OPERATION AND MAINTENANCE PLAN
FOR

CROWDERS MOUNTAIN STATE PARK DAM

GASTON COUNTY, NORTH CAROLINA

State ID #: GASTO-003

Date: June 1, 2007

Owner Name: DIVISION OF PARKS & RECREATION

Address: 522 PARK OFFICE LANE

KINGS MOUNTAIN, NC 28086

Telephone #: (704)-853-5375

State Construction ID#: 0406276015

Code: 40416 Fund: 4E64

O&M prepared by: MEADE GUNNELL ENGINEERING

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Telephone #: (704) 655-7290

Operation and Maintenance Plan

Dam: CROWDERS MOUNTAIN STATE PARK DAM

County: GASTON

INSTRUCTIONS

The purpose of this Operation and Maintenance Plan (O&M) is to reduce the risk of damage to or failure of the dam and thereby protect downstream life and property. This plan is to provide guidance on the operation and maintenance of the above-listed dam. This plan is to be implemented immediately upon issuance of Approval to Impound to impound the North Carolina Department on Environment and Natural Resources (NCDENR), Division of Land Resources at the completion of the dam repairs.

BACKGROUND

The Crowders Mountain State Park Dam was constructed in 1961 for recreational and agricultural purposes. It appears likely that the dam was designed by the Soil Conservation Service (SCS). However, no records of the dam construction could be located.

The existing dam is an earthen structure with a corrugated metal pipe (CMP) riser and barrel principal spillway. The previous CMP riser/barrel outlet structure has failed and is need of repair. The impoundment depth is approximately nineteen feet. Once repairs are complete, the principal spillway will consist of a high-density polyethylene (HDPE) slip liner conduit connected to a 48-inch diameter reinforced concrete pipe (RCP) manhole riser. A resilient wedge gate valve with operating mechanism will be provided within the spillway riser to serve as a reservoir drain. The existing emergency spillway is a grass-lined channel with 22:1 side slopes. This spillway will not be modified during these repairs. Hydrologic and hydraulic analyses indicate that the emergency spillway will not be activated during the 100-year storm event.

OPERATION

For the following sections, refer to the figures attached to this plan. The gate valve will be manually operable. The valve control wheel will be located on the top of the proposed RCP spillway riser structure. The valve should remain closed at all times except when in use. Opening the valve will lower the lake level to the natural channel bottom.

The valve will need to be fully opened six (6) months after the lake has reached normal pool elevation. After a few minutes of operation, the valve will be closed. Observe the flow at the bottom drain outlet to ensure that the valve is completely closed and the flow has ended. This process should be repeated every six months. At no time should more than twelve months be exceeded between operations, with the exception of weather delays. Additionally, the lake level can be lowered for a short period during the winter months to assist with the control of vegetation around the lake. Care should be taken to not lower the lake level at a rate that exceeds one vertical foot per day to preclude upstream slope failure.

MAINTANENCE

Every time the lake is drained exposing the upstream gate valve, it is to be inspected both visually and by opening and closing operations to ensure smooth operation. Any debris in the bottom drain system must be removed and/or cleaned. Refer to manufacturers recommendations for the maintenance of the valves. Any debris around or on the trash rack should be removed periodically. The probability of debris accumulation is greater during and after large storm events.

Any damage shall be reported to NCDENR Division of Land Resources at (704) 663-1699 prior to the initiation of repairs. Any replacement of materials or other work needed to repair the dam shall be authorized by NCDENR division of land resources, or a qualified North Carolina registered professional engineer, per NCDENR's request.

Also, the dam embankment should be inspected for cracks, sliding and seepage around the primary spillway outlet and the on earthen dam structure periodically. This schedule may increase to one visual inspection a month in the winter months due to prolonged periods of sub-freezing temperatures. Every time the lake is drained, it should be controlled to a rate of no more than one foot of elevation drop per day. In winter months, the draw down rate shall be decreased to two feet per week to prevent damage to saturated exposed shorelines from freezing and sliding.

The grass-lined emergency spillway and the dam should be mowed on a regular basis and kept free of trees and underbrush.

TOE DRAIN OUTLET MONITORING

The flow rate from the toe drain outlets shall be monitored on a monthly basis and following all major storm events. The intent is to quantify and record the flow rate from each toe drain outlet pipe. Any discharge of cloudy or muddy discharge from the toe drain outlets should be noted and the Division of Land Resources, Mooresville Regional Office notified at telephone number (704) 663-1699 as soon as possible.

The appropriate method of monitoring the toe drain discharge is to place a one gallon bucket below the drain outlet and monitor the time needed to fill this bucket recorded. The flow rate should be recorded in gallons per minute.

RECORD KEEPING

Good record keeping is required. A log shall be kept with the owner or their representative recording the following items:

- Observations: At every inspection, observations as to the dam's performance should be noted.
- Maintenance: A record shall be made any time the dam and/or bottom drain is repaired or cleaned.
- Rainfall and water surface level: Specific measurements of rainfall, date, time and maximum water level shall be recorded.
- Draw down: Every time the lake is drained, record the date(s), the rate at which the water level lowers (i.e. FT/DAY), the outlet flow rate (i.e. CF/SEC) of the 10" DIP, and the reason the lake is drained.

The owner shall keep a set of "as-built" drawings of the dam and/or repairs on file.