
ANNEX H

DAM FAILURE

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I. PURPOSE

To facilitate the evacuation of downstream residents or notification of the public in the event of an imminent or impending dam failure. City officials should be prepared for reacting to unlikely but potential failure conditions at the Peace River Reservoir #2. By pre-planning the coordination of actions by the Dam Owner, the Peace River Manasota Regional Water Supply Authority, and responsible emergency management officials, timely notification, warning and evacuation can occur which will save lives and minimize property damage.

II. EXPLANATION OF TERMS

A. Acronyms

1. EAP - Emergency Action Plan
2. FDEP - Florida Department of Environmental Protection
3. MSL - Mean Sea Level
4. PRMRWSA - Peace River Manasota Regional Water Supply Authority

B. References

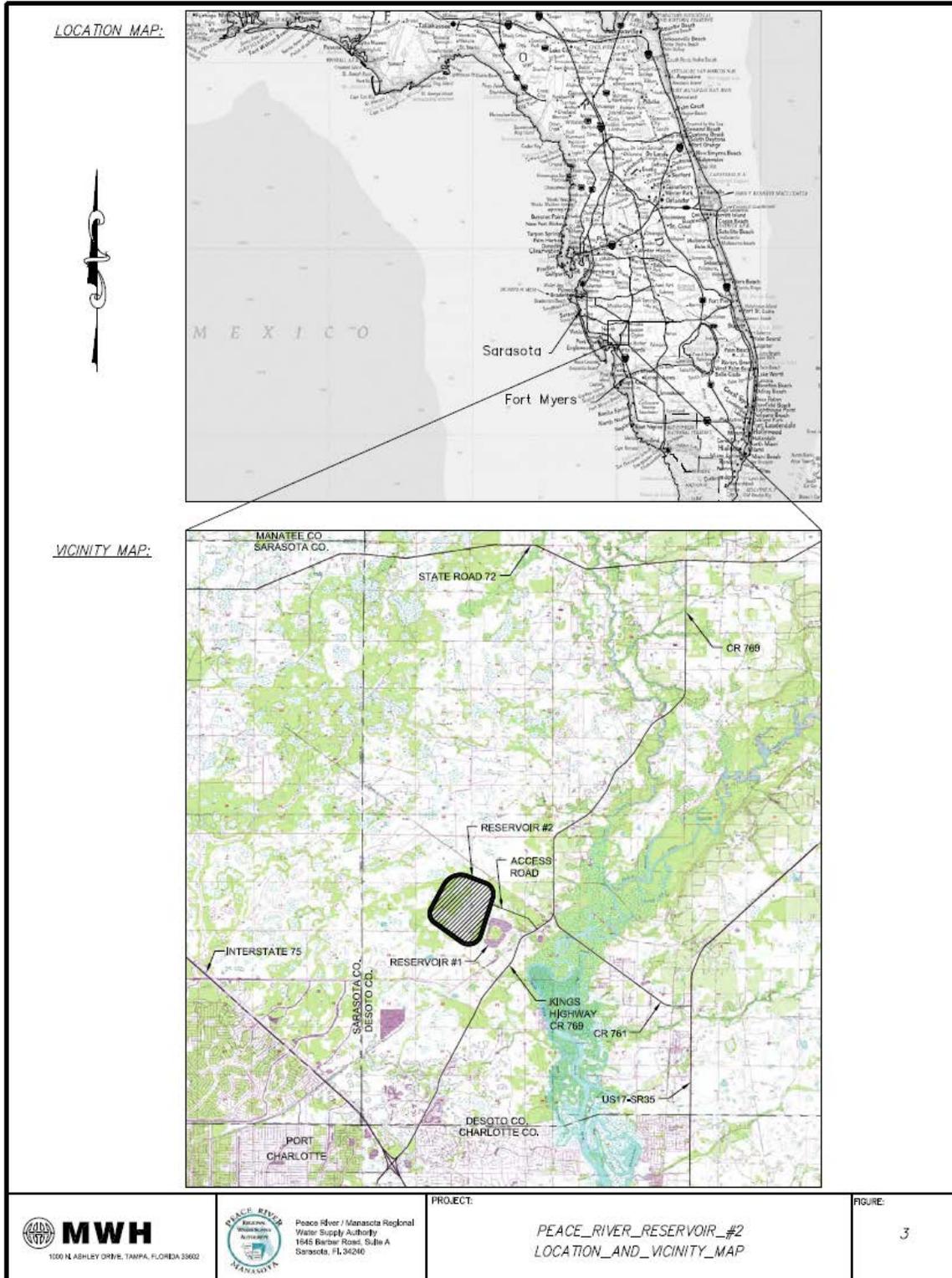
1. City of North Port Comprehensive Emergency Management Plan, Annex D - Flood Warning and Response
2. Peace River/Manasota Regional Water Supply Authority Reservoir, Emergency Action Plan (henceforth referred to as the EAP)

III. SITUATION AND ASSUMPTIONS

A. Situation

1. Location of Reservoir

Reservoir #2, can be accessed from the west by traveling approximately 6.5 miles northeast on Kings Highway (CR 769) from the I-75 interchange (Milepost 170) east of Port Charlotte, Florida; turn left (northwest) on a gated unpaved road that goes directly to the Reservoir #2 inlet structure. Keys for the lock on the gate are available from the Knox Box at the gate. Note that this road is in the inundation area, and may be flooded.



2. Description of Reservoir

Peace River Reservoir #2 is an off-stream, above-ground reservoir that provides 18,412 acre-feet (6-billion gallons) of normal operating raw water storage for water supply to the PRMRWSA. PRMRWSA's Reservoir #1 is primarily a below-grade reservoir with approximately 2,000 acre-feet (625 million gallons) of storage located east of Reservoir #2.

Reservoir #2 is located within R.V. Griffin Reserve, an area bounded by:

- An abandoned railroad grade to the north;
- Reservoir #1 to the east;
- An old railroad grade and a residential area to the south; and,
- Undeveloped platted land to the west.

Site access is from Kings Highway to a perimeter road at the exterior toe of the embankment. The site access road extends from an intersection at King's Highway near the main entrance to the water treatment plant following an alignment approximately 100 feet north of Reservoir #1. A control gate located at the main entrance will provide security for the project site. Additionally, a perimeter fence around the reservoir will be constructed to restrict access to non-authorized personnel.

Reservoir #2 is a mostly above-ground impoundment surrounded by an earthen embankment consisting of compacted fill with a geosynthetic membrane water retaining core. A soil-bentonite slurry (cutoff) wall is constructed to limit seepage underneath the embankment, and extends from the geosynthetic membrane to an underlying low permeability clayey soil layer. In addition, an internal drain is installed to intercept potential seepage through the embankment. A perimeter drain at the downstream toe of the embankment will collect and convey seepage, from the embankment and foundation, to seepage outlets located around the perimeter of the embankment.

The normal maximum operating water level in the reservoir will be approximately 26 feet above the natural ground level (or 61.8 feet above MSL). Water will be pumped into Reservoir #2 through a submerged inlet structure. Releases from Reservoir #2 will be controlled by a gated outlet structure with an overflow spillway to Reservoir #1. The raw water source is Peace River. Water is pumped from the River via the raw water pump

station, through two 48-inch pipelines, which connect to a 66-inch supply pipeline that discharges into Reservoir #2.

B. Assumptions

1. Dam breach analyses were performed for development of this EAP. Dam-breach studies are designed to evaluate a severe hypothetical failure of the dam under a range of assumed concurrent conditions. The evacuation areas shown on EAP Figure 2 reflect the specific failure assumptions considered in the dam breach analyses. The assumptions were selected to give a “worst-case” scenario of downstream flooding for a selected reservoir condition, which would be maximum reservoir water level, and an extreme wet-weather inflow condition and an overflow failure.
2. The Peace River Reservoir #2 (Reservoir #2) project area is relatively flat with no well-defined stream/river channel, and consists of a fully encircling embankment. With an approximately 4-mile long embankment, the location of a hypothetical breach could occur at any location along the embankment. Most dam breaches occur at penetrations through the embankment (e.g. filling or outlet pipes), or at foundation defects. Therefore, model simulations included dam breach modeling at six locations around the perimeter. Flood inundation modeling of the dam breach was performed for six different locations around the dam, and the Inundation Maps showing the assumed breach location and the maximum theoretical flood wave depth, are provided in Appendix 1. Two of the modeled breach locations consisted of the pipe penetrations (the inlet pipe and the outlet/spillway pipe) through the embankment.
3. Foundation defects that are unknown cannot be predicted. The four other breach locations were selected based on proximity to population areas and to provide coverage at each of the primary compass directions (North, NE, South, SE, West, and East). Since the location of a hypothetical breach cannot be predicted, a composite map of the results for the six breach locations, presenting the hypothetical extent of inundation is shown as an evacuation map on EAP Figure 2. The evacuation map illustrates the time of arrival for the leading edge of a dam breach flood wave, time to 1-foot flood depth. An actual failure of the dam could result in different downstream flooding. Therefore, this map should serve as a guide for warning and evacuation, but should not replace the judgment and local experience of emergency management officials.

IV. METHOD OF OPERATIONS

A. General

1. In general, any release from the Reservoir is a flooding event, and would be managed per City of North Port Comprehensive Emergency Management Plan, Annex B - Flood Warning and Response.

B. Phases of Detection

1. Step 1 Emergency Condition Detection - This step describes the detection of an unusual or emergency event. Information is provided herein to assist the Dam Owner in determining the appropriate emergency level for the event. Unusual or emergency events may be detected by:
 - a. Observations at or near the dam by PRMRWSA or other government personnel (local, state, or federal), landowners, visitors to the dam, or the public. All reports of an unusual or emergency event should be verified by the Dam Owner.
 - b. Evaluation of instrumentation data
 - c. Forewarning of conditions which may cause an unusual event or emergency event at the dam (for example, a severe weather or hurricane forecast)
 - d. Sinkholes in or near the embankment
2. Step 2 Emergency Level Determination - After an unusual or emergency event is detected and verified, the EAP Officer is responsible for classifying the event into one of the following three levels:
 - a. Emergency Level I - Urgent; dam failure is imminent or in progress:
 - i. This is an extremely urgent situation when a dam failure is occurring or obviously is about to occur and cannot be prevented. Flooding will occur downstream of the dam. The appropriate Emergency Operations Center(s) should be contacted immediately so emergency services can begin evacuations of all at-risk people and close roads as needed.

ii. Examples of Emergency Level 1 Events:

- Rapid flow rate increase with cloudy discharge from existing seepage area(s) near the dam
- Rapid flow rate increase with cloudy seepage or evidence of significant, active, and continuing material movement from the drain system outfall(s)
- Sudden or rapidly progressing slides of the embankment slopes
- Overtopping flow not eroding the embankment slope; reservoir level expected to rise
- Overtopping flow eroding the embankment slope
- Detonated bomb that has resulted in damage to the dam or appurtenances
- Damage to dam or appurtenances that has resulted in uncontrolled water release
- Earthquake resulting in uncontrolled release of water from the dam

b. Emergency Level II - Potential dam failure situation, rapidly developing:

- i. This situation may eventually lead to dam failure and flash flooding downstream, but there is not an immediate threat of dam failure. The appropriate Emergency Operations Center(s) should be notified of this emergency and placed on alert. The Dam Owner should closely monitor the condition of the dam and periodically report the status of the situation to the Emergency Operations Center(s) and FDEP Dam Safety Engineer.

- ii. If the dam condition worsens and failure becomes imminent, the appropriate Emergency Operations Center(s) must be notified immediately of the change in the emergency level to evacuate the people at risk downstream.
- iii. The Owner's Engineer of Record for the dam and the FDEP Dam Safety Engineer should be contacted to evaluate the situation and recommend remedial actions to prevent failure of the dam. The Dam Owner should initiate remedial repairs (note local resources that may be available – See EAP Appendix C-5). Time available to employ remedial actions may be hours or days.
- iv. This emergency level is also applicable when discharge from the outlet-works/spillway has, or is expected to result in flooding of downstream areas where people near the channel could be endangered. Emergency services should be on alert to initiate evacuations or road closures if the flooding increases.
- v. Examples of Emergency Level 2 Events:
 - The reservoir level has reached El. 67.0 and is experiencing high winds.
 - New seepage areas with cloudy discharge or increasing flow rate
 - Rapidly enlarging sinkhole
 - Cracks in the embankment with seepage
 - Un-verified bomb threat that, if carried out, could result in damage to the dam
 - Damage to dam or appurtenances that has resulted in seepage flow
 - Earthquake resulting in visible damage to the dam or appurtenances

- c. Level III - Monitoring; Operation & Maintenance Condition; Non-emergency incident; unusual event; slowly developing situation:
- i. This situation is not normal but has not yet threatened the operation or structural integrity of the dam, but possibly could if it continues to develop, and/or a general state of monitoring exists during the hurricane season.
 - ii. The condition of the dam should be closely monitored, especially during storm events, to detect any development of a potential or imminent dam failure situation. The appropriate Emergency Operations Center(s) should be informed if it is determined that the conditions may possibly develop into a more serious condition that may require emergency actions.
 - iii. Examples of Level III Events:
 - A hurricane is expected to make landfall near the project site
 - New wet spots on the face of the dam, and the toe of the dam
 - New soft spots on the face of the dam
 - New seepage areas in or near the dam
 - Observation of new sinkhole in reservoir area or on embankment
 - Erosion gully in embankment slope of 3 feet or deeper below grade.
 - New cracks in the embankment greater than 1-inch wide without seepage
 - Visual movement/slippage of the embankment slope

- Instrumentation readings beyond predetermined values
- Damage to dam or appurtenances with no impacts to the functioning of the dam
- Modification to the dam or appurtenances that could adversely impact the functioning of the dam
- Measurable earthquake felt or reported on or within 50 miles of the dam

3. Step 3 Notification and Communication Notification:

After the emergency level has been determined, people on the notification flowcharts (See EAP Page 2) shall be notified immediately.

a. Emergency Level I - Urgent; dam failure is imminent or in progress:

- i. The EAP Officer should immediately contact the appropriate Emergency Operations Center(s) and communicate that dam failure is imminent or in progress and the potentially flooded area must be evacuated (see Page 2). The following actions should be taken:

- Call the Emergency Operations Center and use the following message to describe the situation:

“This is an emergency. This is (identify yourself; name, position). Peace River Reservoir #2, located on Kings Highway, is failing. The failure is occurring at the (North, NE, South, West, East) portion of the reservoir. All potential inundation area residents must be evacuated immediately. Repeat, Peace River Reservoir #2 is failing; evacuate inundation area residents immediately. This is not a test.

We have activated the Emergency Action Plan for this reservoir and are currently under Emergency Level I. Reference the inundation map in your copy of this Emergency Action Plan.

I can be contacted at the following number _____ . If you cannot reach me, please call the following alternative number _____ .”

- Do whatever is necessary to bring people in immediate danger to safety (anyone on the dam, or within the inundation area). See EAP Appendix A and Appendix B.
 - Keep in frequent contact with the Emergency Operations Center(s) to keep them up-to- date on the condition of the dam. They will tell you how you can help handle the emergency.
 - If all means of communication are lost and can't quickly be re-established: (1) try to get to another radio or telephone that works, or (2) Send a PRMRWSA representative to the DeSoto County Fire Station 2 on Highway 761 near Kings Highway to summon help and re-establish communications. If these means fail, handle the immediate problems as well as you can, and periodically try to reestablish contact with the EAP Officer and emergency services.
- ii. The following pre-scripted message may be used as a guide for the Emergency Operations Center staff to communicate the status of the emergency with the public:

“Attention: This is an emergency message from (Your Name and Title). Listen carefully. Your life may depend on immediate action.

Peace River Reservoir #2 located along Kings Highway is failing. Repeat. Peace River Reservoir #2 is failing. Serious flooding will result. If you are in or near this area, evacuate immediately. Do not travel on (names of roads or highways) or return to your home to recover your possessions. You cannot outrun or drive away from the flood wave. Evacuate immediately.”

Repeat message.

b. Emergency Level II - Potential dam failure situation; rapidly developing:

i. Any PRMRWSA employee observing a potential situation, or receiving word of such must contact the EAP Officer immediately and describe the situation. If the EAP Officer cannot be reached the following designees, in order of responsibility, shall assume all responsibilities of the EAP Officer:

- PRMRWSA Environmental Affairs Coordinator
- PRMRWSA Water Resources Director

ii. The EAP Officer, or their designee, will contact the Dam Owner's Engineer of Record the appropriate Emergency Operations Center(s) and the FDEP Dam Safety Officer, describe the situation, and request technical assistance on the next steps that should be taken. The following message may be used to help describe the emergency situation to the emergency management personnel:

"This is (identify yourself; name, position). We have an emergency condition at Peace River Reservoir #2, located along Kings Highway. We have activated the Emergency Action Plan for this dam and are currently under Emergency Level 2.

We are implementing predetermined actions to respond to a rapidly developing situation occurring at the reservoir. Please prepare to evacuate the inundation area.

Reference the inundation maps in your copy of the Emergency Action Plan.

We will advise when this situation is resolved or if the situation gets worse.

*I can be contacted at the following number _____.
If you cannot reach me, please call the following alternative number _____."*

- c. Level III - Monitoring; Operation & Maintenance Condition; Non-emergency incident; unusual event; slowly developing situation:

The following actions should be taken:

1. The Dam Owner shall identify the situation.
2. The Dam Owner should contact the Dam Owner's Engineer of Record, describe the situation, and request technical assistance on appropriate steps that should be taken.
3. The Dam Owner should notify FDEP Dam Safety Officer of the situation.

V. ORGANIZATION AND ASSIGNMENT OF RESPONSIBILITIES

A. Organization

B. Assignment of Responsibilities

1. Peace River Manasota Regional Water Supply Authority - Dam Owner
 - a. Daily monitoring and management of Reservoir # 2.
 - b. Respond to observed or reported conditions, incidents, or unusual events to detect if an existing or potential emergency exists (See Step 1 - Event Detection, above).
 - c. When an emergency event is detected immediately contact the EAP Officer.
 - d. Immediately notify the personnel in the order shown on the notification flow chart for the appropriate emergency level.
2. Peace River Manasota Regional Water Supply Authority - Emergency Action Plan Officer(s)
 - a. Serve as the primary contact person responsible for coordination of all emergency actions.
 - b. When an emergency event is detected, immediately determine the emergency level (see Step 2 - Emergency Level Determination, above).

- i. Emergency Level I: Urgent; Dam failure is imminent or in progress
 - ii. Emergency Level II: Potential dam failure situation; Rapidly developing
 - iii. Level III: Monitoring; Operation & Maintenance; Non-emergency incident Unusual event; Slowly developing situation
 - c. During Level III conditions
 - i. Monitor conditions
 - ii. Arrange repairs as needed
 - d. Immediately notify the personnel in the order shown on the notification flow chart for the appropriate emergency level.
 - e. Respond to specific requests from the Emergency Operation Center(s) to help minimize the impacts of an emergency event.
 - f. Provide updates of the situation to the Emergency Operations Center(s) to assist them in making timely and accurate decisions regarding warnings and evacuations.
 - g. Provide leadership to assure the EAP is reviewed, understood, and updated annually and copies of the revised EAP are distributed to all who received copies of the original EAP.
 - h. Facilitate exercise of the EAP as necessary to ensure the effectiveness of the EAP and emergency response.
 - i. Participate in annual review and update of the EAP.
- 3. City of North Port
 - a. Emergency Management
 - i. Maintain communication with media.
 - ii. When an Emergency Level I situation occurs:

- Initiate warnings and order evacuation of people at risk downstream of the dam.
 - Carry out the evacuation of people and close roads within the evacuation area (See Appendix A for Inundation Maps).
 - Alert the public of the emergency.
- iii. When an Emergency Level II situation occurs:
- Prepare emergency management personnel for possible evacuations that may be needed if an Emergency Level I situation occurs.

VI. ADMINISTRATION & SUPPORT

A. Reports and Records

1. Situation Report. During emergency operations, a daily situation report should be prepared and distributed to the County EOC.
2. Records Relating to Emergency Operations

See Base Plan.

B. Preservation of Records

If government records are damaged during the incident response, the EOC should be promptly advised so that timely professional assistance can be sought to preserve and restore them.

C. Post-Incident Review

See Base Plan.

VII. ANNEX DEVELOPMENT & MAINTENANCE

A. Responsibility

The Dam Owner is responsible for review and update of their emergency response plan on an annual basis. North Port Emergency Management will be the Plan-holder for the City and will participate in plan review and exercises.

B. Schedule for Annex Updating

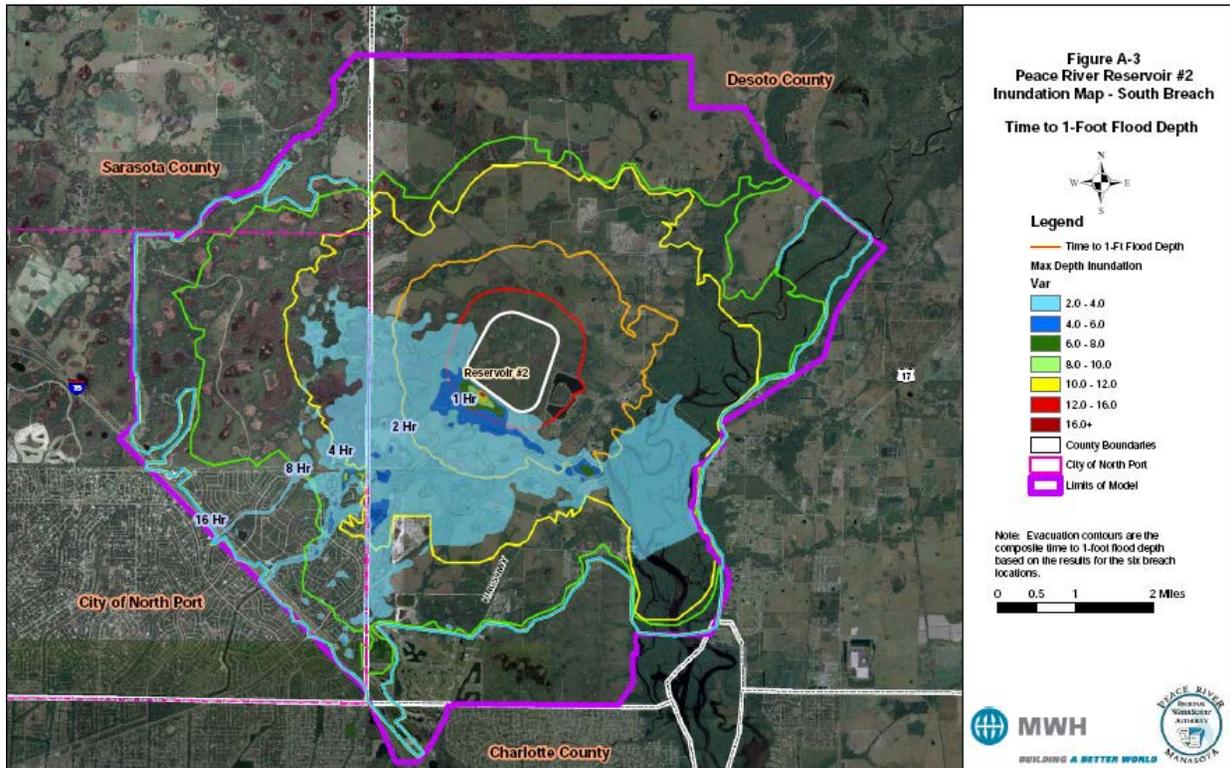
This annex will be maintained in accordance with the following schedule:

1. The annex will be updated with each updating of the City's Comprehensive Emergency Management Plan.
2. The annex will be reviewed after each exercise and/or actual response to a dam-related emergency event and modified as necessary.
3. The annex will be reviewed and revised, if needed, after each of the following types of events:
 - a. A major change in applicable Federal or State laws, regulations, or policies,
 - b. The findings of ongoing vulnerability and needs assessments in Florida, and
 - c. Major advances in applicable response technology and/or operational concepts

C. Security Considerations - General Exemptions from Public Inspection

Certain security procedures and plans developed resulting from this Annex to the City of North Port Comprehensive Emergency Management Plan may be exempt from public inspection under Florida Statutes Chapter 119.

Inundation Map - South Breach



Inundation Map - West Breach

