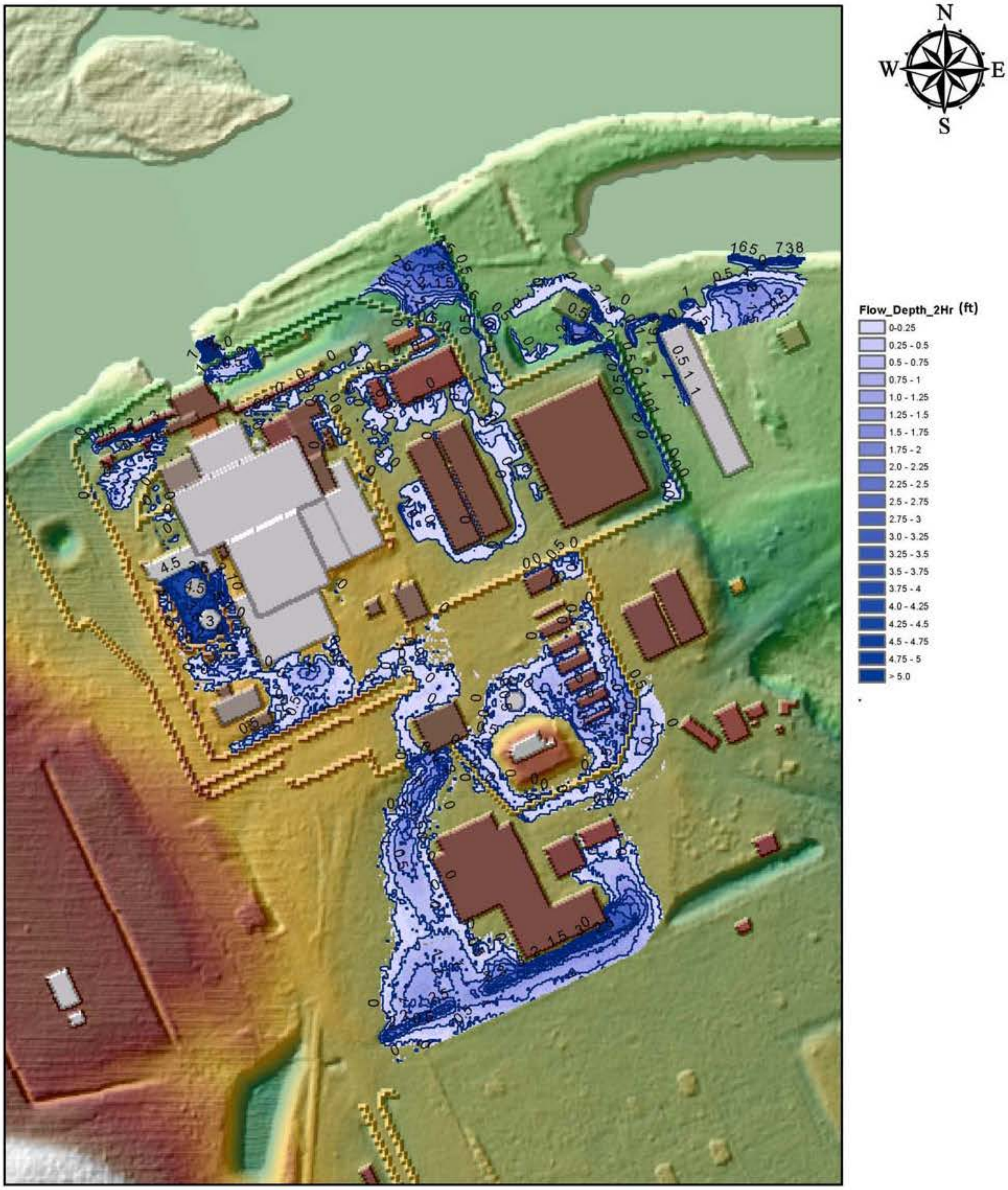
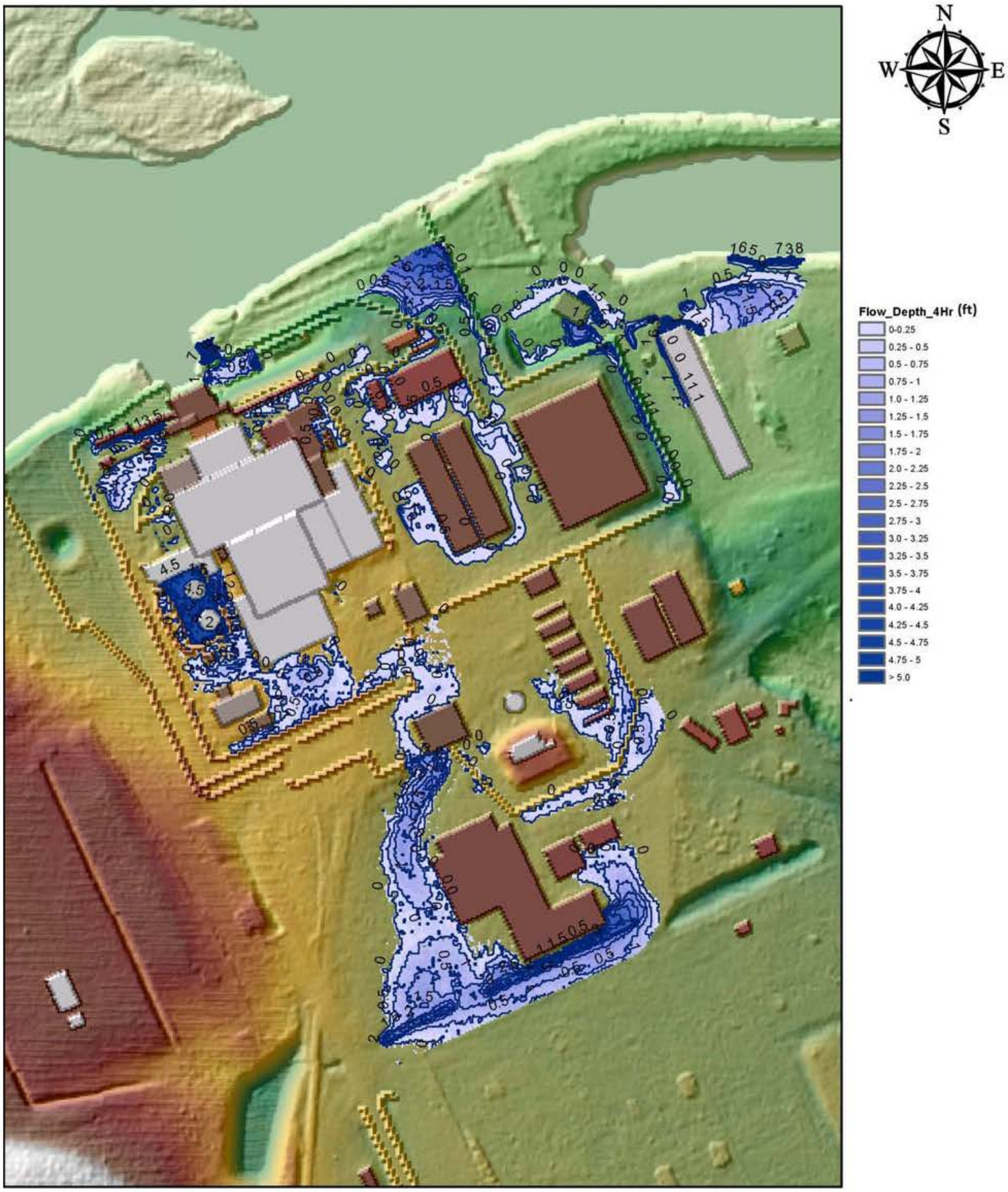


Figure 6.1-3, Water Depths During LIP at Four Hours



An additional consideration is the potential for water ingress to the plant structures. As shown in Table 6.1-2, the maximum water surface elevations around the plant structures can be up to 1.00 ft above the elevation for some of the plant access door sills or inverts. Table 6.1-2 includes the maximum water depth at each door, the door opening width, door gap or if the door is assumed to be open, the peak water inflow rate and total inflow volume and time duration that the water elevation exceeds the door opening. The maximum water depths occur at different times all during the first hour of the event. The locations of the plant access doors are shown on Figure 6.1-4.

Table 6.1-2 Water Depth at Plant Access Doors

Opening Location	Opening Invert/Sill Level (ft)	Estimated Maximum WSE (ft)	Maximum Water Depth at Opening		Door Opening Width (ft)	Gap at Bottom of Door (in.) (Note 1)	Peak Inflow		Total Estimated Inflow Volume (ft^3)	Total Estimated Inflow Time (min)
			(ft)	(in.)			(cfs)	(gpm)		
Intake Structure Door (Door 209) – interior between Screen House and Intake Structure	919.50	920.02	0.52	6.24	3	3/4	0.77	346	707	30
						1/2	0.51	229	472	30
						Open	3.23	1,450	1,520	30
West Roll-Up Door-Turbine Bldg Addition (Door 119)	931.25	931.11	n/a	n/a	n/a	n/a	Turbine Building Door 119 Open (Notes 2 and 3)		n/a	n/a
East Roll-Up Door-Turbine Bldg Addition (Door 120)	931.25	931.53	0.28	3.36	n/a	n/a	Turbine Building Door 120 Open (Notes 2 and 3)		n/a	n/a
Turbine Bldg Door (Door 30)	931.00	931.53	0.53	6.36	3	1	1.04	467	2,242	66
						3/4	0.78	350	1,681	66
Railcar Entry – Turbine Bldg (Door 24)	935.00	935.72	0.72	8.64	16	1	6.5	2,918	17,700	86
						1/4	1.6	719	4,425	86
Railcar Entry – Reactor Bldg (Doors 45 and 46)	935.00	935.23	0.23	2.76	17	1/8	0.48	216	617	36
						1/16	0.24	108	309	36
Emergency Diesel Generator – East- (Door 8)	931.00	931.11	0.11	1.32	3	1/4	0.12	54	33	7
Emergency Diesel Generator – West- (Door 7)	931.00	931.11	0.11	1.32	3	1/4	0.12	54	33	7
PAB Stairway Door (Adjacent to Door 341)	932.83	933.09	0.26	3.12	4	1/2	0.48	216	177	9
						5/16	0.30	135	111	9
13.8 KV Room (Door 1)	931.00	931.52	0.52	6.24	6	1/2	1.03	463	2,253	67
						1/4	0.51	229	1,127	67
Off Gas Stack (Door 193)	932.50	933.50	1.00	12.00	5	1/4	0.59	265	2,720	101
						1/8	0.30	135	1,360	101
Fuel Oil Transfer Pump House (Door 483)	931.00	931.11	0.11	1.32	2.5	1/4	0.10	45	28	7
						1/8	0.05	23	14	7
						Open	0.26	117	52	7
Flex Building #1 (FLEX Storage Bldg) East Roll-Up Door	920	919.81	0	0	n/a	n/a	Flex #1 East Roll-Up Door Open		n/a	n/a
Flex Building #1 (FLEX Storage Bldg) West Roll-Up /Man Door	920	920.04	0.04	0.48	n/a	n/a	Flex #1 West Roll-Up/Man Door Open		n/a	n/a

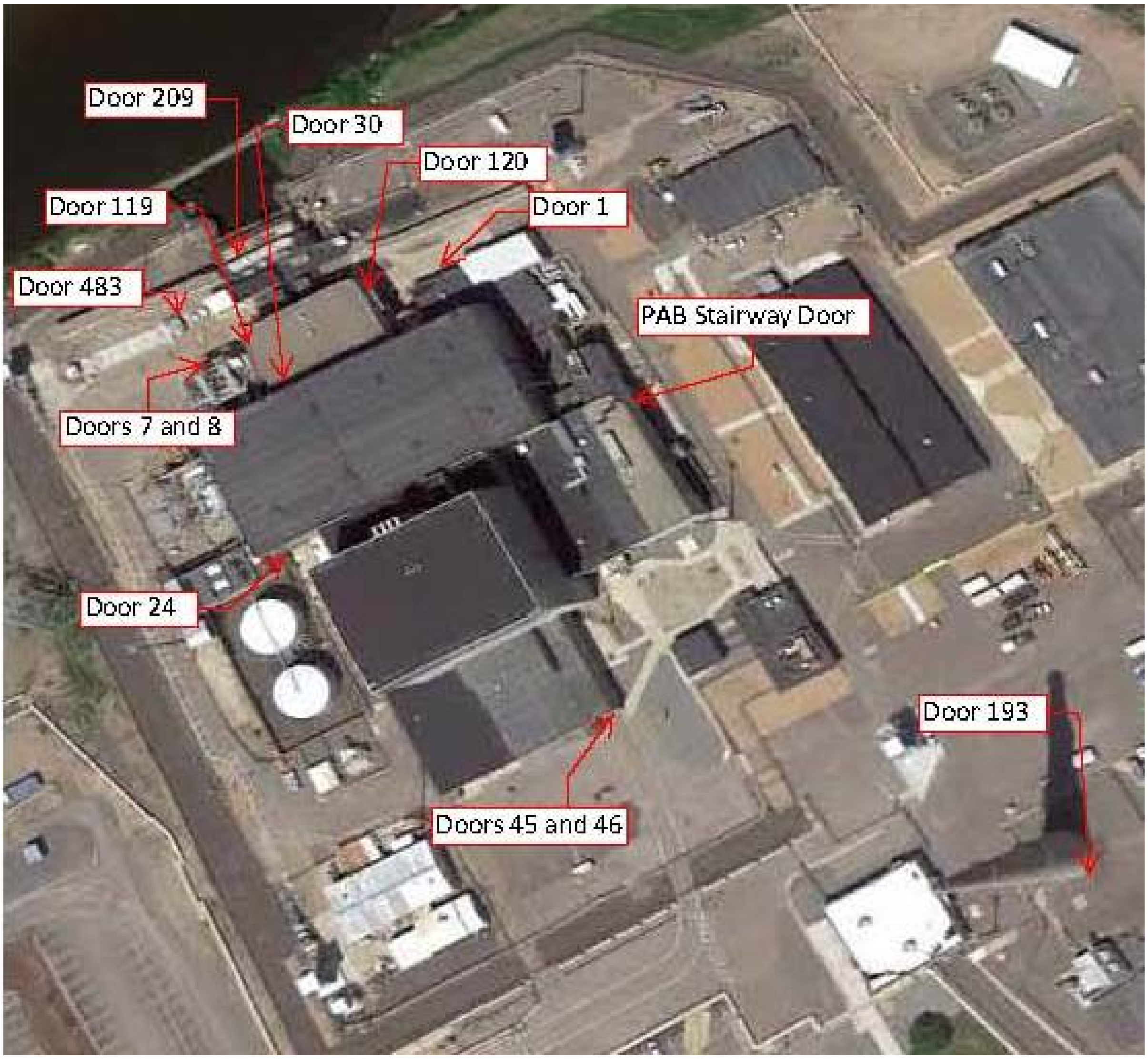
Table 6.1-2 Water Depth at Plant Access Doors

Opening Location	Opening Invert/Sill Level (ft)	Estimated Maximum WSE (ft)	Maximum Water Depth at Opening		Door Opening Width (ft)	Gap at Bottom of Door (in.) (Note 1)	Peak Inflow		Total Estimated Inflow Volume (ft^3)	Total Estimated Inflow Time (min)
			(ft)	(in.)			(cfs)	(gpm)		
Flex Building #2 (Warehouse #6) North Door	931.94	932.56	0.62	7.44	n/a	n/a	Flex #2 North Door Open		n/a	n/a
Flex Building #2 (Warehouse #6) Center Door	931.71	932.56	0.85	10.20	n/a	n/a	Flex #2 Center Door Open		n/a	n/a
Flex Building #2 (Warehouse #6) South Door	931.71	932.56	0.85	10.20	n/a	n/a	Flex #2 South Door Open		n/a	n/a

Notes:

1. Where more than one gap for a door is shown, the smaller gap is based on site measurements. The larger gap is an assumed value that is conservative relative to the measured gap.
2. Doors 119 and 120 can be open or closed and are assumed to be open for this evaluation.
3. Doors 119 and 120 are exterior doors from the outside to the Turbine Building Addition. Door 30 is between the Turbine Building Addition and the Turbine Building. Door 30 is credited with precluding water ingress in lieu of Doors 119 and 120.

Figure 6.1-4, Plant Access Door Locations



6.2 Robustness of Plant Equipment

Section 6.2 evaluates the robustness of plant equipment per Reference 4, Appendix G, in order to demonstrate that the existing FLEX strategies can be implemented for the LIP.

The MNGP is licensed for a PMF from the Mississippi River with a flood water elevation up to 939.2 ft (USAR - Reference 6). Procedural actions are implemented based on river water elevation projections to provide flood protection for a PMF. Flood preparation measures for a PMF are implemented per procedures A.6 and 8300-02 (References 10 and 11, respectively). Specific measures are taken as part of References 10 and 11 for preparation for a flood from the Mississippi River. These protective measures include construction of a levee and bin wall extensions around the power block and sealing penetrations in the Intake Structure in order to keep water out of the plant. Implementation of these preparation measures can take several days. Based on the time duration of the PMF there is sufficient time to implement the protective measures.

For a LIP event the levee and bin wall extensions would not be constructed due to an absence of warning time and because, if constructed, the levee and bin wall extensions could exacerbate the LIP event by precluding water drainage from the site. With the exception of Door 209, penetrations in the Intake Structure will not see water during the LIP. During the LIP flood, the predicted water levels exceed threshold elevations of several pathways as the doors are not protected.

The evaluation of the robustness of plant flood protection features during a LIP considers (1) the impact of water intrusion at doors that would not be protected, and (2) the structural impacts of the hydraulic loads to doors that would not be protected.

6.2.1 Plant Access Doors – Evaluation of Potential Water Intrusion

As shown in Table 6.1-2, the LIP flood levels exceed the elevation of several door sill/inverts. The impact of inleakage by the doors in Table 6.1-2 is assessed by considering the location in the plant structures where the water could accumulate.

EDG Building

The peak water elevation outside the doors is 931.11 or approximately 1.3 inches. The equipment in the EDG Building can tolerate a water depth up to 16 inches. In addition, there are 9 in. curbs which separate the two EDG rooms from each other and separate the EDG Building from the Turbine Building. At a water level of 9 in. in the EDG Building, the water would overtop the curbs and flow into the Turbine Building. Therefore, even if it is assumed that the water level in the EDG Building equalized with the water level outside the doors, SSCs important to safety in the EDG Building would not be adversely affected by the LIP.

Turbine Building

Leakage past Doors 1, 24, 30, and 209 could accumulate in the Turbine Building. Leakage past Door 1 can accumulate in either the Turbine Building or the PAB Basement, thus, it is included in the determination of total water accumulation in both structures. The available volume in the Turbine Building to accommodate inleakage is 140,874 ft^3. Turbine Building Addition Doors 119 and 120 can either be open or closed, thus, Doors 119 and 120 are not credited with precluding water ingress. Door 30 is credited in lieu of Doors 119 and 120. Using the conservative door gap sizes for Doors 1, 24, 30, and 209 (assuming that Door 209 is open) the total water volume that could accumulate in the Turbine

Building is 2,253 + 17,700 + 2,242 + 1,520 = 23,715 ft^3. Thus, SSCs important to safety in the Turbine Building will not be adversely affected by the LIP.

PAB Basement

Leakage past the PAB Stairway Door and Door 1, could accumulate in the PAB Basement. The available volume in the PAB Basement to accommodate inleakage is 3,047 ft^3. It is noted that the volume of 3,047 ft^3 is based on a conservative water height of 4 inches as compared to a limiting component height of 4.75 inches. Using the conservative door gap sizes for the PAB Stairway Door and Door 1 the total water volume that could accumulate in the PAB Basement is 177 + 2,253 = 2,430 ft^3. If the realistic door gap size is used for Door 1, the total water volume that could accumulate in the PAB Basement is 177 + 1,127 = 1,304 ft^3. This is much less than the acceptance criteria of 3,047 ft^3. Thus, SSCs important to safety in the PAB will not be adversely affected by the LIP. 2,430 ft^3 of water in the PAB Basement is equivalent to 3.2 inches of water depth.

Fuel Oil Pump House

The available volume in the Fuel Oil Pump House to accommodate inleakage past Door 483 is 80 ft^3. Using a conservative door gap with the door closed the inleakage is 28 ft^3. Furthermore, conservatively assuming that Door 483 is open the total water volume that could accumulate in the pump house is 52 ft^3. Thus, SSCs important to safety in the Fuel Oil Pump House will not be adversely affected by the LIP.

Reactor Building

Leakage past Doors 45/46 and 193 could accumulate in the Reactor Building. The available volume of the Reactor Building to accommodate inleakage is 6,713 ft^3. Using the conservative door gap size for Door 45/46 and Door 193 the total water volume that could accumulate in the Reactor Building is 617 + 2,720 = 3,337 ft^3. This is much less than the allowable volume of 6,713 ft^3. Thus, SSCs important to safety in the Reactor Building would not be adversely affected by the LIP.

Intake Structure

Leakage by Door 209 would accumulate in the Turbine Building, and is addressed in the discussion for the Turbine Building, above.

Off Gas Stack

Leakage by Door 193 into the Off Gas Stack would accumulate in the Reactor Building. This is included in the above discussion of the Reactor Building. There are no SSCs important to safety in the Off-Gas Stack that could be affected by water accumulation during the LIP.

6.2.2 Plant Access Doors – Structural Evaluation for LIP Loads

Consideration was also given to hydrodynamic and debris impacts during the LIP event. The maximum flood level predicted during the LIP event is 935.72 ft. The LIP event does not include any debris impact or any appreciable hydrodynamic effects due to the direction of all flow being away from the building.

As described above, there are several doors that will be subjected to water loading without flood protection. Reference 12 performed a structural evaluation comparing existing allowable pressure, differential pressure, or capacity qualifications for each door with the resultant LIP loading. The results of the evaluation indicate that the existing allowable pressure, differential pressure, or capacity qualifications bound the resultant LIP loading.

6.3 Operator Actions Outside of the Plant Structures

Section 6.3 evaluates performing operator actions outside of plant structures during the LIP. Following unit trip, an operator goes to the Gas House to support the purge of hydrogen in the main generator. Accessing the gas house requires a short transit outside the Turbine Building; near the Turbine Building Railway Door 24. This is the only operator action outside of plant structures during the LIP.

The MNGP FLEX Validation document (Reference 13) indicates that there is a 5 hour time constraint for performing this action. The ability to purge the main generator within the time constraint was validated in Reference 13, Validation Plan No. 1009; which showed that the action could be completed within 14 minutes. The validation plan assumed that the actions did not start until after the first hour.

Precipitation rates as a function of time are shown in Table 6.1-1, above. During the first hour the precipitation rates are very high and may make it difficult for the operator to go between the Turbine Building and the Gas House. After the first hour, the precipitation rate has decreased to 1.5 inches per hour and the operator can make the transit to perform the actions in the Gas House. Table 6.1-2 shows that the peak water surface elevation near Door 24 is 8.6 inches and the water elevation is above the door elevation for 86 minutes. After that time, the water has receded from this area and is no longer above the door sill. Thus, water elevations during the LIP will not preclude the operator from being able to make the transit to the Gas House to perform the actions.

Assuming the operator does not start the actions until after the water has receded from the vicinity of Door 24 is consistent with the validation plan assumption. Using the validated time of 14 minutes to perform the actions, there is more than sufficient time to complete the actions to purge the main generator within the 5 hour time constraint.

6.4 FLEX Portable Equipment Storage

Section 6.4 evaluates the storage of FLEX portable equipment per Reference 4, Appendix G, in order to demonstrate that the existing FLEX strategies can be implemented for the LIP.

Two storage buildings are provided; Warehouse #6 and the FLEX Storage Building; shown on Figures 6.5-1 through 6.5-3. One complete set of portable equipment is stored in each FLEX storage building. The portable equipment to be deployed and the deployment strategy are determined during the initial time of the event using procedure C.5-4101, FLEX Site Assessment (Reference 14). The LIP calculation determines the peak water level that could be reached inside Warehouse #6 and the FLEX Storage Building assuming that the exterior doors are open. The peak water level inside Warehouse #6 is 10.2 in. and inside the FLEX Storage Building is 0.48 in. These water levels will not adversely affect the FLEX portable equipment in the storage buildings, the associated equipment such as hoses, or the deployment vehicle. Thus, for the LIP, both sets of FLEX portable equipment will be available providing redundancy and flexibility.

6.5 Deployment of Portable Equipment

Section 6.5 evaluates FLEX equipment deployment, including validation performed of deployment activities, per Reference 4, Appendix G, in order to demonstrate that the existing FLEX strategies can be implemented for the LIP.

Table 3-1, above, identifies the time critical actions that need to be completed for successful implementation of the FLEX strategies. Actions that require deployment of portable equipment and the associated timing are:

- Stage the diesel driven FLEX pump for use within 8-10 hours. This is for Reactor Pressure Vessel (RPV) makeup and SFP makeup (non-emergency case). Provide makeup to Spent Fuel Pool (SFP) within 8 hours for the case where the reactor fuel assemblies are off-loaded into the SFP; referred to as the emergency heat load case.
- Provide Battery Room, RCIC Room and Main Control Room cooling within 10 hours using portable fans powered from portable FLEX 120 VAC generators.
- Repower Battery Chargers within 11 hours using portable FLEX 480 VAC generators.

Each of these is described in more detail below. Equipment deployment locations are shown on Figures 6.5-1, 6.5-2 and 6.5-3.

Refueling of portable equipment is not included as part of this evaluation. As shown in Table 3-1, refueling of portable equipment is required no earlier than 22 hours; which is well after the LIP event is over.

6.5.1 Deployment of Portable Diesel Pump (PDP)

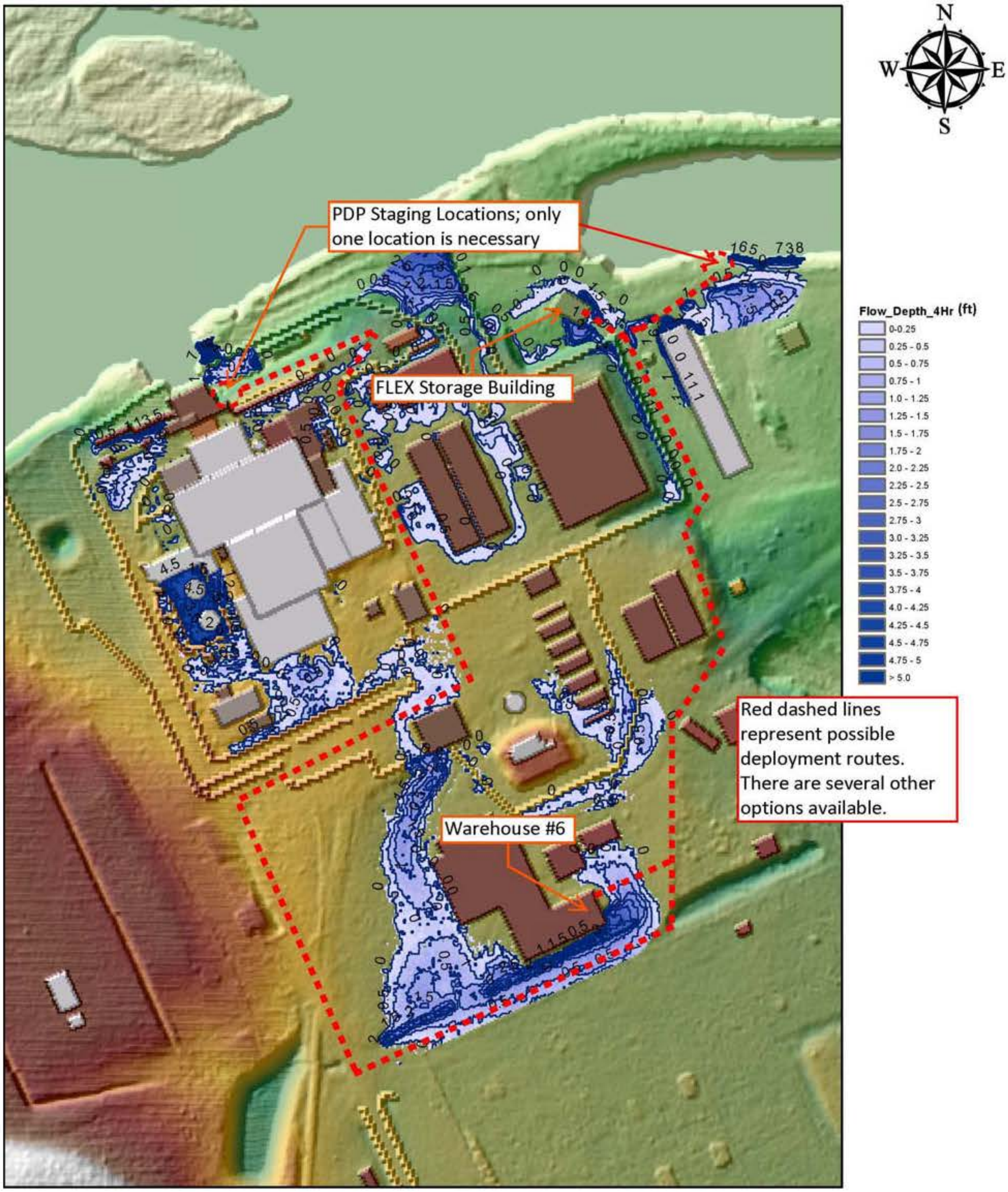
6.5.1.1 Function

The function of the portable diesel pump (PDP) is to provide makeup to the Reactor Pressure Vessel (RPV) and the Spent Fuel Pool (SFP). As shown in Table 3-1, for providing makeup to the RPV and the SFP, the PDP is staged after hour 8 and before the end of hour 10 after event initiation. For the case during an outage where the fuel has been removed from the RPV and placed in the SFP (emergency heat load case) it may be necessary to provide makeup to the SFP within 8.3 hours; i.e., minimum time for the liquid in the SFP to start to boil (Reference 7). The LIP event is over by this time and as shown on Figures 6.5-1, the water levels have receded and will not affect PDP deployment or operation.

6.5.1.2 Pump Staging and Hose Routing Location

Procedure C.5-4201 (Reference 15) shows possible PDP staging locations and hose routing. Only one PDP is deployed. The suction for the PDP can be taken from the Intake or the Discharge Canal. The PDP staging location depends on the selected suction source. Figure 6.5-1 shows potential PDP staging locations and deployment routes six hours into the LIP event. The majority of the deployment routes are relatively dry with the exception of the south side of the Warehouse #6. Adjacent to the south side of Warehouse #6 is a swale with deeper water. As shown on Figure 6.5-1 south of the swale, the water depth is less than 9 inches and will not preclude deployment.

Figure 6.5-1 PDP Deployment Routes and Staging Locations (water elevations shown are at 4 hours)



6.5.1.3 Connection Locations

The PDP can be connected to one of the following locations to provide makeup to the RPV and SFP:

1. RHRSW-68 via Turbine Building North Route
2. Fire System at 12 Cooling Tower
3. 'A' RHR Discharge Pipe
4. RHRSW-68 via PAB South Route

The RHRSW-68 connection is at the 931 ft level in the Turbine Building. This connection point is above the accumulated water elevation in the Turbine Building. Thus, the LIP will not affect access to this connection point.

The Fire System connection at 12 Cooling Tower is located outside. As shown in Section 6.1, the LIP is essentially over after 6 hours and the waters have receded. The PDP is deployed after six hours and this connection point should be available.

The connection to the 'A' RHR Discharge Pipe is at the 896 ft elevation in the Reactor Building. As discussed in Section 6.2.1, above, water volume that could accumulate in the Reactor Building is a small fraction of the available volume. Thus, this connection point will not be affected by the accumulated water volume in the Reactor Building. Thus, the LIP will not affect access to this connection point.

6.5.1.4 Time Validation

MNGP validated the ability to deploy and stage the PDP within the time constraints in Reference 13, Validation Plan No. 1006. The validation plan assumed a start time of 8 hours and showed that the PDP can be staged within the available time constraint. The 8 hours is based on an assumed arrival time for supplemental personnel at 6 hours and includes 2 hours for debris removal. For the LIP event, debris removal is expected to be minimal and deployment should be able to start earlier than 8 hours. The validation also used the most limiting staging location and hose routing options. The 8 hour assumed start time is after the LIP event is over and water has receded from the deployment paths. Thus, the LIP will not affect the time validation for deploying the PDP.

For the SFP emergency heat load case, it may be necessary to provide makeup to the SFP within 8.3 hours; i.e., minimum time for the liquid in the SFP to start to boil. This configuration could exist during an outage. During this condition there are additional supplemental personnel already at the site to support the outage. Using available personnel, the deployment and staging would occur much sooner than 8 hours, but well after the most severe time periods for the LIP. In addition, makeup would only need to be provided to the SFP in lieu of both the RPV and the SFP, which simplifies deployment and operation. Based on these considerations, the LIP will not affect the ability to provide makeup to the SFP within the time constraint.

6.5.2 Deployment of 120 VAC Portable Generator

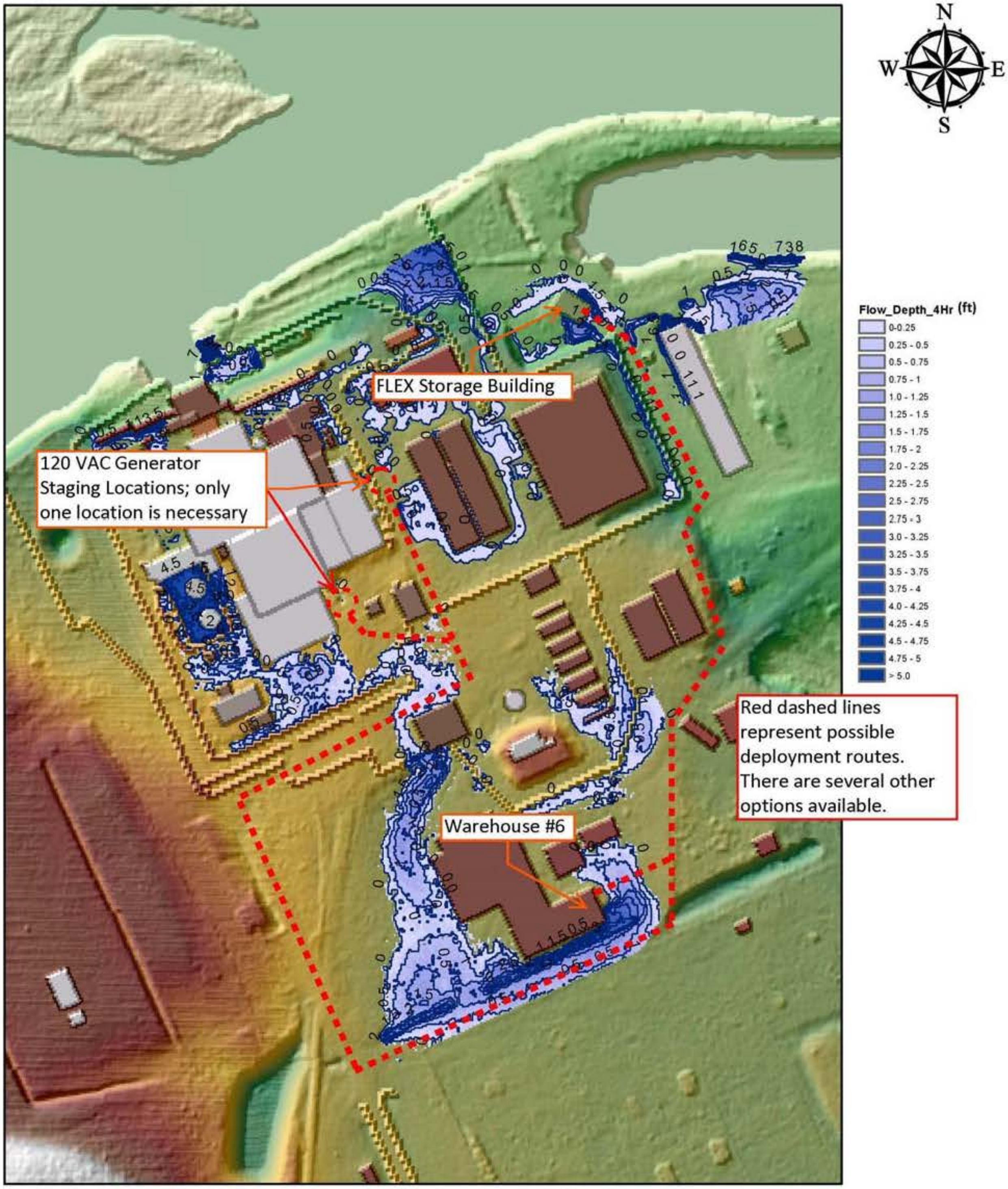
6.5.2.1 Function

The function of the 120 VAC portable generator is to power portable fans to provide forced ventilation for the Battery Room, RCIC Room and Main Control Room. As shown in Table 3-1, the fans are operating to provide forced ventilation for these areas before the end of hour 10 after event initiation. The LIP event is over by this time and as shown on Figure 6.5-2, the water levels have receded and will not affect deployment or operation of the 120 VAC portable generator.

6.5.2.2 Generator Staging and Cable Routing Location

Procedure C.5-4406 (Reference 16) shows possible staging locations for the 120 VAC portable generator. One 120 VAC portable generator is deployed. Figure 6.5-2 shows potential staging locations and deployment routes for the 120 VAC portable generator six hours into the LIP event. The majority of the deployment routes are relatively dry with the exception of the south side of the Warehouse #6. Adjacent to the south side of Warehouse #6 is a swale with deeper water. As shown on Figure 6.5-2 south of the swale, the water depth is less than 9 inches and will not preclude deployment.

Figure 6.5-2 120 VAC Generator Deployment Routes and Staging Locations (water elevations shown are at 4 hours)



6.5.2.3 Connection Locations

The 120 VAC Generator is used to provide power to portable fans to provide cooling for Battery Chargers, the RCIC Room, and the Main Control Room.

To provide cooling to the Division I Battery Chargers, a portable fan is placed outside the Division I 250V Battery Room at elevation 928 ft in the PAB (Reference 17). Water that enters the PAB during the LIP accumulates at the 928 ft elevation. As discussed in Section 6.2.1, the water depth at the 928 ft elevation in the PAB is approximately 3 in. A portable fan can be staged above this elevation such it would not be affected by the LIP. It is noted that the placement of the portable fan is based on which battery charger(s) is powered – Refer to Section 6.5.3. If the battery chargers in the EFT are powered, then this fan is not necessary.

To provide cooling to the Division 2 Battery Chargers, a portable fan is placed outside the Division II 250V Battery Room at elevation 932 ft in the EFT Building (Reference 18). This is above the LIP maximum surface elevation and water does not enter the EFT Building during a LIP. Therefore, operation of this fan will not be affected by the LIP.

To provide cooling to the RCIC Room, the portable fan is placed at elevation 935 ft in the Reactor Building and flexible ducting is lowered to the RCIC Room (Reference 19). The power cord from the 120 VAC Generator to the portable fan is routed through Doors 45/46. As shown in Table 6.1-2, the water level has receded below the elevation of Doors 45/46 within 36 minutes. This is well before the portable fan, ductwork, and power cord would be staged. Therefore, operation of this fan will not be affected by the LIP.

To provide cooling to the Main Control Room, a portable fan is placed outside the PAB entrance and flexible ductwork is routed to the Main Control Room (Reference 17). The elevation of the PAB entrance is above the maximum water surface elevation for the LIP. Therefore, operation of this fan will not be affected by the LIP.

6.5.2.4 Time Validation

MNGP validated the ability to deploy and stage the 120 VAC Generator within the time constraints in Reference 13, Validation Plan No. 1008. The validation showed that the total time to establish cooling was 36 minutes compared to a success criteria of 1 hour. The validation also used the most limiting staging location, fan placement, duct routing, and cable routing options. The ability to initiate the actions to deploy the 120 VAC Generator need to consider an assumed arrival time for supplemental personnel at 6 hours and time for debris removal; 2 hours has been used for other FLEX scenarios for debris removal. For the LIP event, debris removal is expected to be minimal and deployment should be able to start earlier than 8 hours. The 8 hour assumed start time is after the LIP event is over and water has receded from the deployment paths. With the conservative 8 hour start time, cooling will be established within the available time constraint. Thus, the LIP will not affect the time validation for deploying the PDP.

6.5.3 Deployment of 480 VAC Portable Diesel Generator

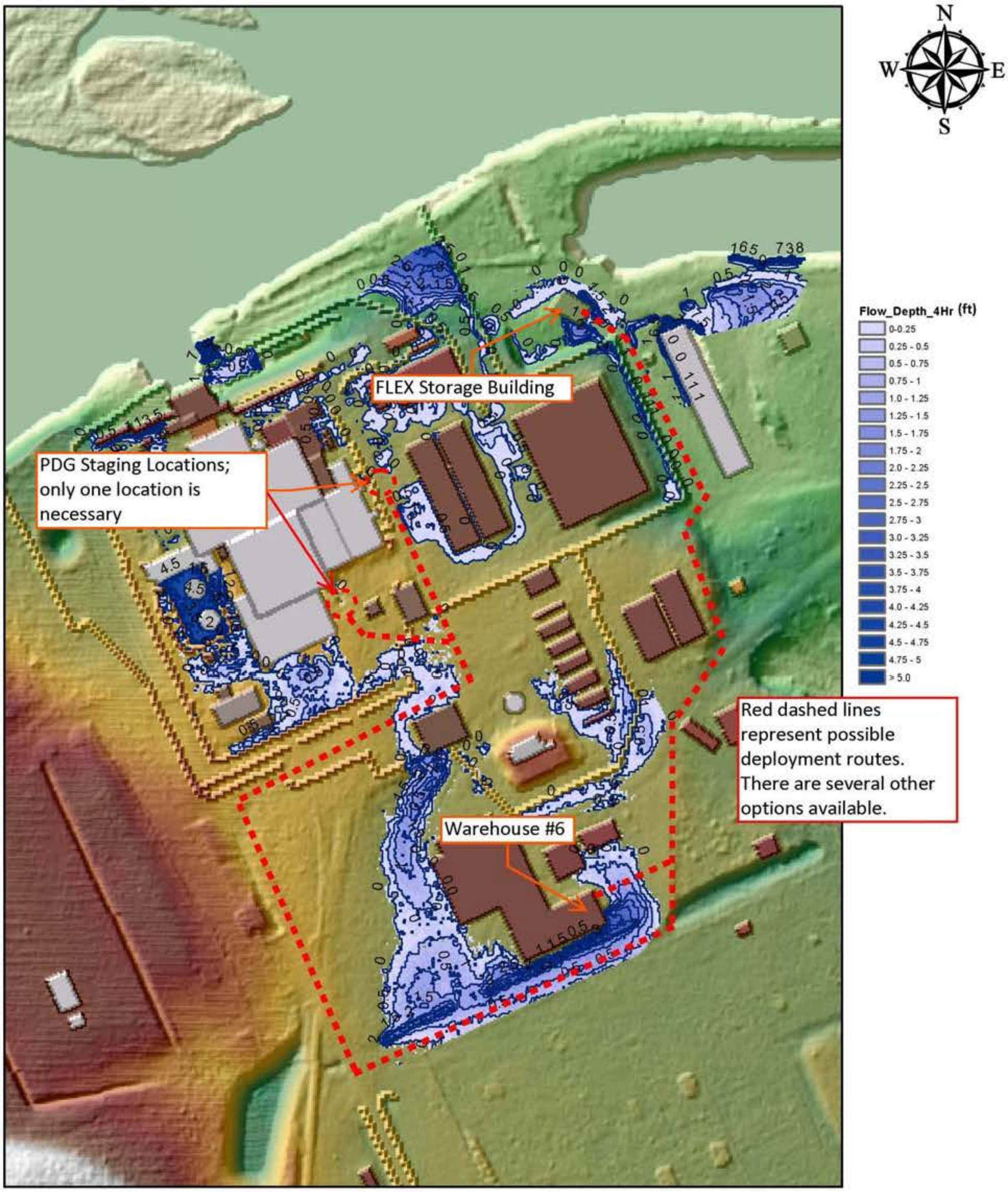
6.5.3.1 Function

The function of the 480 VAC Portable Diesel Generator (PDG) is to repower the Battery Chargers to charge the Batteries. As shown in Table 3-1, the Battery Chargers are energized no later than 11 hours after event initiation. The LIP event is over by this time and as shown on Figure 6.5-3, the water levels have receded and will not affect deployment or operation of the PDG.

6.5.3.2 Generator Staging and Cable Routing Location

Procedure (Reference 14) shows possible staging locations for the 480 VAC PDG. Only one PDG is deployed. Figure 6.5-3 shows potential staging locations and deployment routes for the PDG six hours into the LIP event. The majority of the deployment routes are relatively dry with the exception of the south side of the Warehouse #6. Adjacent to the south side of Warehouse #6 is a swale with deeper water. As shown on Figure 6.5-3 south of the swale, the water depth is 9 inches or less and will not preclude deployment.

Figure 6.5-3 PDG Deployment Routes and Staging Locations (water elevations shown are at 4 hours)



6.5.3.3 Connection Locations

The PDG can be connected to one of the following locations to power battery chargers or other components (Reference 20).

1. Repower D52, Charger, D3A (13) and D54, Swing Charger, D3A, D3B (13) Battery
2. Repower D10, 125 VDC Charger for #11 Battery
3. Repower D70, Charger, D16B, and D90, Charger Swing D6A
4. Repower D20, 125 VDC Charger for #12 Battery

The connections for Battery Chargers D70 and D90 are located in the Division II 250 VDC Battery Room; which is located at 932 ft elevation in the EFT Building. Water does not enter the EFT Building during a LIP. Thus, the LIP will not affect making this connection.

The connections for Battery Chargers D52 and D54 are located in the Division I 250 VDC Battery Room. The connection for Battery Charger D10 is in the Division I 125 VDC Battery Room. The connection for Battery Charger D20 is in the Division II 125 VDC Battery Room. All of these connections are located at the 928 ft elevation in the PAB. Water that enters the PAB during the LIP accumulates at the 928 ft elevation. As discussed in Section 6.2.1, the water depth at the 928 ft elevation in the PAB is approximately 3 in. The connections to the Battery Chargers are above the accumulated water depth.

It is noted that, due to water accumulation at the PAB 928 ft elevation it may be desirable to make the connection in the EFT which is unaffected by the LIP.

6.5.3.4 Time Validation

MNGP validated the ability to deploy and stage the PDG within the time constraints in Reference 13, Validation Plan No. 1005. The validation plan assumed a start time of 8 hours and showed that the PDG can be staged within the available time constraint; i.e., a total deployment of time of 9 hour 35 minutes compared to time constraint of 11 hours. The 8 hours is based on an assumed arrival time for supplemental personnel at 6 hours and includes 2 hours for debris removal. For the LIP event, debris removal is expected to be minimal and deployment should be able to start earlier than 8 hours. Furthermore, the 8 hour assumed start time is after the LIP event is over and water has receded from the deployment paths. The validation also used the most limiting staging location and cable routing options. Thus, the LIP will not affect the time validation for deploying the PDG.

6.5.4 Debris Removal

In support of implementation of FLEX strategies, debris removal is assessed in Reference 21. For debris removal, the plant maintains a front end-loader and a Freightliner truck with a plow; one is stored at each FLEX Building location.

Regarding timing of debris removal (for any external event), Reference 21 states:

> "Based on the type of debris expected it is reasonable to consider that a deployment path can be cleared within two hours. Minor debris such as building materials, tree limbs, and fencing can be removed within a 2 hour period by use of the Freightliner truck with chains and plow along one of the many deployment path options leading to the main security entrance as well.

For the LIP event significant debris is not expected. The deployment paths from Warehouse #6 are paved and level; thus erosion is not expected. Portions of the deployment path the FLEX Storage Building to the Protected Area are not paved and areas are sloped. These unpaved sloped areas could experience erosion due to the LIP. These paths would be assessed as part of Reference 14. Any debris removal and minor erosion repair due to the LIP are well within the capability of either the front end-loader or the Freightliner truck.

6.5.5 Operation of Portable Equipment

The evaluation of the operation of portable equipment considers the equipment qualifications and the conditions for the personnel operating the equipment. Per Sections 6.5.1 through 6.5.3, above, the portable equipment is expected to be available at approximately 10 hours. Per Table 6.1-1, at 6 hours, the LIP event is essentially over. The heaviest precipitation has passed; however, there could be some lingering relatively light precipitation. In the event that the portable equipment is staged and available prior to 6 hours, then per Table 6.1-1, the precipitation rate is approximately 1.4 inches/hour. The equipment and personnel supporting the equipment are evaluated based on this higher precipitation rate.

The procurement specifications (Reference 22) for the portable equipment include the following requirement for the equipment:

> "The engine and generator shall also be capable of starting and continuous operation regardless of external weather conditions (e.g., rain, snow, sleet, ice, wind, high solar radiation, high humidity, etc.). Support system enclosures shall provide protection from these elements and shall be permanently affixed to the unit (e.g., NEMA 4X cabinet for controls)."

When necessary to check on the portable equipment, personnel would use protective clothing as necessary.

6.6 Conclusions and Summary

The above evaluation demonstrates that the current FLEX strategies can be implemented during a LIP without changes. Therefore, consistent with NEI 12-06 (Reference 4), Section G.4.1, the existing FLEX strategies can be implemented for the LIP as designed and no further actions are necessary.

7. References

1. U.S. Nuclear Regulatory Commission Letter, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident;" dated March 12, 2012.

2. NSPM Letter L-M-16-024 to the U.S. Nuclear Regulatory Commission, "Monticello Nuclear Generating Plant, Units 1 and 2, Response to March 12, 2012 Request for Information Enclosure 2, Recommendation 2.1, Flooding, Required Response 2, Flooding Hazard Reevaluation Report," dated May 12, 2016, (ADAMS Accession No. ML16145A233).

3. U.S. Nuclear Regulatory Commission Letter, "Coordination of Requests for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events," dated September 1, 2015.

4. Nuclear Energy Institute (NEI), Report NEI 12-06, Rev 2, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," dated December 2015.

5. U.S. Nuclear Regulatory Commission, Revision to JLD-ISG-2012-01, Revision 1, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design-Basis External Events," dated January 22, 2016, (ADAMS Accession No. ML15357A163).

6. NSPM, "Monticello Updated Safety Analysis Report," Section 2.2, "Site Description", Revision 26, and Section 2.4, "Hydrology," Revision 32.

7. NSPM, FLEX, "Diverse and Flexible Coping Strategies Coping Strategies (FLEX) Program Document," Revision 1.

8. U.S. Nuclear Regulatory Commission, Letter to Peter A. Gardner, Northern States Power Company – Minnesota, "Subject: Monticello Nuclear Generator Plant – Interim Staff Response to Reevaluated Flood Hazards Submitted in Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation (CAC Nos. MF7712)," Dated September 16, 2016, (ADAMS Accession No. ML16248A003).

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