UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 11, 2017

Mr. Bryan C. Hanson
President and Chief Nuclear Officer
Exelon Generation Company, LLC
4300 Winfield Rd
Warrenville, IL 60555

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNITS 1 AND 2 – FLOOD HAZARD MITIGATION STRATEGIES ASSESSMENT (CAC NOS. MF7946 AND MF7947)

Dear Mr. Hanson:

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f), "Conditions of Licenses" (hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML111861807).

Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood hazards for their sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A046). Concurrent with the reevaluation of flood hazards, licensees were required to develop and implement mitigating strategies in accordance with NRC Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML12054A735). In order to proceed with implementation of Order EA-12-049, licensees used the current licensing basis flood hazard or the most recent flood hazard information, which may not be based on present-day methodologies and guidance, in the development of their mitigating strategies.

By letter dated December 14, 2016 (ADAMS Accession No. ML16349A029), Exelon Generation Company, Inc. (the licensee) submitted the mitigation strategies assessment (MSA) for Nine Mile Point Nuclear Station, Units 1 and 2 (Nine Mile Point). The MSAs are intended to confirm that licensees have adequately addressed the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events. The purpose of this letter is to provide the NRC's assessment of the Nine Mile Point MSA.

The NRC staff has concluded that the Nine Mile Point MSA was performed consistent with the guidance described in Appendix G of Nuclear Energy Institute 12-06, Revision 2, as endorsed by Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2012-01, Revision 1, and that the licensee has demonstrated that the mitigation strategies are reasonably protected from reevaluated flood hazards conditions for beyond-design-basis external events. This closes out the NRC's efforts associated with CAC Nos. MF7946 and MF7947.

If you have any questions, please contact me at 301-415-6197 or at Tekia.Govan@nrc.gov.

Sincerely,

Lauren Kate Gibson for

Tekia Govan, Project Manager
Hazards Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Enclosure:
Staff Assessment Related to the
Mitigating Strategies for Nine Mile Point

Docket Nos. 50-220 and 50-410

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STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO MITIGATION STRATEGIES FOR

NINE MILE POINT NUCLEAR STATION, UNITS 1 AND 2

AS A RESULT OF THE REEVALUATED FLOODING HAZARD NEAR-TERM TASK FORCE

RECOMMENDATION 2.1- FLOODING CAC NOS. MF7946 AND MF7947

1.0 INTRODUCTION

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f), "Conditions of Licenses" (hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML111861807).

Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood hazards for their sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A046). Concurrent with the reevaluation of flood hazards, licensees were required to develop and implement mitigating strategies in accordance with NRC Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML12054A735). That order requires holders of operating reactor licenses and construction permits issued under 10 CFR Part 50 to modify the plants to provide additional capabilities and defense-in-depth for responding to beyond-design-basis external events, and to submit to the NRC for review a final integrated plan that describes how compliance with the requirements of Attachment 2 of the order was achieved. In order to proceed with implementation of Order EA-12-049, licensees used the current licensing basis flood hazard or the most recent flood hazard information, which may not be based on present-day methodologies and guidance, in the development of their mitigating strategies.

The NRC staff and industry recognized the difficulty in developing and implementing mitigating strategies before completing the reevaluation of flood hazards. The NRC staff described this issue and provided recommendations to the Commission on integrating these related activities in COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flood Hazards," dated November 21, 2014 (ADAMS Accession No. ML14309A256). The Commission issued a staff requirements memorandum on March 30, 2015 (ADAMS Accession No. ML15089A236), affirming that the Commission expects licensees for operating nuclear power plants to address the reevaluated flood hazards, which are considered beyond-design-basis external events, within their mitigating strategies.

Nuclear Energy Institute (NEI) 12-06, Revision 2, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" (ADAMS Accession No. ML16005A625), has been endorsed by the NRC as an appropriate methodology for licensees to perform assessments of the mitigating strategies against the reevaluated flood hazards developed in response to the March 12, 2012, 50.54(f) letter. The guidance in NEI 12-06, Revision 2, and Appendix G in particular, supports the proposed Mitigation of Beyond-Design-Basis Events rulemaking. The NRC's endorsement of NEI 12-06, including exceptions, clarifications, and additions, is described in NRC Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2012-01, Revision 1, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML15357A163). Therefore, Appendix G of NEI 12-06, Revision 2, describes acceptable methods for demonstrating that the reevaluated flooding hazard is addressed within the Nine Mile Point Nuclear Station, Units 1 and 2 (Nine Mile Point) mitigating strategies for beyond-design-basis external events.

2.0 BACKGROUND

By letter dated November 4, 2015 (ADAMS Accession No. ML15306A502), the NRC issued a supplement to its staff assessment letter for Nine Mile Point. The supplement letter provided the reevaluated flood hazard mechanisms that exceeded the current design basis (CDB) for Nine Mile Point and parameters that are a suitable input for the mitigating strategies assessment (MSA). For Nine Mile Point, the mechanism listed as not bounded by the CDB is local intense precipitation (LIP). By letter dated December 14, 2016 (ADAMS Accession No. ML16349A029), Exelon Generation Company, Inc. (the licensee) submitted the Nine Mile Point MSA for review by the NRC staff.

By e-mail dated August 29, 2017 (ADAMS Accession No. ML17241A270), the licensee submitted a response to a request for additional information (RAI) that addressed apparent discrepancies in warning time between the MSA and the Focused Evaluation (FE), which was submitted by letter dated March 10, 2017 (ADAMS Accession No. ML17069A005). The NRC staff considered the RAI response in the evaluation below.

3.0 TECHNICAL EVALUATION

3.1 Mitigating Strategies under Order EA-12-049

The NRC staff evaluated Nine Mile Point's FLEX strategies as developed and implemented under Order EA-12-049. The Nine Mile Point, Unit 1 Final Integrated Plan (FIP), "Nine Mile Point Nuclear Station, Unit 1, Report of Full Compliance with March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," was submitted to the NRC by letter dated June 8, 2015 (ADAMS Accession No. ML15163A097). The Nine Mile Point Unit 2 FIP, "Nine Mile Point Nuclear Station, Unit 2, Report of Full Compliance with March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," was submitted to the NRC by letters dated July 1, 2016 (ADAMS Accession Nos. ML16188A265 and ML16188A271, respectively). These evaluations were documented in the NRC staff's safety evaluation issued by letter dated January 31, 2017 (ADAMS Accession No. ML17009A141).

The safety evaluation concluded that the licensee has developed guidance and proposed designs which if implemented appropriately will adequately address the requirements of Orders EA-12-049 and EA-12-051.

3.2 Nine Mile Point's FLEX Strategies

A brief summary of Nine Mile Point's FLEX strategies are listed below:

Nine Mile Point Unit 1

- For Phase 1, the emergency cooling (EC) system is manually initiated at the beginning of the ELAP [extended loss of alternating current (ac) power] event to remove decay heat and condense steam from the reactor pressure vessel (RPV) to control reactor pressure. Station batteries provide power for the EC operation and for maintaining key reactor and containment instrumentation. Direct current (dc) load shed is performed within the first hour of the ELAP event to extend the life of the station batteries.

- For Phase 2, FLEX equipment is deployed from the FLEX storage building and staged to support various FLEX strategies. The FLEX diesel driven pumps provide makeup water to the EC system, RPV, and spent fuel pool (SFP). Makeup water to the FLEX diesel driven pumps is provided by the Lake Ontario through the screen house, which serves as the site's ultimate heat sink (UHS). The FLEX diesel generators (DGs) provide power to the station battery chargers and other selected loads to maintain key plant instrumentation and other equipment needed for FLEX.

- For Phase 3, the equipment from the national SAFER [Strategic Alliance of FLEX Emergency Response] response center (NSRC) will be available on site as backup equipment for the Phase 2 FLEX equipment.

Nine Mile Point Unit 2

- For Phase 1, the reactor core isolation cooling (RCIC) system automatically initiates after the ELAP event and takes suction from the Suppression pool to provide core cooling and reactor makeup. The safety relief valves (SRVs) control the reactor pressure. The station batteries power the RCIC and SRVs as well as the key reactor and containment instruments. The dc load shed is performed within the first hour of the ELAP event to extend the life of the station batteries.

- For Phase 2, FLEX equipment is deployed from the FLEX storage building and staged to support various FLEX strategies. The FLEX diesel driven pumps provide makeup water to suppression pool, RPV, and SFP. Makeup water to the FLEX diesel driven pumps is provided by two installed dry hydrants that are connected to the UHS. The FLEX DG provides power to the station battery chargers and other selected loads to maintain key plant instrumentation and other equipment needed for FLEX.

- For Phase 3, the equipment from the NSRC will be available on site as backup equipment for the Phase 2 FLEX equipment.

3.3 NRC's Evaluation

3.3.1 Evaluation of Current FLEX Strategies Against Reevaluated Hazard(s)

In its MSA, the licensee stated that, "the FLEX design basis flood level was selected with knowledge of the reevaluated flood hazard, and, therefore, was established to bound the MSFHI [mitigating strategies flood hazard information]." Local Intense Precipitation is the only mechanism that exceeded the CDB, and the reevaluated hazard level of 262.2 feet (ft.) (Unit 1) and 262.4 ft. (Unit 2) was used as the basis for designing the FLEX mitigating strategies.

The NRC staff reviewed the information provided by the licensee in the MSA, along with the information provided in the FIP that confirmed the FLEX design-basis flood. The NRC staff confirmed that the water surface elevation reported in the MSA matches the value in the supplement to staff assessment of the licensee's flood hazard reevaluation report. NRC staff also evaluated if the reevaluated LIP hazard impacted any of the storage location(s) of FLEX equipment, any staging areas, haul paths, connection points, activities, etc. In its FIP, the licensee states that LIP would not prevent the FLEX strategies from being implemented if the planned flooding protection measures were implemented. Therefore, the NRC evaluated the planned flooding protection measures as described below.

3.3.2 Evaluation of Nine Mile Point's Flood Protection Features

The Nine Mile Point Flood Hazard Reevaluation Report (FHRR), "Response to March 12, 2012 Request for Information Enclosure 2, Recommendation 2.1, Flooding, Required Response 2, Flooding Hazard Reevaluation Report," (ADAMS Accession No. ML130740943) indicated that the LIP flooding event exceeded the current flood elevation for Nine Mile Point, Units 1 and 2 and required evaluation of the FLEX strategies and flood protection features in the MSA. Further evaluation of the LIP is below.

LIP Flood

Section 4 of the Nine Mile Point MSA described the reevaluated LIP as a maximum flood height of 262.2 ft. for Nine Mile Point, Unit 1 and 262.4 ft. for Nine Mile Point, Unit 2. The Nine Mile Point site building grade elevation is 261 ft. The licensee identified Nine Mile Point, Unit 1 DG rollup door as the area where the maximum LIP flood height will exceed the door threshold elevation. For Nine Mile Point, Unit 2, the southeast corner of the DG building is the area where the maximum LIP flood height will exceed the door threshold elevation. To divert the LIP water from the power block for Nine Mile Point, the licensee upgraded the existing severe weather procedures for both Nine Mile Point, Unit 1 and Nine Mile Point, Unit 2 to include warning time triggers and actions for deployment of temporary flood barriers.

To develop the warning time based upon the LIP flooding event at Nine Mile Point, the licensee used guidance from NEI 15-05, "Warning Time for Local Intense Precipitation Events," Revision 6, April 8, 2015 (ADAMS Accession No. ML15104A158)," to model the consequential flooding rainfall on the Nine Mile Point site. The NRC-endorsed white paper is based upon the NEI 15-05 guidance, which provides parameters for establishing warning time into site procedures using information from relevant forecasting methods, triggering points, and site specific operator actions. In its August 2017 RAI response, the licensee explains that, in the time since the MSA was submitted, there has been a change in understanding of the available warning time from the third party rainfall forecasting vendor. The MSA submittal states the licensee would need 6.5 hours to install the flood barriers and would get sufficient warning time

to do so. The FE discusses the possibility that the warning time may be less than the 6.5 hours. In its FE, the licensee commits to performing additional analysis of consequential rainfall, and, if needed, to enhance site procedures. The licensee states in its RAI response that those commitments are applicable to the information in the MSA. The licensee will continue to use the guidance in NEI 15-05.

Furthermore, the licensee states in its RAI response that "NMP's key safety functions can be maintained during the LIP flood with installed equipment even without the temporary barriers in place or with the temporary barriers installed with limited or no warning time." Therefore, the NRC considered both a situation in which warning time was sufficient to place the barriers and one in which it was not.

Temporary Barriers Deployed

The FLEX storage buildings are at an elevation of 263.3 ft., which is higher than the reevaluated LIP flood height for both units. The installation of the temporary flood barriers throughout the Nine Mile Point site will divert the LIP flood water away from the power block for both Nine Mile Point units, and allow for normal deployment of FLEX equipment when needed. As described in the Nine Mile Point FIPs, the reactor building, the DG building, and control building have watertight penetration sleeves for the exterior wall penetrations.

Underground cables are protected from flooding by being housed in watertight conduits, which are enclosed in reinforced concrete encasements to form electrical duct lines. As electrical duct lines enter the reactor building, DG building, and control building, the joints of the electrical duct lines are provided with water stops to prevent in-leakage of the design-basis groundwater or floodwater into the buildings.

Temporary Barriers Not Deployed

The license states that the ingress calculations for Unit 1 show no significant water buildup at the ground elevation (261 ft.) where the Safe Shutdown Equipment is located. Water may build up at a lower elevation (250 ft.) with an average depth of 31 inches. However, this would not affect safe shutdown equipment. There is 8.5 ft of available physical margin before reaching the floor elevation of the area where the safe shutdown equipment is located.

If the barriers are not able to be deployed, then water ingress would occur in Unit 2's Control Building and Electrical Tunnels (Unit 1 would not be affected). The water ingress calculations are based on the original 2013 FHRR LIP results, prior to the more conservative roof runoff modeling approach. (A sensitivity analysis showed only minimal changes in the flood depth that could affect the Control Building and Electrical Tunnels.) The licensee states that the internal flooding would rise to an elevation of approximately 225 ft., and that there is no safe shutdown equipment located below 261 ft. Therefore, the NRC agrees that the key safety functions would not be affected.

The licensee further notes in its RAI response, that there are two doors that require temporary barriers in order to implement FLEX by installing cables and hoses. However, those temporary barriers can be installed after rainfall has begun with no impact to the FLEX implementation.

Conclusion

The NRC staff reviewed the licensee's assessment of the reevaluated LIP event against the existing FLEX strategies and flood protection features as described in the NRC staff's safety evaluation and the Nine Mile Point FIP. The FLEX equipment stored in the FLEX storage buildings are protected from the LIP flood water due to the buildings having a higher floor elevation than the maximum LIP flood height. The NRC staff finds that the licensee's use of the NRC-approved NEI guidance for establishing warning time for LIP events is acceptable and acknowledges the commitments to modify the severe weather procedures to incorporate a warning time to deploy the temporary flood barriers before the predicted LIP rainfall. Until the revised warning time is established, the NRC finds that the water ingress without the barriers would not affect the safe shutdown equipment. Furthermore, the NRC staff found that, if they are able to be deployed, the proposed flood protection features would be sufficient for protecting against negligible water inundation near the reactor building, DG building, and control building due to the temporary flood barriers diverting the LIP flood water away from those areas. The NRC staff concludes that the licensee appears to have adequately assessed the mitigating strategies flood hazard for the LIP flood event and that the applicable FLEX strategies can be implemented, as described in the Nine Mile Point FIPs.

3.3.3 Confirmation of the Flood Hazard Elevations in the MSA

The NRC staff noted in the supplement to its staff assessment of the Nine Mile Point FHRR that the model used to develop the LIP flood-causing mechanism incorrectly simulated roof runoff. This is due to use of the 2009 version of the FLO-2D (two dimensional) model, which does not correctly account for runoff from building roofs. In the Nine Mile Point MSA, the licensee provided a sensitivity analysis for different rainfall durations (e.g., 1-hour, 6-hours, and 72 hours) using a new version of the FLO-2D model, Build No. 14.03.078 (FLO-2D, 2014), that simulated roof runoff correctly. As part of the sensitivity analysis, the licensee demonstrated that the maximum water surface elevations simulated with the new version of the model are nearly identical to the Nine Mile Point FHRR values. The NRC staff reviewed the Nine Mile Point MSA and input/output files associated with the new FLO-2D model and determined that the licensee's methods and results are reasonable for use in the MSA. The NRC staff compared the LIP flood elevations in the sensitivity analysis' new FLO-2D model input/output files with the LIP reevaluated flood hazard elevations in the supplement to the NRC Nine Mile Point staff assessment. The NRC staff agrees with the licensee that the roof runoff does not significantly increase the LIP flood elevation adjacent to buildings at the Nine Mile Point site. The NRC staff reviewed the flood hazard elevations in the Nine Mile Point MSA and confirmed that the elevations match the values in the supplement to the staff assessment of the licensee's FHRR.

3.3.4 Evaluation of Associated Effects

The NRC staff reviewed the information provided in Nine Mile Point MSA regarding the associated effects parameters need to perform the additional assessments of plant response for flood hazards not bounded by the CDB. The associated effects parameters not directly associated with water surface elevation are discussed below and are summarized in Table 3.3-1 of this staff assessment.

For the LIP flood-causing mechanism, the licensee concluded in the Nine Mile Point MSA that the associated effects parameters related to water-borne loads, including hydrostatic, hydrodynamic, debris, and sediment loads, would induce minimal impacts to plant operations due to the low water depths and slow velocities. The licensee also concluded that other

associated effects, including sediment deposition and erosion, concurrence site conditions, and effects on groundwater intrusion are minimal at the plant site. The licensee estimated the water depths and velocities using FLO-2D model. The NRC staff reviewed the FLO-2D model and input/output files and noted that the flow depths and velocities used to estimate the associated effects parameters are small enough to create minimal associated effects on the plant operations. Correspondingly, the NRC staff determine that the licensee's assessment of the associated effects parameters for the LIP flood-causing mechanism are acceptable for use in the Nine Mile Point MSA.

The NRC staff determined that the licensee-provided associated effects parameters for the LIP flood-causing mechanism are acceptable as the approach to estimate these parameters is consistent with the guideline provided by Appendix G of NEI 12-06, Revision 2.

3.3.5 Evaluation of Flood Event Duration

The NRC staff reviewed information provided by the licensee in its MSA regarding the flood event duration (FED) parameters needed to perform the MSA for flood hazards not bounded by the CDB. The FED parameters for the flood-causing mechanisms not bounded by the CDB are summarized in Table 3.3-2 of this staff assessment.

The Nine Mile Point MSA provides the periods of inundation of 19 hours and 20 hours for Nine Mile Point, Unit 1 and Nine Mile Point, Unit 2, respectively, and the period of recession of 32.5 hours for both units. The licensee used the FLO-2D model described in the Nine Mile Point MSA to determine these inundation and recession periods. The NRC staff reviewed the licensee's LIP FLO-2D model during its review of the Nine Mile Point MSA and concluded that the licensee's modeling and the estimation of the FED parameters are acceptable for use in the Nine Mile Point MSA, as they used present-day methodologies and regulatory guidance.

The NRC staff determined that the licensee-provided FED parameters for the LIP flood-causing mechanism are acceptable as the approach to estimate these parameters is consistent with the guideline provided by Appendix G of NEI 12-06, Revision 2.

The sensitivity analysis discussed in Section 3.3.3 showed that, with the revised simulated roof runoff, the duration of flooding above the plant's finished floor elevation approximately doubles. The licensee did not use these revised flood event durations in its MSA; however, given the actual resulting elevations, a longer duration would not have an effect on implementing the mitigating strategies for the reasons discussed in Section 3.3.2. As the licensee proceeds with the analyses discussed in the commitments, the NRC anticipates that the licensee will continue to use an approach to estimate these parameters that is consistent with that provided by Appendix G of NEI 12-06, Revision 2.

4.0 COMMITMENTS

The NRC acknowledges the following regulatory commitments as expressed in the FE submittal and the RAI response.

Commitment 1. Perform an analysis to more accurately define the consequential rainfall estimate using the existing FLO-2D model. (Commitment date 12/31/2017)

Commitment 2. As an optional task, if the consequential rainfall is determined to be low, a site-specific evaluation of storm types and seasonality will be conducted to determine the types of storms that could produce consequential rainfall and the meteorological parameters that could produce such events. This step may not be required if the consequential rainfall is sufficiently large to use available NWS and/or meteorological vendor tools and provide the necessary 6.5 hours of warning time (Commitment date 12/31/2017)

Commitment 3. Enhance site procedures to better define a monitoring threshold for longer forecasting periods (3 to 7 days) and the action trigger (per NEI 15-05) Based on the results of the above actions, existing site severe weather procedures will be updated and/or the meteorological vendor contract will be modified to incorporate the monitoring threshold and action trigger. (Commitment date 06/30/2018)

Commitment 4. Modify the flood protection strategy if severe weather procedure enhancements and/or NWS/meteorological vendor contract forecast periods are determined not to be viable once the consequential rainfall and meteorological assessments described in Commitment Nos. 1 and 2 above are complete. (Commitment date 06/30/2018)

4.0 CONCLUSION

The NRC staff has reviewed the information provided in the Nine Mile Point MSA related to the original FLEX strategies, as evaluated against the reevaluated LIP hazard described in Section 3.3 of this staff assessment, and found that the licensee has adequately assessed the mitigation strategies flood hazard for the reevaluated LIP flood event to determine that the FLEX strategy can be implemented as currently designed. The NRC staff made its determination based upon:

- The available physical margin between the expected interior flood levels and the key structures, systems of components or credited FLEX equipment;
- The FLEX storage buildings having a higher floor elevation than the maximum LIP flood height for both units; and
- The existing flood protection features for the wall penetrations and underground cables for the reactor building, DG building, and control building to protect from any remaining flood water inundation on the Nine Mile Point site.

Therefore, the NRC staff concludes that the licensee has demonstrated the capability to deploy the original FLEX strategies, as designed, against a postulated beyond-design-basis event for the LIP, including associated effects and flood event duration, as described in NEI 12-06, Revision 2 and ISG-2012-01, Revision 1.

TABLE 3.3-1. ASSOCIATED EFFECTS PARAMETERS NOT DIRECTLY ASSOCIATED WITH TOTAL WATER HEIGHT FOR FLOOD-CAUSING MECHANISMS NOT BOUNDED BY THE CDB.

Associated Effects Factor	Local Intense Precipitation [1]
Hydrodynamic loading at plant grade	Minimal
Debris loading at plant grade	Minimal
Sediment loading at plant grade	Minimal
Sediment deposition and erosion	Minimal
Concurrent Conditions, including adverse weather	Minimal
Groundwater ingress	Minimal
Other pertinent factors (e.g., waterborne projectiles)	Minimal

1. Information provided in Nine Mile Point MSA Table 1

Table 3.3-2. Flood Event Durations for Flood-Causing Mechanisms Not Bounded by the CDB

Flood-Causing Mechanism	Time Available for Preparation for Flood Event	Duration of Inundation of Site	Time for Water to Recede from Site
Local Intense Precipitation and Associated Drainage	Use of NEI 15-05 Guidance	19 hrs for Unit 1, 20 hrs for Unit 2	32.5 hrs

Source: from Nine Mile Point MSA. This does not include information from the 2014 Sensitivity Study that accounted for the corrected roof runoff in FLO-2D.

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNITS 1 AND 2 – FLOOD HAZARD MITIGATION STRATEGIES ASSESSMENT (CAC NOS. MF7946 AND MF7947) DATED SEPTEMBER 11, 2017

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