NRC Pre-Submittal Meeting
Proposed Request for Licensing Action Perry Flood Hazards

February 16, 2021

energy harbor

Presentation Agenda

- Introductions
- Meeting Purpose
  - Site Design Basis External Flood Hazard Reconstitution direction and scope of License Amendment Request
- Topics for today's discussion
  - History
  - Flood Hazards
  - Proposed Licensing Action Scope
  - Requested Licensing Action

Energy Harbor Representatives

- Stan Gorski, Manager – Strategic Engineering
- Dan Lieb, Acting Manager – Design Engineering
- Phil Lashley, Manager – Fleet Licensing
- Mark Mlachak, Manager – Fleet Oversight
- Jeremy Schudel, Supervisor – Design Engineering
- Kathy Nevins, Fleet Licensing
- Mark Bensi, Design Engineering

History

March 12, 2012; NRC Issues 50.54(f) letter

April 11, 2013; Prompt Functionality Assessment Condition Report 2013-05625,
Updated by CR 2015-05079 and 2015-08036

March 10, 2015; Rev. 0 Flood Hazard Re-evaluation Report (FHRR) Submitted

November 3, 2015; New Diversion Channel and Stream Modifications, Field Implemented

March 24, 2016; Rev. 1 Flood Hazard Re-evaluation Report Submitted

July 25, 2016; NRC Interim Staff Response – Flood Hazard Re-evaluation Report Audit

July 25, 2017; Submittal to NRC of Mitigating Strategies Assessment Summary Document

April 25, 2018
Notification of Permanent Cessation of Power Operations, PNPP Flooding Project Suspended

December 7, 2018
PNPP Submitted Request to defer remaining flooding actions

February 19,2019
RAIs received from NRC on deferral request

March 20,2019
RAI Responses provided with two commitments

May 6,2019
Deferral Request Accepted

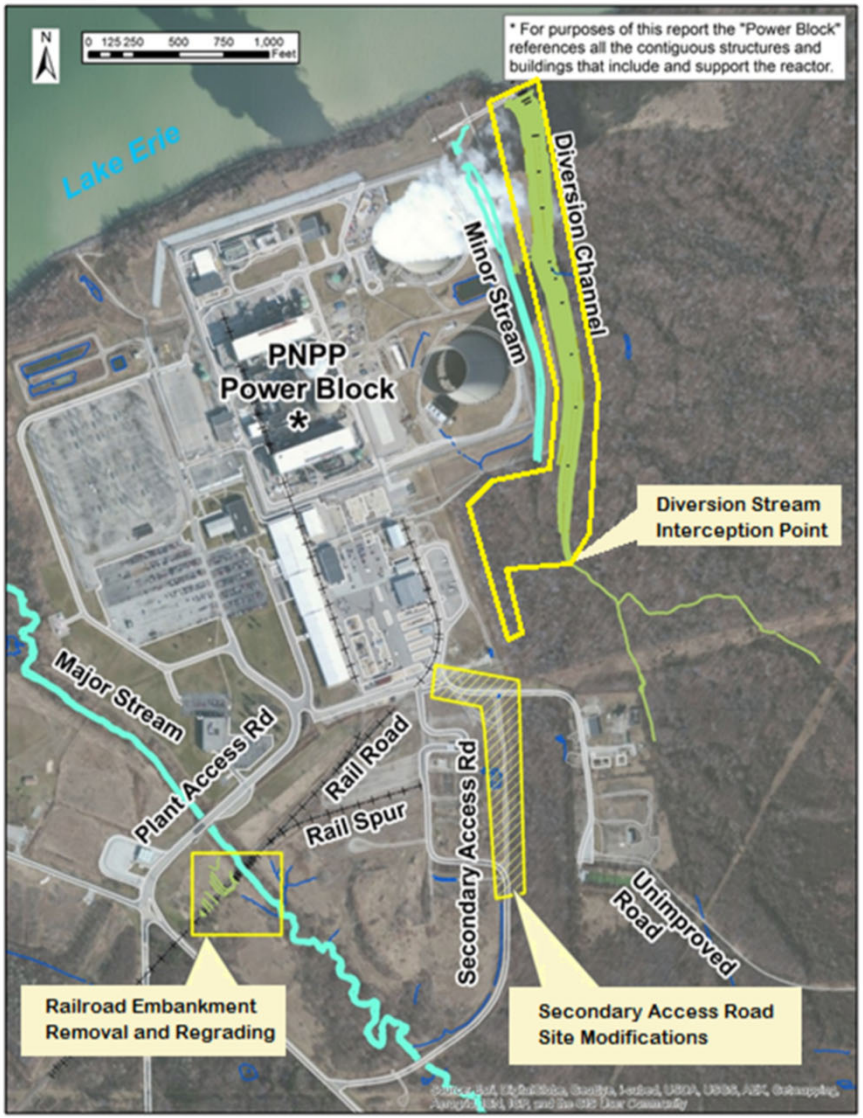
July 26,2019
Cessation Letter Withdrawn
Flooding Project Restarted

November 18, 2019
Perry Flooding Focused Evaluation Submitted

May 7, 2020
50.54(f) Letter Actions Closed (Based on planned actions described in FE)

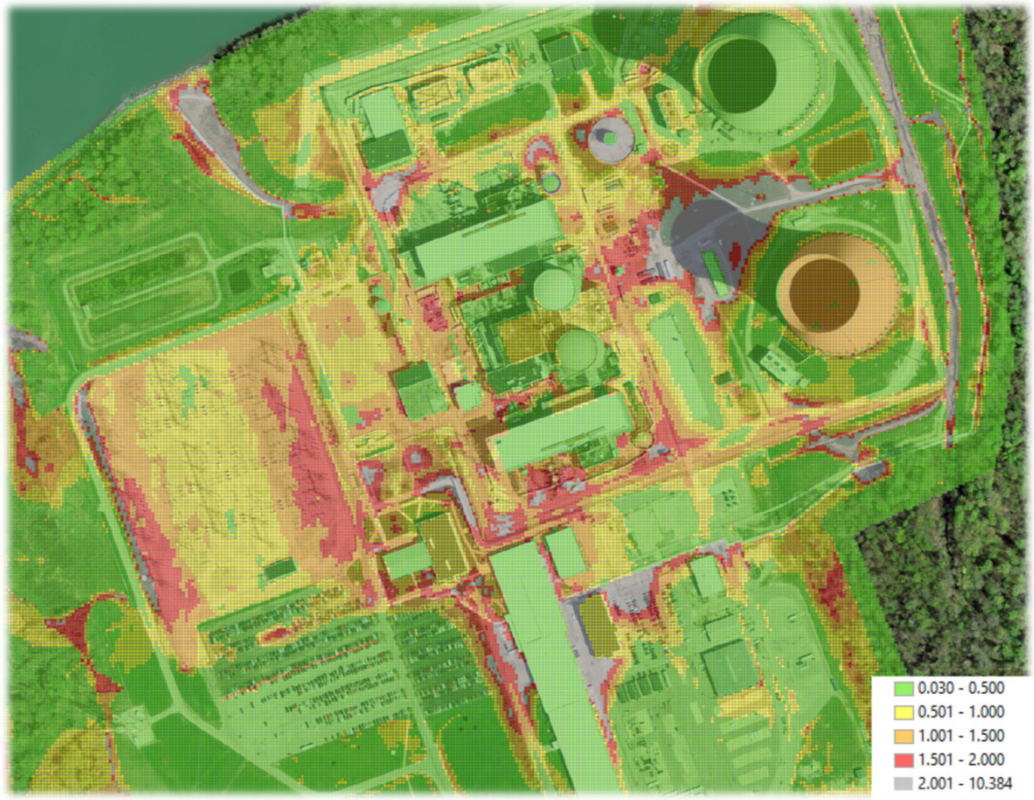
Flood Hazards

- Dam Breaches and Failures
  - No traditional dams in Perry watershed
- Storm Surge and Seiche
  - Passively protected by bluff height
- Tsunami – N/A
- Ice-Induced Flooding – N/A,
  - High bluffs, stream ice blockage bounded by all-season event
- Channel Migration or Diversion – N/A
  - No cooling water channels exist
- Flooding in Streams and Rivers
  - New diversion channel installed
  - Railroad embankment removed for major stream
  - Secondary access road raised
  - PMF streamflow stay within streams' drainage basins
- Local Intense Precipitation (LIP)
  - Reevaluation of LIP shows the LIP event is controlling



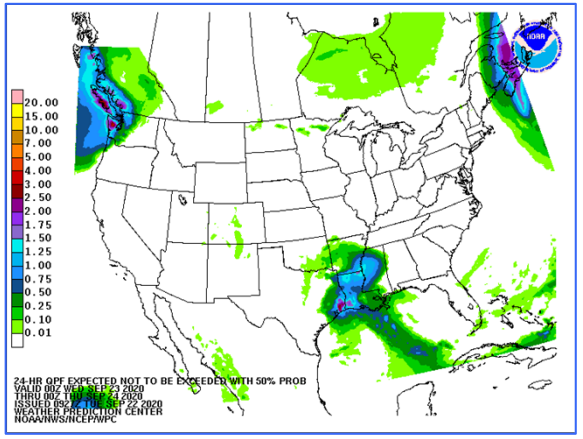
Proposed Request for Licensing Action Scope

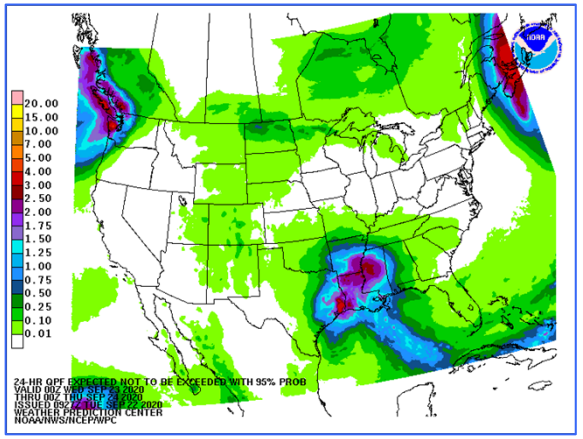
- All hazards except for LIP have been passively mitigated.
  - Site drainage (LIP Domain) remains the controlling site flood hazard based on reconstituted analyses using FLO-2D Pro computer program
- Items required for Design Basis LIP analyses and mitigation in proposed licensing action scope:
  - Flooding methodology changes (Amendment)
  - Time-based warning based on meteorological forecasting (Amendment)
  - Incorporated barriers (deployable and permanent) for mitigation of LIP event (Amendment)
  - Credit non-safety incorporated barriers to mitigate GDC-2 hazard (Exemption)
  - Credit non-safety plant storm system to mitigate GDC-2 hazard (Exemption)



Time-Based Warning Protection
(License Amendment Request)

- Provide “Hardened Protection” for all events up to and including the Standard Project Storm/Standard Project Flood (SPF)
  - Standard Project Storm (SPS) for PNPP determined to be 28.4% of PMP
  - SPS determined using the guidance of EM 1110-2-1411
  - SPS process provides an event “reasonably characteristic of the region”
  - SPF results developed using process consistent with LIP PMF (FLO-2D Pro)
  - Hardened Protection also provided for other non-LIP events such as Cool-Season PMP and non-precipitation events such as exterior tank failure and ESW Swale discharge
- PNPP Operational Requirements Manual (ORM) will contain requirement for temporary barrier deployment in response to meteorological warning
  - Proposed in lieu of plant Technical Specifications as discussed RGs 1.59 and 1.102
  - ORM will only require plant shutdown if barriers are not deployed within specification timeframe. Anticipatory shutdown not proposed.
- Proceduralized response for events in excess of SPS/SPF
  - Advanced warning to be received from external meteorological firm
  - Warning response to be incorporated into plant procedures
  - Plant personnel to deploy temporary “incorporated barriers”
  - Similar to approach adopted for Beyond Design Basis hazards
- Similar in concept to Regulatory Position 2 of RG 1.59, Rev. 2
  - Warning time will be sufficient to reach cold shutdown, if required
  - SSCs needed for cold shutdown will utilize temporary barriers for PMF effects





Incorporated Barriers for Mitigation of LIP Event
(License Amendment Request)

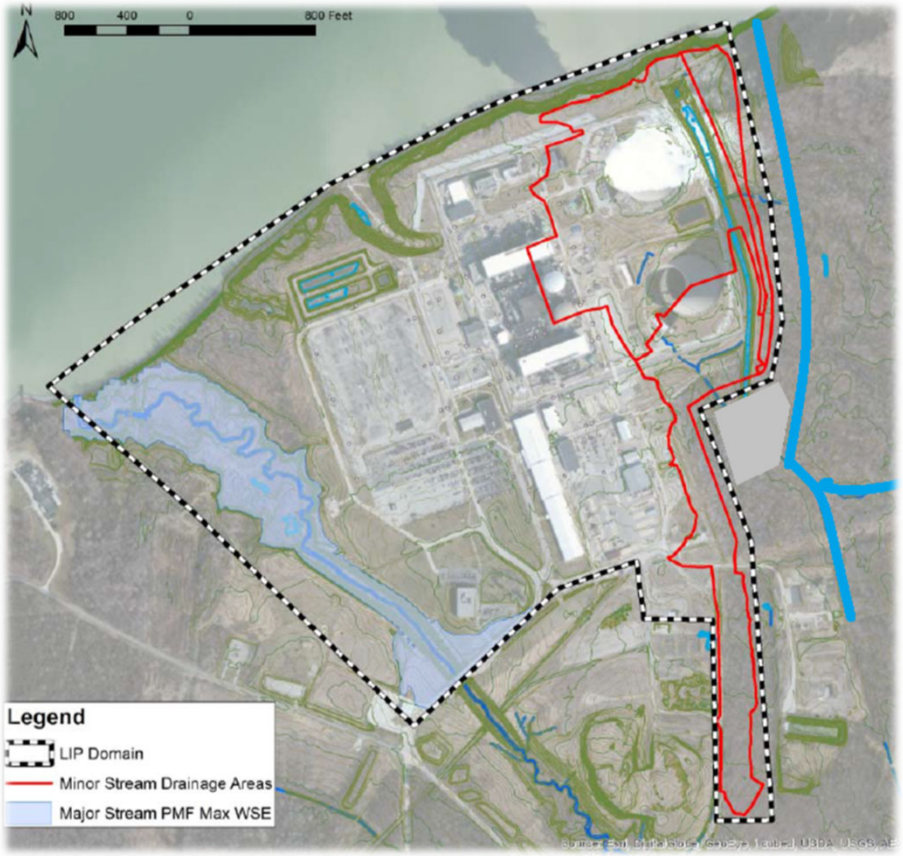
In order to mitigate the reconstituted flood hazards at building exteriors, PNPP proposes use of incorporated barriers as defined in RG 1.102. Barriers will be either permanent or temporary, depending on the location of interest.

- Permanent Incorporated barriers
  - Concrete flood walls
  - Aluminum flood walls
  - Ramps
  - Closure Plates
- Deployable Incorporated Barriers
  - Aluminum stop log design with steel end channels
  - Integrated seals, very low leakage allowance
  - Certified to ANSI/FM-2510
  - No tools required for deployment
  - Designed for all loads including flood-borne missile impacts

Incorporated Barriers
(License Amendment and Exemption Request)

Flooding Methodology Changes
(License Amendment Request)

- FLO-2D Pro Software
  - Used to Perform Complex Flooding Simulation (precipitation and non-precipitation event)
    - Conservation of mass
    - Water storage
    - Site runoff
    - Timing of rainfall event
    - Storm Drain System analysis
  - Diversion Stream berm inflow routing
    - Breach profile determined using USACE guidance (RD-5 and RD-13)
    - Incorporated as a steady-state inflow with flood-routing performed by FLO-2D
- FLO-2D Pro Validation
  - Vendor Appendix B Program
  - FEMA
  - Maricopa County, Arizona
- Flood-borne Missile Evaluations
  - Method obtained from FEMA P-259, supplemented by ASCE 7-10 and ANSI A58.1-1972



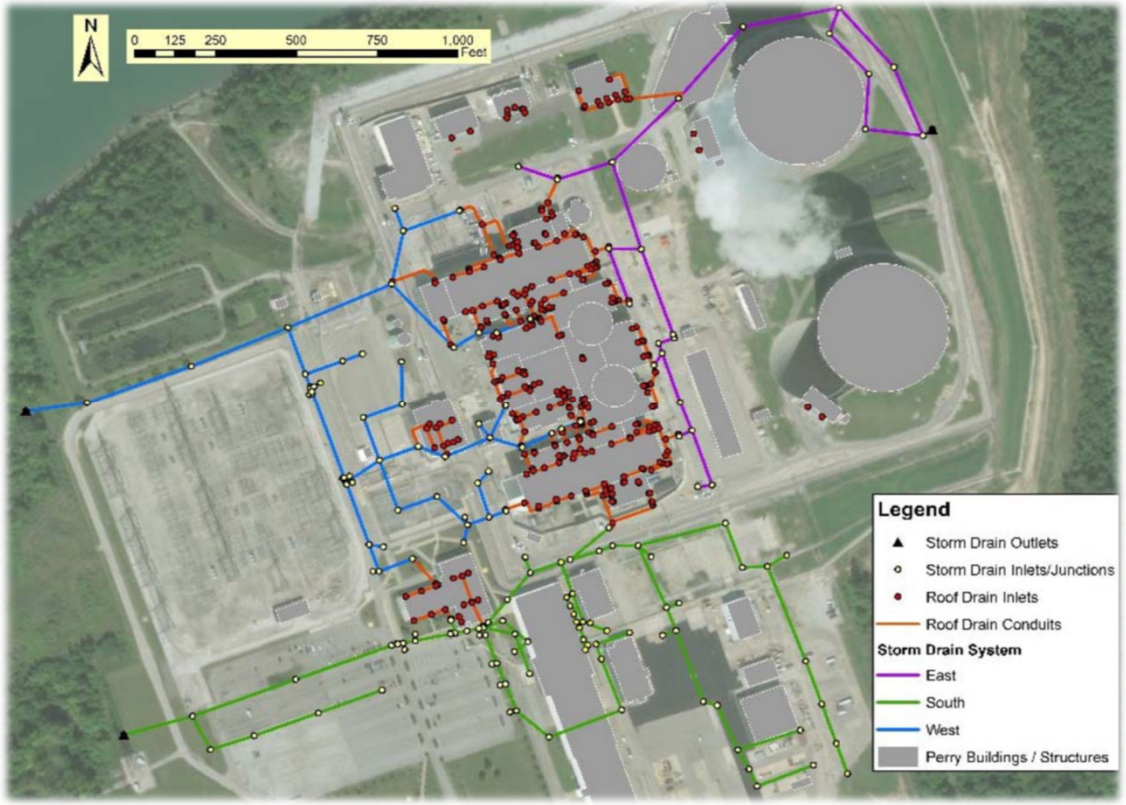
FLO-2D PRO Computer Program
(License Amendment Request)

- FLO-2D program employs an unsteady state modeling technique
  - Also known as a transient flow technique
  - Unsteady state modeling is described in ANSI N170-1976
- Underlying computational methodology of FLO-2D, the program employs the use of the shallow water equations (also known as Saint Venant's Equations).
  - Numerical solution of these equations are referenced in Section 5.4 of ANSI N170-1976 (Reference 1 of Section 5.4.2.1 is Strelkoff's "Numerical Solution of Saint-Venant Equation" as published in ASCE's Journal of the Hydraulics Division, Jan. 1970)
- One of the key capabilities of the program is the ability to perform storage routing functions
  - Storage routing is referenced in the PNPP USAR in that the USAR credits the topographic storage of six inches of precipitation for LIP domain analyses
- EPA's SWMM Module
  - Runs as a sub-routine within FLO-2D Pro
  - Models subsurface flow under gravity and pressurized flow conditions
  - Exchanges volume with surface model (FLO-2D)

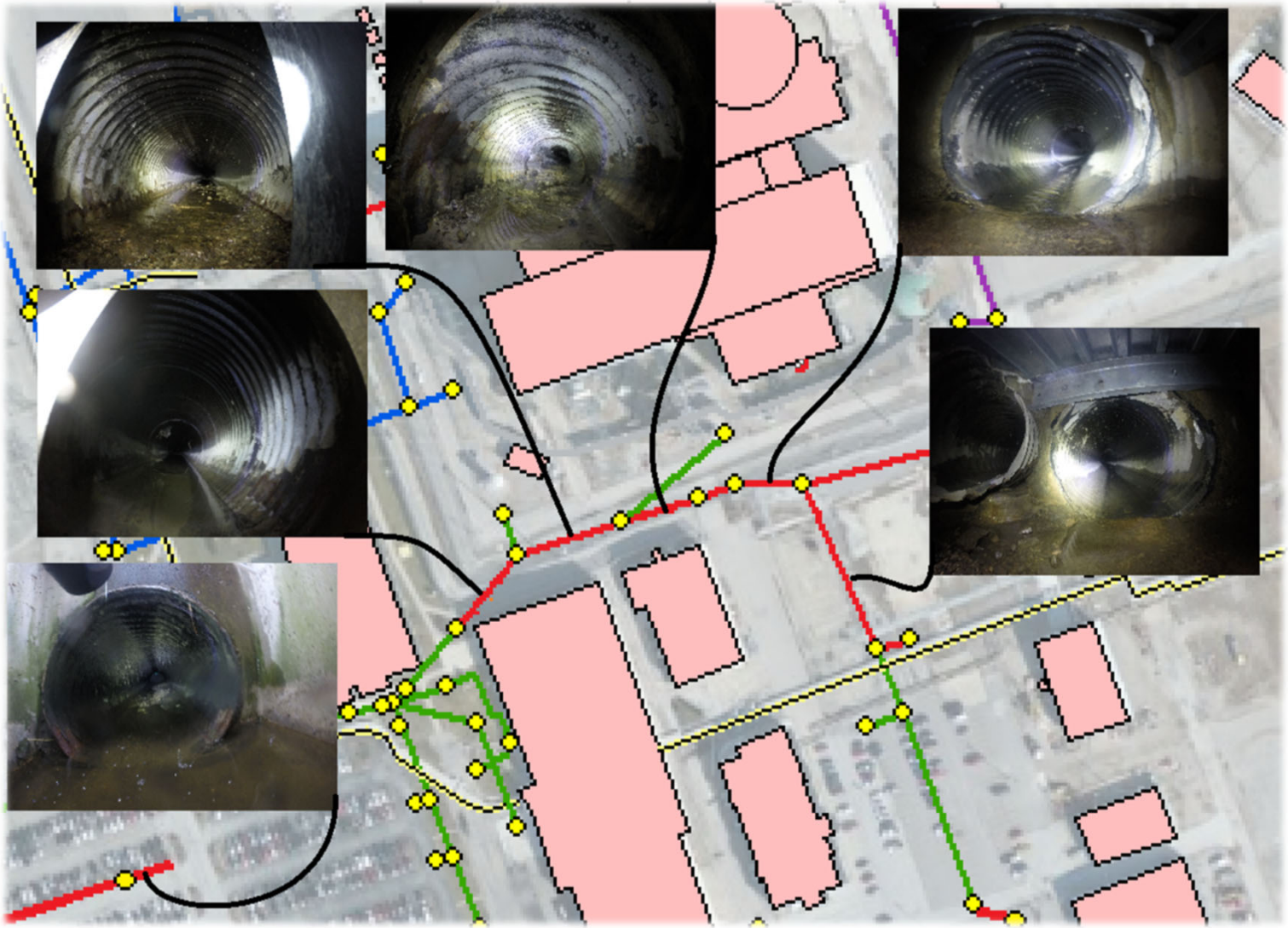
Credit Plant Storm System
(Exemption Request)

Storm Drain System

- Minimizes water surface elevation during LIP
- Reduces duration of LIP event
- Corrugated metal with paved invert
  - AASHTO M190 Bituminous Coated
  - AASHTO M218 Galvanized
- Cleaned and inspected in 2016
- Included in FLO-2D model
- Roof drains
  - Conservatively included in FLO-2D model
  - Roof drains would result in roof storage if inoperable
- Periodic maintenance inspections to maintain conditions
  - Critical characteristics for periodic inspections will be identified



Credit Plant Storm Drain System



Requested Licensing Action

Next Step:

- Submittal planned for March 2021
- Nominal 12-month review requested
- Items required for Design Basis LIP analyses and mitigation in proposed licensing action scope:
  - Flooding methodology changes (Amendment)
  - Time-based warning based on meteorological forecasting (Amendment)
  - Incorporated barriers (deployable and permanent) for mitigation of LIP event (Amendment)
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QUESTIONS?