

Progress Energy – Harris Lake Infrastructure Impacts

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DATE: May 16, 2007

Introduction

During November 2006 and January 2007, Cindy Newman and Adam Sharpe of CH2M HILL conducted an inventory of the infrastructure projected to be affected by an increase in the operational level of Harris Lake in New Hill, North Carolina. The planned increase in the normal pool elevation of the lake is from 220 feet to 240 feet above mean sea level (msl) (PEC, 2007a). The 100-year flood level for this new pool elevation is projected to be 243.03 feet (CH2M HILL, 2007). Infrastructure that is likely to be affected was identified, and geographical and descriptive information was collected using global positioning system (GPS) units (Attachment 2).

This evaluation of infrastructure impacts is required to support the ongoing development of the Environmental Report (ER) for the Proposed Shearon Harris Nuclear Power Plant Units 2 and 3 (HAR). This technical memorandum is being submitted before the ER as requested by Progress Energy to facilitate the evaluation of infrastructure impacts as early as possible.

Methods

On November 14 and 15, 2006, Cindy Newman and Adam Sharpe, along with Mike Swing of Progress Energy, surveyed by airboat the infrastructure adjacent to Harris Lake. A Trimble GeoXT GPS unit (Trimble Navigation Limited, Sunnyvale, CA), with submeter accuracy of horizontal data, was used to collect infrastructure locations. Vertical data collected using GeoXT GPS units are less accurate than horizontal data. However, the vertical data collected are still useful for a planning-level survey, especially when the georeferenced points are compared with digitally produced topographic contours. Collected GPS data were post-processed using differential correction. Correction files were obtained from the North Carolina Geodetic Survey (NCGS) base station in Raleigh, North Carolina.

On January 3, 5, and 6, 2007, Adam Sharpe and Mike Swing surveyed the infrastructure points not accessible by boat. Two GPS units were used to collect infrastructure locations. A Trimble 5700 RTK GPS receiver with a Trimble Zephyr Geodetic antenna and a Trimble 5800 rover antenna with a TSCe data logger (Trimble Navigation Limited, Sunnyvale, CA) were used to collect points near the Harris Energy and Environmental Center (HEEC), firing ranges, and Harris Lake County Park. This GPS unit collects horizontal and vertical data that are accurate to the centimeter. However, collecting data to this level of accuracy requires substantial time and equipment for set-up. Consequently, this GPS unit was primarily used for locations where infrastructure features were located in close proximity to each other. A Trimble GeoXT GPS unit was used to collect additional infrastructure locations. Data from both GPS units were differentially corrected and then plotted on an aerial photo of the area (see Note 1; Attachment 2).

Infrastructure Impacts

Infrastructure inventoried for potential impacts were organized into the following categories: road, transmission line tower, transmission foundation, boat ramp, emergency siren tower, Harris Lake County Park, facility, bird boxes, and other. The locations of inventoried road sections are presented on Figure 1a. Figure 1b presents the inventoried transmission line towers and foundations. All other infrastructure inventoried for potential impacts from the reservoir level rise are presented on Figure 1c. Infrastructure located below 240 feet, as measured using a GPS unit, are displayed in yellow and infrastructure located above 240 feet are displayed in green. The measured elevation and a description of the infrastructure feature are presented in Table 1. Photographs of a representative selection of infrastructure features are presented in Attachment 1. All affected road lengths reported in Attachment 1 were obtained from Sargent & Lundy, LLC (2007a).

A brief description of impacts to infrastructure surrounding Harris Lake is presented in the following subsections:

- Road impacts
- Transmission line impacts
- Transmission foundation impacts
- Boat ramp impacts
- Emergency siren tower impacts
- Harris Lake County Park impacts
- Facility impacts
- Bird box impacts
- Other impacts

Infrastructure was evaluated based on an assumed operational lake level of 240 feet (PEC, 2007a) and a 100-year flood level of 243 feet (CH2M HILL, 2007).

Road Impacts

The HAR vicinity contains highways, county roads, and unimproved or unmaintained roads that will be affected by a lake level rise. North Carolina Highway 42 (Highway NC-42) drops to an elevation of 241 feet (Table 1, see Note 1) near the southwest corner of

Harris Lake, as shown on Figure 1a (rd-101). Local roads with sections that dip below 240 feet (Table 1; see Note 1) include Sweet Springs Road (rd-104), Rex Road (section between rd-105 and rd-106; Attachment 1 photograph 1), New Hill Holleman Road (section between rd-31 and rd-107 and section between rd-108 and rd-109; Attachment 1 photograph 2), Cass Holt Road (section between rd-102 and rd-103; Attachment 1 photograph 3), and Holly Springs/New Hill Road (section between rd-112 and rd-113).

The three depressions on Shearon Harris Road (rd-110, rd-114, and rd-115) and the causeway to the plant site (rd-33) are located above 240 feet (Figure 1a; Table 1; see Note 1)). These road sections will not be directly inundated, however, they could potentially be affected by wind and wave action during a 100-year flood event. An estimated 1,914 feet of Shearon Harris Road and 1,402 feet of the causeway will need to be improved (S&L, 2007a).

Several roads around the existing Shearon Harris Nuclear Power Plant, Unit 1 (HNP) and the HEEC are likely to be affected. The old construction road that enters the plant at the north (rd-32) is located below 240 feet (see Note 1) at the eastern end of the earthen dam on which the road was constructed (Figure 1a; Table 1). An estimated 1,364 feet of road will need to be improved (S&L, 2007a). Approximately 1,450 feet (S&L, 2007a) of the HEEC sewage treatment plant access road (rd-01) is likely to be inundated (Figure 1a). The lower HEEC entrance road, near New Hill Holleman Road (section between rd-11 and rd-13) is located below 240 feet and therefore, will be inundated (Figure 1a; Table 1). The access road for the Town of Cary police firing range (rd-34) also is located below 240 feet (Figure 1a; Table 1).

In addition, numerous unimproved or unmaintained roads will be inundated when the lake level is increased (Table 1; Figure 1a; and Attachment 1 photographs 4 through 6).

Transmission Line Impacts

Numerous transmission line towers were surveyed (tl-01 through tl-33; Table 1; Attachment 1 photographs 7 and 8), as shown on Figure 1b. However, this was not a comprehensive survey of all towers that will be affected by the lake level rise. When multiple poles were connected by a crossbar, the structure was counted as one tower. In addition, when lines were running in parallel, one GPS point was collected for the two parallel towers and explained in Table 1. We estimate that approximately 52 transmission towers will be inundated and an additional 14 towers may be affected during a 100-year flood event (that is, approximately 66 affected towers) (Table 2).

An independent estimate was prepared for Harris Plant #2 to estimate the number of towers that would be affected by a maximum water level of 245 feet (S&L, 2007b). This estimate, provided in Table 3, is more conservative because it accounts for transmission towers that will be affected by wind and wave action during a 100-year flood event (S&L, 2007a).

Table 3 shows that seven transmission lines leading from the HNP would be affected by a lake level rise to 245 feet. This independent estimate identified 89 transmission line structures that would be directly affected by the rise in lake level to 245 feet (that is, inundated). Of the 89 structures that would be inundated, 12 have existing foundations ranging from 4- to 28-feet tall, with an average height of 17 feet. Based on the 245-foot water level, 83 structures would require new foundations, which would include replacing 11

existing foundations. The foundations would range from 3- to 48-feet tall, with an average height of 17 feet (S&L, 2007b).

In addition to the estimated 89 structures that would be affected by a 245-foot water level, approximately 8 structures would be located on islands created by the water level increase. These structures might require relocation and/or new foundations, depending on future soil conditions (S&L, 2007b).

Transmission Foundation Impacts

Five sets of transmission tower foundations (tp-01 through tp-05; Table 1; Attachment 1 photograph 8) were identified during the Harris Lake survey. Their locations are shown on Figure 1b. These concrete foundations were installed during construction of the HNP.

However, the transmission towers were never completed. Currently, these tower foundations pose little danger because they are located onshore or in the water with several feet of foundation exposed above the water surface. However, during the lake level rise and once the lake is operating at 240 feet (PEC, 2007a), these foundations may pose a boating hazard. In addition, there may be other transmission tower foundations located onshore that have not been identified.

Boat Ramp Impacts

Four boat launch facilities were identified during the lake survey (Figure 1c; Table 1). Two of these are public facilities (Hollemans Crossing boat ramp [bl-01] and Highway NC-42 [Dam Site] boat ramp [bl-04]) and two were installed for Progress Energy use (bl-02 and bl-03).

The impact to Hollemans Crossing boat launch facility from the proposed rise in lake level will be significant. The two Hollemans Crossing ramps (bl-01; Table 1; Figure 1c; Attachment 1 photograph 9), the 56-space parking lot (NMMA, 2007a) (pl-01; Attachment 1 photograph 10), and a portion of the access road from Bartley Holleman Road (rd-02; Figure 1a; Attachment 1 photograph 11) will be inundated. The impact to the Highway NC-42 boat launch facility also will be significant because the two ramps (bl-04; Attachment 1 photograph 12) and one-half of the 66-space parking lot (NMMA, 2007b) (pl-02; Table 1; Figure 1c; Attachment 1 photograph 13) will be inundated. Both of the Progress Energy boat ramps (bl-02 and bl-03; Attachment 1 photographs 14 and 15) will be inundated.

Emergency Siren Tower Impacts

Ten emergency siren towers were identified along the shoreline of Harris Lake (et-01 through et-10; Figure 1c; Table 1; Attachment 1 photograph 16). All of the emergency siren towers located below the 240-foot contour line will need to be relocated.

Harris Lake County Park Impacts

Harris Lake County Park is a 680-acre park leased from Progress Energy by Wake County Parks, Recreation, and Open Space (Wake County 2007). The impacts to the park will be significant. Most of the park facilities are located below 240 feet (Figure 1c; Table 1) and will be inundated, including three shelters (hp-04, Attachment 1 photograph 17), a fishing pier (Attachment 1 photograph 18), the amphitheater (hp-01, Attachment 1 photograph 19), a

restroom building (Attachment 1 photograph 20), a playground and picnic area (Attachment 1 photograph 21), a car-top boat launch, and several sections of County Park Drive (rd-23 through rd-30). Most of the recreational areas also will be affected. The Buckhorn Disc Golf Course (hp-07, Attachment 1 photograph 22), the Peninsula Hiking Trail (hp-02, Attachment 1 photograph 23), three Hog Run mountain bike trails (beginner, intermediate, and advanced), and the flower gardens will be mostly inundated. In addition, more than one-half of the Longleaf Pine Management Area (hp-03) will be inundated by the future operational level of Harris Lake.

Facility Impacts

There are numerous facilities owned by Progress Energy or local agencies that are located close to or below 240 feet that will be affected by the lake level rise. These are discussed in the following paragraphs.

Portions of the Progress Energy firing range (fac-04 through fac-10; Attachment 1 photograph 24) and the access road to the Town of Cary police firing range (rd-34; Attachment 1 photograph 24) will be inundated, as shown on Figure 1c and presented on Table 1.

Landfill 92-G, which was used during the construction of the HNP, may be affected by the lake level increase (fac-12; Table 1; Figure 1c; Attachment 1 photograph 25). A solid waste permit was issued by the State of North Carolina (1983) for the areas shown on Figure 2. Although three areas were permitted, all three areas may not have been used. Portions of these three areas are located below 240 feet and will be inundated. The landfills are estimated to be 10 to 12 feet deep below grade (PEC, 2007b).

The HNP picnic area, restroom (Figure 1c fac-11; Attachment 1 photograph 26), playground, and ball field will be affected because they are located at or below 240 feet (Table 1).

The majority of the facilities at the HEEC are located above 240 feet. However, several of the peripheral facilities will be affected by the increased lake level, as shown on Figure 3. The remote storage building for transmission lines and the lay-down yard east of the Non-Destructive Examination (NDE) Bunker and Technical Training Facility II building are located below 240 feet. The NDE Bunker, which is located at approximately 240 feet, may be affected. Two areas Progress Energy uses for training purposes will also be affected by the increased lake level. The Reconductor Training Area is located below 240 feet in the field east of the wastewater treatment plant and southwest of rd-01. This area contains five mock transmission line poles and a pavilion. A portion of the Lineman Training Area is below 240 feet. This facility is located southwest of the HEEC and includes the following training structures: overhead power lines and poles, underground LOOP with transformers, and underground field multiple lines. Many of these structures are located in the wooded area downhill from the HEEC and will likely be affected by the new lake elevation. Many more of the facilities at the HEEC will be vulnerable to flooding because they are located below 243 feet. These facilities could be protected by constructing a dike around the HEEC (S&L, 2007c).

The sidewalls of the Auxiliary Reservoir (Figure 1c fac-13; Table 1; Attachment 1 photograph 27) are located below 240 feet and may need to be built higher. Additionally, the cooling tower blowdown pipeline access manhole (Figure 1c fac-14; Table 1; Attachment 1

photograph 28) may be completely submerged when the operational lake level is 240 feet (PEC 2007a).

An earthen dam (Figure 1c fac-16; Table 1) approximately 1 mile upstream from Utey Creek's connection with Harris Lake is located at the 240-foot contour. The Town of Holly Springs wastewater discharge is located upstream of the dammed pond. The earthen dam has already partially failed at the outlet. A rise in the surface elevation of Harris Lake could have unpredictable effects on this dam and the pond behind it. Currently, the pond behind this earthen dam is a flowing system. Once the water surface elevation of the lake is raised, the wastewater discharge and its regulatory specifications may be affected. Concerns related to the Holly Springs wastewater discharge may not be an issue in the future because the Town of Holly Springs plans to pump all of the treated effluent to the proposed Western Wake Water Reclamation Facility (WWRF). This facility is planned to be operational in 2010. Subsequently, the Town of Holly Springs would have their conveyance system online by 2011 (Green Engineering, 2005).

Bird Box Impacts

Seventy-seven wood duck boxes were installed along the perimeter of Harris Lake starting in 1983. These boxes are monitored annually in conjunction with the Western Wake Ducks Unlimited chapter and Harris Lake County Park (PEC, 2004). As a part of Progress Energy's participation in the National Wild Turkey Federation's (NWTf's) "Energy for Wildlife" program, an unspecified number of bluebird boxes also were erected throughout the area (PEC, 2006a). Thirty-seven wood duck/bluebird boxes were observed during the lake survey in November 2006 (Attachment 1 photograph 29). The number and location of observed bird boxes (bb) are shown on Figure 1c. The remaining wood duck boxes and bluebird boxes are either gone or were not observed during the lake survey.

Other Impacts

An old grist mill located adjacent to the Cass Holt Road bridge over Buckhorn Creek (Figure 1c rd-102) is shown in Attachment 1 photograph 30. This abandoned mill is located at a 239-foot elevation (Table 1; see Note 1) and likely will be inundated.

There may be other historic properties and cultural resources located below the 100-year flood elevation that will be affected by the increased lake level. These impacts will be addressed in the archaeological study conducted by Progress Energy in order to comply with Section 106 of the National Historic Preservation Act, 16 U.S.C. § 470 (NHPA) and its implementing regulations (36 CFR 800).

A historic railroad bed extends from Harris Lake to the far side of Highway NC-42. It is below the current lake level and filled with water near the main dam (rr-01). This railroad bed rises above 240 feet where it crosses Highway NC-42. During times of flood, this railroad bed could potentially serve as a conduit for water to Highway NC-42 and the valley on the other side. It may be necessary to fill in or dike the railroad bed to prevent impacts to Highway NC-42.

Progress Energy owns the land below 243 feet around Harris Lake (PEC, 2006b). Therefore, private property will not be directly affected. However, at least two landowners own property adjacent to the future shoreline.

Numerous warning signs were observed along the current edge of Harris Lake and will be inundated during the water level rise. In addition, a blue heron rookery and several beaver dams and dens were observed near the current shoreline of Harris Lake.

Summary

A rise in lake level from the current operational level of 220 feet to 240 feet (PEC, 2007a) will inundate infrastructure along the shores of Harris Lake. The most serious impacts will be to county roads, transmission lines, boat ramps, emergency siren towers, Harris Lake County Park, the Town of Cary police firing range access road, and several Progress Energy facilities.

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Notes

1. The location coordinates for infrastructure features obtained from the GPS units were provided to a CH2M HILL Geographic Information System (GIS) technologist who projected them on an aerial photo in ArcGIS Version 9.1 (Environmental Systems Research Institute [ESRI]), using North Carolina State Plane NAD-83 (FIPS 3200 Feet) projection. The accuracy of the GPS units was confirmed by checking individual points to make sure they are projected in the correct location based on the aerial photo. For example, road infrastructure points are plotted on the roads that are visible on aerial photo. It is recognized that elevation measurements are not as accurate as horizontal measurements; however if the infrastructure point appears in the correct location on the aerial photo, then the point is assumed to be within the accuracy limitation of the particular GPS unit that was used. A signed document stating the accuracy of the GPS data by the CH2M HILL staff that collected the data points is included as Attachment 2.