BRICK POND PARK PRE-RESTORATION SURVEY

PRECONSTRUCTION FIELD SURVEY REPORT OF THE NORTH AUGUSTA CONSTRUCTED WETLAND RESTORATION SITE IN NORTH AUGUSTA, SC

Conducted for the City of North Augusta, SC

by

Sarah Michele Harmon, PhD, University of South Carolina-Aiken
Tanya Strickland and David Caddell – City of North Augusta
Stormwater Management Department

June 2007

INTRODUCTION

The purpose of this report was to present a baseline survey of wildlife, vegetation, and overall conditions in the area proposed for restoration through a conservation grant from the National Fish and Wildlife Foundation. Most of the survey was conducted during March and April 2007, before restoration activities had begun.

Section 1 includes a description of each area within the property with accompanying figures and photographs. This description will also include a description of vegetation and wildlife observed during site visits. Section 2 includes a comprehensive list of all plants and wildlife identified on the property. Appendix A is a complete photo gallery from this field survey. Appendix B is a photo gallery of plants and wildflowers observed on the property. Appendix C is a photo gallery of animals observed during field surveys.

SECTION 1
FIELD SURVEY OF THE RESTORATION SITE

The area slated for restoration encompasses approximately 30 acres and is composed of a former industrial site used for mining of clay and production of bricks. Clay mining activities left behind a series of small pools and quarry ponds that filled with water shortly after mining was complete in the 1930s and remain filled to this day. This site is located within the city limits of North Augusta, SC, in the floodplain adjacent to the Savannah River. The area immediately surrounding this site is being developed for mixed commercial and residential purposes. The former brick quarry that is to be restored is featured in Figure 1 along with some of the dominant features of this property.

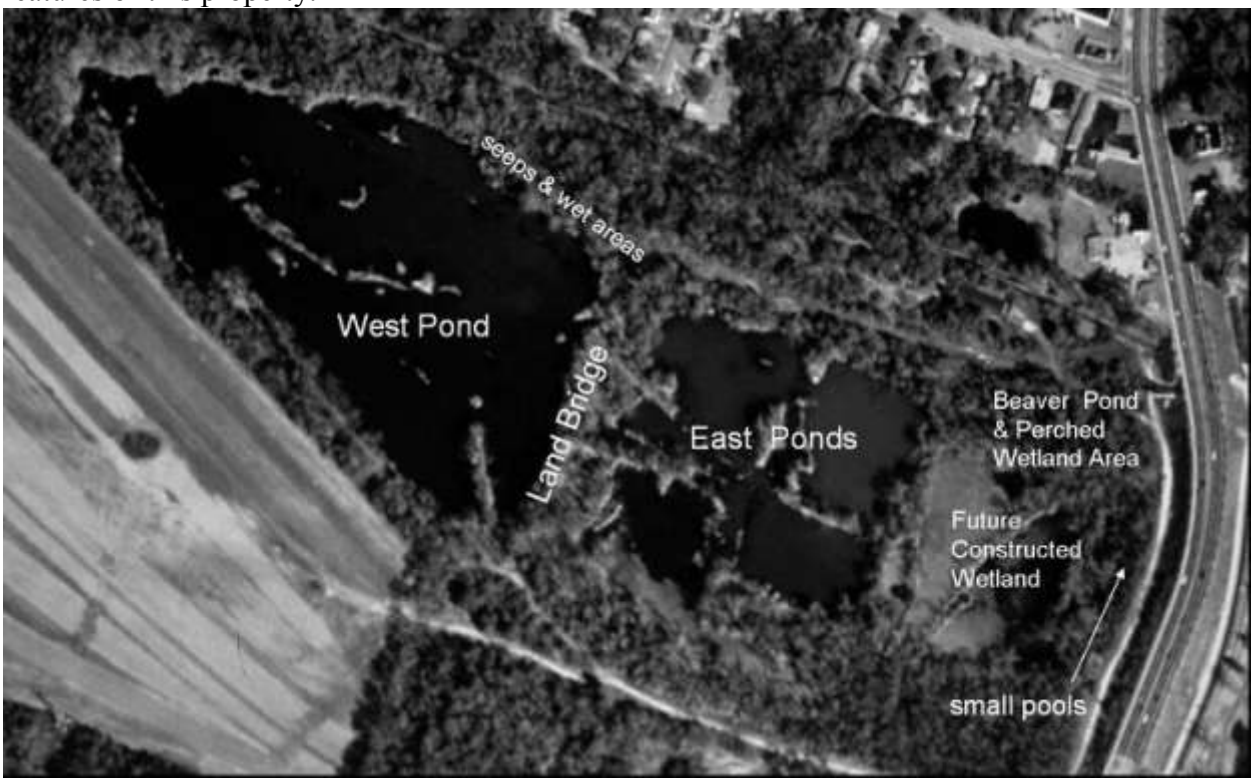

Figure 1. Aerial photograph of the area to be restored using grant money from the NFWS.

The site receives groundwater seepage and stormwater runoff from the from commercial and residential areas within the City of North Augusta's Crystal Lake Drainage Basin. There is no outflow from this system other than seepage and evaporation.

Small Pools on Eastern Side

The eastern end of the restoration site is currently a series of ten small ponds (named pools one through ten for this report) that directly receive the majority of the stormwater runoff from this basin (Figure 2) through a 36" concrete stormwater pipe located along the eastern edge of the property (Figure 3).

Figure 2. Pools one through ten and the location of the stormwater pipe that delivers most of the stormwater runoff from the upper regions of the drainage basin.

Figure 3. The stormwater runoff pipe into the eastern section of the restoration site during clear weather (a) and during a storm event (b).

The ten small pools in the eastern section were all highly disturbed due to former mining activities and the flow of large volumes of stormwater runoff. Most of the pools were characterized by little vegetation, an abundance of scattered debris, and thick oil on the surface (Figure 4).

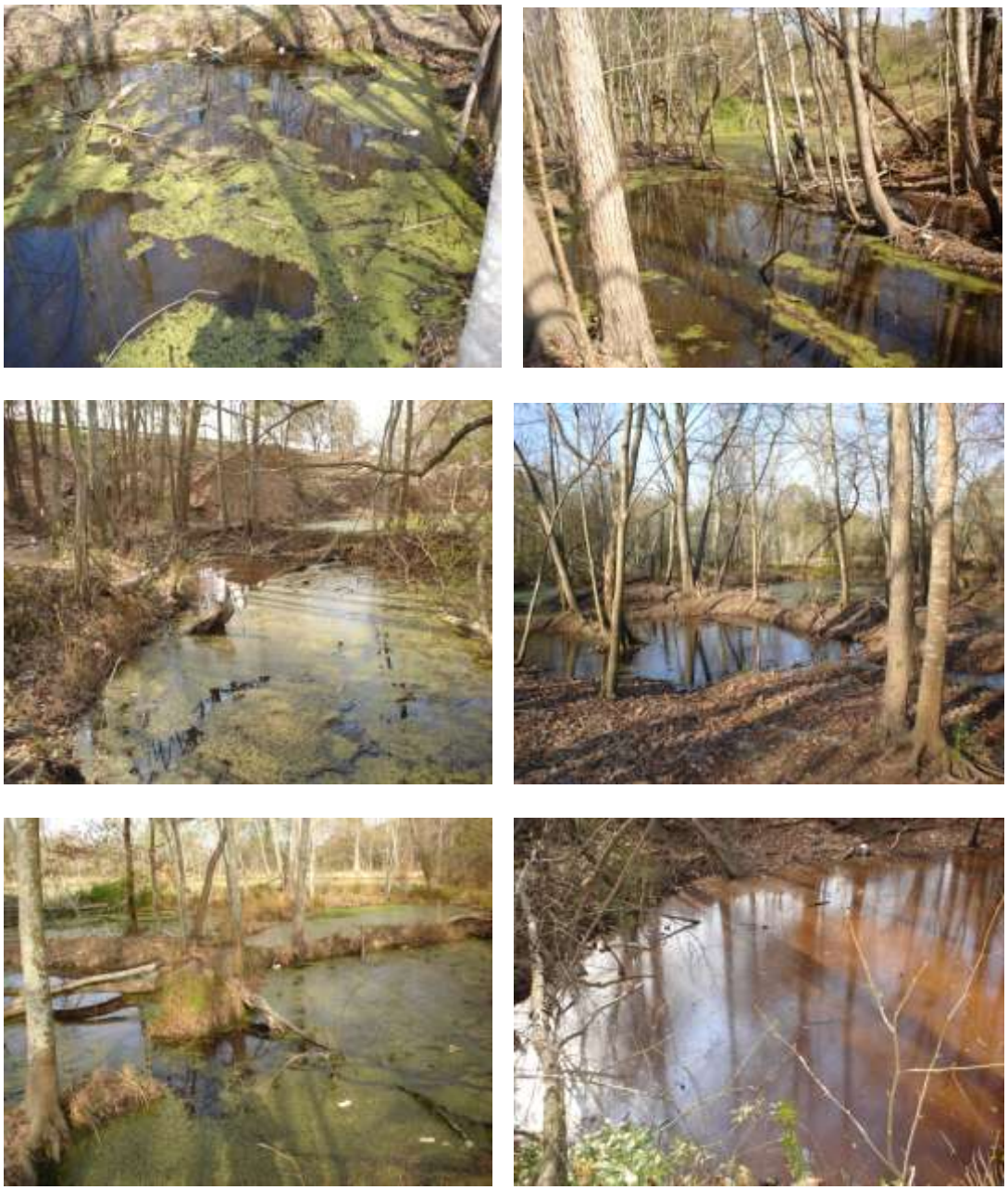

Figure 4. Photographs from the eastern section of the restoration site showing the highly-disturbed nature of these small pools.

The pools in this area contained very little wetland vegetation with the exception of duckweed (*Lemna* sp.), which covered most pools, and a few rushes (*Juncus* sp.). Pools three and four contained small populations of alligatorweed (*Alternanthera philoxeroides*), a rooted macrophyte that is considered a nuisance non-native invasive species in South Carolina (SC DNR 2006).

Vegetation in pool seven included parrot feather (*Myriophyllum aquaticum*), another rooted non-native invasive species (SC DNR 1996). The dominant shrub along the banks in this area is another non-native invasive species, privet (*Ligustrum* sp.). Privet is particularly dominant on banks to the north and west of the small pools. Filamentous algae was noted in pool 3, and was later identified in the laboratory as the pollution-tolerant algae, *Spirogyra* sp. Trees along berms and banks in this area included sweetgum (*Liquidambar styraciflua*), willow (*Salix* sp.), elm (*Ulmus* sp.), white mulberry (*Morus alba*), and a number of oaks (*Quercus* sp.). Beaver activity was also noted along the western edge of pool seven (Figure 5); however, the location appeared to be abandoned at the time of this survey.

Figure 5. Beaver activity along the western edge of pool seven.

Beaver Pond Area

A large beaver pond covers approximately 0.98 acres north of the small ponds, and it is fed by a small stream flowing from off site (Figure 6).

Figure 6. Beaver pond.

The stream meandered a short distance through thick stands of privet, then opened into the shallow beaver pond (Figure 7). The beaver pond was the most dense area in terms of aquatic vegetation (Figure 8). It was characterized by numerous clumps of rushes (*Juncus* sp.) and a dense cover of duckweed (*Lemna* sp.). Other rooted macrophytes included alligatorweed (*Alternanthera philoxeroides*), parrot feather (*Myriophyllum aquaticum*), cattails (*Typha latifolia* L.), water pennywort (*Hydrocotyl ranunculoides*), and butterweed (*Senecia glabellus*).

Figure 7. Stream flowing from off site and into beaver pond. Stream flows through thick stands of privet.

Figure 8. Photographs from the beaver pond showing various vegetation types.

Perched Wetland Area

North of the beaver pond, is an area referred to as the "perched wetland" (Figure 9). It is fed by the same ground water stream as the beaver pond. This small area (approximately 0.34 acres) was almost completely covered by parrot feather (*Myriophyllum aquaticum*) and surrounded by small trees, mostly willow (*Salix* sp.) (Figure 10).

Figure 9. The perched wetland.

Figure 10. Vegetation in the perched wetland. The dominant aquatic species is parrot feather (*Myriophyllum aquaticum*), and the dominant tree is willow (*Salix* sp.)

Much of the beaver pond will be lost to street construction as part of the development of this property. The perched wetland will be restored as part of the work funded by NFWF.

Ponds Eleven and Fifteen (the Future Constructed Wetland Location)

Pond eleven (Figure 11) will be the site of the greatest restoration activity of this project, and this will be the location of the shallow portions of the stormwater treatment wetland. At the time of this survey (prior to restoration activities), pond eleven covered 1.9 acres. Pond fifteen is immediately adjacent to pond eleven (Figure 12) and covered 1.3 acres in April 2007. Once restoration is complete, pond fifteen will serve as the deepest pool of the stormwater treatment wetland. Both ponds were completely covered with duckweed (*Lemna* sp.) and contained large stands of parrot feather (*Myriophyllum aquaticum*) (Figure 13). Rushes (*Juncus* sp.) dominated the littoral zone of both ponds. Privet (*Ligustrum* sp.) was the dominant shrub species on the upper banks surrounding these ponds. Trees noted on banks and berms in this area include wing-barked elm (*Ulmus alata*), poplar (*Populus* sp.), sweetgum (*Liquidamber styraciflua*), and a number of species of oak (*Quercus* sp.).

Figure 11. Pond eleven. After wetland restoration, this pond will serve as the shallow regions of the stormwater treatment wetland.

Figure 12. Pond fifteen. This will serve as the deepest pool for the stormwater treatment wetland.

Figure 13. Close up views of ponds eleven and fifteen. These two ponds will be restored into a stormwater treatment wetland.

Pond Thirteen

Pond thirteen is the largest pool on the eastern side of the property and is characterized by a number of berms from former mining activities (Figure 14). Berms separate individual pools, but all have been broken to allow flow through one contiguous system (Figure 15). As with ponds eleven and fifteen, this large pond was completely covered by duckweed (*Lemna* sp.) and parrot feather (*Myriophyllum aquaticum*). Rushes (*Juncus* sp.) were present in the littoral zone, and privet (*Ligustrum* sp.) was the dominant shrub species on the upper banks, particularly to the south and west. One adult American alligator (*Alligator mississippiensis*) and at least three juveniles (< 6 inches long) were observed in the northwest corner of this pond. Trees noted along the banks and berms of pond thirteen include willow (*Salix* sp.), elm (*Ulmus* sp.), poplar (*Populus* sp.), sweetgum (*Liquidamber styraciflua*), red maple (*Acer rubrum*), and a number of different oaks (*Quercus* sp.).

Figure 14. Pond thirteen, the largest pond on the eastern side of the property's land bridge.

Figure 15. Photographs of pond thirteen. Numerous berms outline the former clay quarries. All berms have been breached in order to provide one contiguous wetland system.

West Pond

The west pond is located west of the land bridge and is the largest pond on the property, covering approximately 17.8 acres (Figure 16). There are a number islands and small isolated pools along the perimeter that are remnants of a once-extensive berm system created during mining activities. There was a large cover of the aquatic nuisance alligatorweed (*Alternanthera philoxeroides*) along with parrot feather (*Myriophyllum aquaticum*) in shallow regions around the pond's perimeter (Figure 17). The pollution-tolerant filamentous algae, *Spirogyra* sp., was also observed in shallow areas along with the alligatorweed. Other rooted macrophytes included spotted pond weed (*Potamogeton pulche*r) and cattails (*Typha latifolia* L.). Rushes (*Juncus* sp.) were present in the littoral zone along the entire perimeter. Upper banks on the north and south sides of west pond held dense stands of privet (*Ligustrum* sp.). Trees surrounding west pond include poplar (*Populus* sp.), hackberry (*Celtis sp*.), sweetgum (*Liquidambar styraciflua*), black cherry *(Prunus serotina*), willow (*Salix* sp.), elm (*Ulmus* sp.), red maple (*Acer rubrum*), and a number of oak species (*Quercus* sp.).

Figure 16. West pond.

Figure 17. Photographs of west pond.

The northeastern bank of west pond contained several springs and isolated wet areas (Figure 18) characterized by lizard's tail (*Saururus cernuus* L.), a common wetland plant, and a dense stand of cane (*Arundinaria gigantea*) at the northeastern corner. The cane stand extended onto the land bridge to the eastern side of the land bridge road. Several species of ferns were also observed along the wet areas of the land bridge; these included cinnamon fern (*Osmunda cinnamomea*) and chain fern (*Woodwardia areolata*).

Figure 18. A spring along the northern bank of west pond and its associated wetland vegetation.

ADDITIONAL INVASIVE VEGETATION

Several terrestrial invasive plants were observed in addition to privet and all of the aquatic nuisance species listed in the descriptions above. English ivy (*Hedera helix*), vinca (*Vinca* sp.), mimosa (*Albizia julibrissin*), monkey grass (*Ophiopogon* sp.), and wisteria (*Wisteria* sp.) were all observed on the land bridge between east and west ponds. These plants are of note because of their non-native status and invasive nature. Japanese climbing fern (*Lygodium japonicum*), another highly invasive non-native terrestrial plant, was noted along the northwestern shore near the recently developed residential area and along the road adjacent to emergency overflow ditch between the restoration site and the Savannah River (Figure 19).

Figure 19. Notable stands of invasive terrestrial vegetation in addition to privet. Privet is the dominant shrub throughout the entire property.

SECTION 2
VEGETATION AND WILDLIFE LISTS

Wildlife

Wildlife species were observed and recorded over the course of this survey and the beginning stages of the restoration project. Turtles and fish were collected over several days of trapping (April 2-5, 2007, and April 23-24, 2007) in west pond and in pond thirteen near the land bridge. This list also includes species noted by Southeastern Natural Sciences Academy in their report dated April 18, 2007.

Reptiles and Amphibians

Alligator snapping turtle (*Macrochelys temminckii*)
American alligator (*Alligator mississippiensis*)
Black racer (*Coluber constrictor*)
Black rat snake (*Elphe obsoleta*)
Broadhead skink (*Eumeces laticeps*)
Bronze frog (*Rana clamitans*)
Brown water snake (*Nerodia taxispilota*)
Bullfrog (*Rana castesbeiana*)
Common snapping turtle (*Chelydra serpentina*)
Eastern box turtle (*Terrapene carolina*)
Eastern narrowmouth toad (*Gastrophryne carolinensis*)
Eastern painted turtle (*Chrysemys picta*)
Eastern river cooter (*Pseudemys concinna*)
Green anole lizard (*Anolis carolinensis*)
Green treefrog (*Hyla cinerea*)
Southern leopard frog (*Rana sphenocephala*)
Mud turtle (*Kinosternon* sp.)
Musk turtle, Stinkpot turtle (*Sternotherus odoratus*)
Southern cricket frog (*Acris gryllus*)
Spotted salamander (*Ambystoma maculatum*)
Stinkpot turtle, Common musk turtle (*Sternotherus odoratus*)
Yellow-bellied slider turtle (*Trachemys scripta*)

Fish

Bluegill sunfish (*Lepomis macrochirus*)
Bullhead catfish (*Ictalurus* sp.)
Mosquitofish (*Gambusia affinis*)
Redear sunfish, shellcracker (*Lepomis microlophus*)
Warmouth *(Lepomis gulosus*)

Mammals

Beaver (*Castor canadensis*)
Common Racoon (*Procyon lotor*)
Eastern gray squirrel (*Sciurus carolinensis*)
Muskrat (*Ondatra zibethicus*)
Opossum (*Didelphis virginiana*)
White-tailed deer (*Odocoileus virginianus*) including several piebald (partial albino) individuals

Birds

Belted kingfisher (*Megaceryle alcyon*)
Blackbird (*Turdus merula*)
Cedar waxwing (*Bombycilla cedrorum*)
Chimney swifts (*Chaetura pelagica*)
Cormorant (*Phalacrocorax* sp.)
Egret (*Ardea alba*)
Great Blue Heron (*Ardea herodias*)
Green Heron (*Butorides virescens*)
Mallard duck (*Anas platyrhynchos*)
Pileated woodpecker (*Dryocopus pileatus*)
Red-shouldered hawk (*Buteo lineatus*)
Red-tailed hawk (*Buteo jamaicensis*)
Ring-necked ducks (*Aythya collaris*)
Wood duck (*Aix sponsa*)

Comprehensive Terrestrial Vegetation List

Vegetation species were observed and recorded by a number of biologists and arborists over the course of this survey and through the beginning stages of the restoration project. Contributors include the Hammond's Ferry Development Group, Southeastern Natural Sciences Academy, and biologists employed by the City of North Augusta. Due to numerous contributors, not all species are listed in the text of the field survey descriptions.

Herbs

Bear's Foot (*Polymnia uvedalia*)
Bitterweed (*Helenium amarum*)
Blackberry (*Rubus fruiticosus*)
Blue mistflower (*Conoclinium coelestinum* a.k.a. *Eupatorium coelestinum*)
Broom-straw, beard grass (*Andropogon* sp.)
Butterweed (*Senecia glabellus*)
Cane (*Arundinaria gigantea*)
Chain fern (*Woodwardia areolata*)
Cinnamon fern (*Osmunda cinnamomea*)
Climbing butterfly-pea (*Centrosema virginianum*)
Climbing hempweed (*Mikania scandens*)
Dayflower (*Commelina erecta*)
Dog fennel (*Eupatorium capillofolium*)
False nettle (*Boehmeria cylindrica*)
Goldenrod (*Solidago* sp.)
Grasses (numerous species)
Greenbriar (*Smilax* sp.)
Honeysuckle (*Lonicera* sp.)
Indian strawberry (*Duchesnea indica*)
Ironweed (*Veronia* sp.)
Japanese climbing fern (*Lygodium japonicum*)
Johnson grass (*Sorghum halepense*)
Lespedeza sp.
Mexican clover (*Richardia scabra*)
Monkey grass (*Ophiopogon* sp.)
Morning glory, blue and white (*Ipomoea pandurata*)
Morning glory, purple, common (*Ipomoea purpurea*)
Morning glory, small-flowered (*Ipomoea lacunosa*)
Nutgass, aquatic species (*Cyperus* sp.)
Nutsedge (*Cyperus strigosus*)
Poison ivy (*Rhus radicans*)
Sedges (*Carex* sp.)
Southern sida (*Sida acuta*)
Spring vetch (*Vicia sativa*)
Spotted jewelweed (*Impatiens capensis*)
Trailing wildbean, sand bean (*Strophostyles helvola*)

Verbena (*Verbena bonariensis*)
Vetch (*Vicia* sp.)
Virginia creeper (*Parthenocissus quinquefolia*)

Shrubs and Trees

Black cherry *(Prunus serotina*)
Black locust (*Robinia* sp.)
Box elder (*Acer negundo*)
Cypress (*Taxodium* sp.)
Elm (*Ulmus* sp.)
    Winged-bark elm (*Ulmus alata*)
Hackberry (*Celtis sp*.)
Locust (*Robinia* sp.)
Mimosa (*Albizia julibrissin*)
Oaks (*Quercus* sp.)
    Laurel oak (*Quercus laurifolia*)
    Water oak (*Quercus nigra*)
    Willow oak (*Quercus phellos*)
Pecan (*Carya illinoesis*)
Poplar (*Populus* sp.)
Privet (*Ligustrum* sp.).
Red maple (*Acer rubrum*)
Sweetgum (*Liquidambar styraciflua*)
Sycamore (*Platanus occidentalis*)
Tree of Heaven (*Ailanthus altissima*)
White mulberry (*Morus alba*)
Willow (*Salix* sp.)
    Black willow (*Salix nigra*)

Aquatic Vegetation

Alligatorweed (*Alternanthera philoxeroides*)
Arrowhead (*Sagittaria sp*.)
Cane (*Arundinaria gigantea*)
Cattails (*Typha latifolia* L.)
Chain fern (*Woodwardia areolata*)
Cinnamon fern (*Osmunda cinnamomea*)
Duckweed (*Lemna* sp.)
Lizard's tail (*Saururus cernuus* L.)
Mild water pepper, swamp smartweed (*Polygonum* sp.)
Parrot feather (*Myriophyllum aquaticum*)
Rushes (*Juncus* sp.)
Spotted pond weed (*Potamogeton pulche*r)
Water pennywort (*Hydrocotyl ranunculoides*)

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