

5000 Duraleigh: Effects on Crabtree Creek

By Douglas N. Rader, PhD · First Approximation, September 20, 2026

The 5000 Duraleigh project site sits on the side of the steep, rocky gorge of Crabtree Creek, adjacent to the creek and the West Crabtree Creek Greenway, and above the emblematic suspension bridge where the greenway crosses the creek. The rezoning required to allow the intensive development proposed requires clearcutting and hill-top and hillside quarrying to level the site, with retaining walls up to 20-25 feet at the top edge of the property and smaller retaining walls at the lower edge where the greenway passes through the floodplain. The applicant is unwilling to consider less intensive development; thus, this analysis will equate the rezoning to that high-density outcome.

Watershed Context

The ecological address of the 5000 Duraleigh project site is the Upper Crabtree Creek Watershed, part of the Crabtree Creek Watershed, in the Neuse River Basin. The Crabtree Creek Watershed covers roughly 145 square miles (about 376 square kilometers), located in the eastern Piedmont of North Carolina, joining the Neuse east of Raleigh, near Anderson Point Park. The basin includes portions of Wake and Durham Counties, Umstead State Park, Lake Crabtree and the Raleigh Durham International Airport. Major tributaries in the western section include Turkey Creek, Reedy Creek, Sycamore Creek, Richland Creek, Hare Snipe Creek, House Creek, and Mine Creek.

Most of Crabtree Creek is contaminated already by two Superfund sites (Koppers at Morrisville and Ward Transformer at RDU). Koppers yielded wood-treating contaminants, including pentachlorophenol; Ward was a major source of polychlorinated biphenyls. Extensive remediation at both sites and long-term education about fish tissue contamination has led to marked improvements in water quality and ecological health.

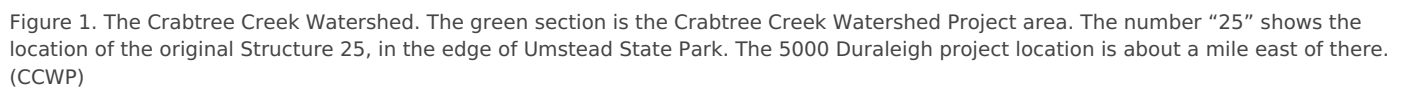
The entire Neuse Basin is also designated nutrient sensitive waters, a result of algal blooms and deoxygenation caused by overenrichment with nitrogen and phosphorus. Large amounts of money have been invested over many years to reduce nitrogen loading into this basin, including the requirement for streamside buffers, where deeply rooted trees intercept nitrogen moving through the groundwater.

Despite these problems, Crabtree Creek remains critical habitat for several aquatic protected species: the freshwater mussels, Atlantic Pigtoe (*Fusconaia masoni*, federal threatened status), Triangle Floater (*Alasmodonta undulata*, state endangered), Creeper Mussel (*Strophitis undulatus*, state vulnerable), and Notched Rainbow (*Villosa constricta*, state threatened). Crabtree Creek also has been identified as an important habitat for North Carolina Spiny Crayfish (*Faxonius carolinensis*, state special concern). Other rare aquatic species have been known historically from Crabtree Creek, including the now-famous aquatic salamander, the Neuse River Waterdog (*Necturus lewisi*, federal threatened, endemic to the Neuse and Tar-Pamlico Basins). Rare fishes known or expected to occur in Crabtree Creek include Mimic Shiner (*Notropis volucellus*, state threatened) and Carolina Madtom (*Noturus furiosus*, state threatened), while others are also expected.

Greenway use and water use all along Crabtree Creek are high and rapidly expanding, especially now that the West Crabtree Greenway connects to Umstead State Park and points east toward the Neuse. Fishing – including flyfishing – is very common, despite the fish tissue consumption advisories in place

Burgeoning development in Crabtree Creek continues to exacerbate flooding associated with storms, and streambank erosion. Crabtree Valley Mall – just downstream – continues to experience extreme flooding under high precipitation conditions. In fact, recurrent and increasing flooding through the 1950s resulted in the development and adoption in 1963–64 of the Crabtree Creek Watershed Project (covering about 91K acres) including the installation of ten stormwater control structures, including the dams at Lake Crabtree (Structure 23, 1988), Shelly Lake (Structure 13, 1975), Lake Lynn (Structure 22B, 1976) and others (Figure 1). Included in this project is a plan to build an instream diversion structure (a weir and spillway just upstream of the 5000 Duraleigh site, called Structure 25) that would send over 5K cfs of stormwater into the quarry for temporary storage, with a pump out option available. Two of the ten built dams are in the significant hazard class, and rehabilitation is being developed: Lake Lynn Dam and Richland Lake Dam.

Rapidly increasing urbanization and impervious surface coverage throughout the watershed – especially in the headwater towns and in the Brier Creek area – has rapidly increased the levels associated with the 100-year return and 500-year return intervals. New federal floodplain maps were released in 2022 and implemented in all county zoning programs. Generally, flood hazard zones are creeping up-bank as development continues, and stream scour and bank erosion is proceeding rapidly.



The Site and the Creek

The 5000 Duraleigh site is located immediately adjacent to Crabtree Creek as it passes into the Crabtree Creek Gorge, formed as this Neuse tributary cut down into the ancient metamorphic rocks of the Raleigh Belt after the Durham/Deep River Triassic Basin was formed 220 million years ago. Geologically, the 5000 Duraleigh 15-acre tract sits on the same hard rock (Crabtree Creek Gneiss, Figure 2) that attracted the Bryan Rock and Sand Company to lease it from a local family back in 1949. In fact, that original lease includes both tracts, where the target hard rock was close to the surface and most accessible (Figure 3). The soils on this site diminish from moderately shallow sandy and rocky loams up on top (including in our rocky backyard), down to very shallow Wake E soils (often less than 10 inches depth to bedrock) down the steep slopes to the floodplain (Figure 4).

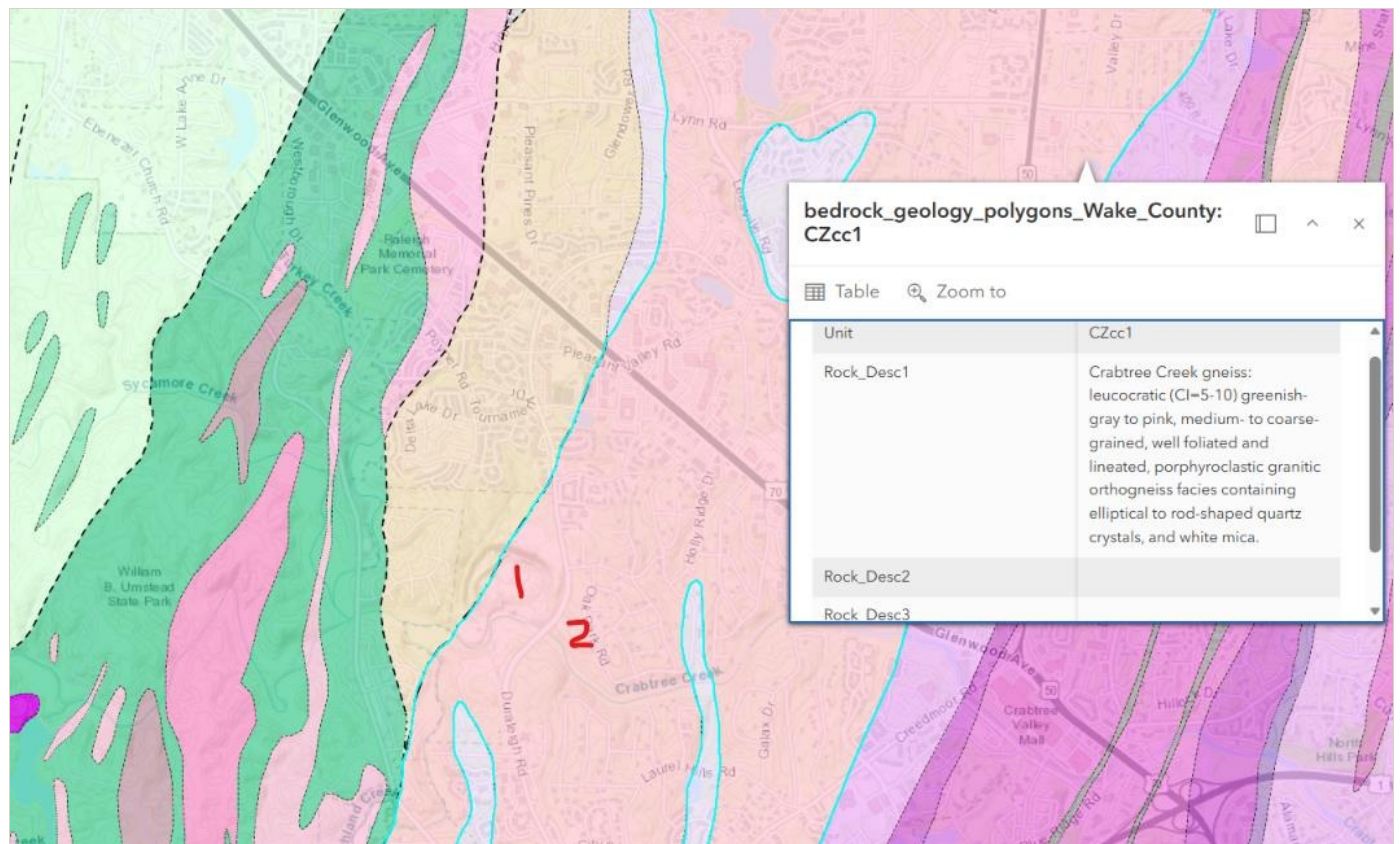


Figure 2. Excerpt from the Wake County Interactive Geologic Map; number 1 is the Crabtree Quarry, while number 2 is the project site.

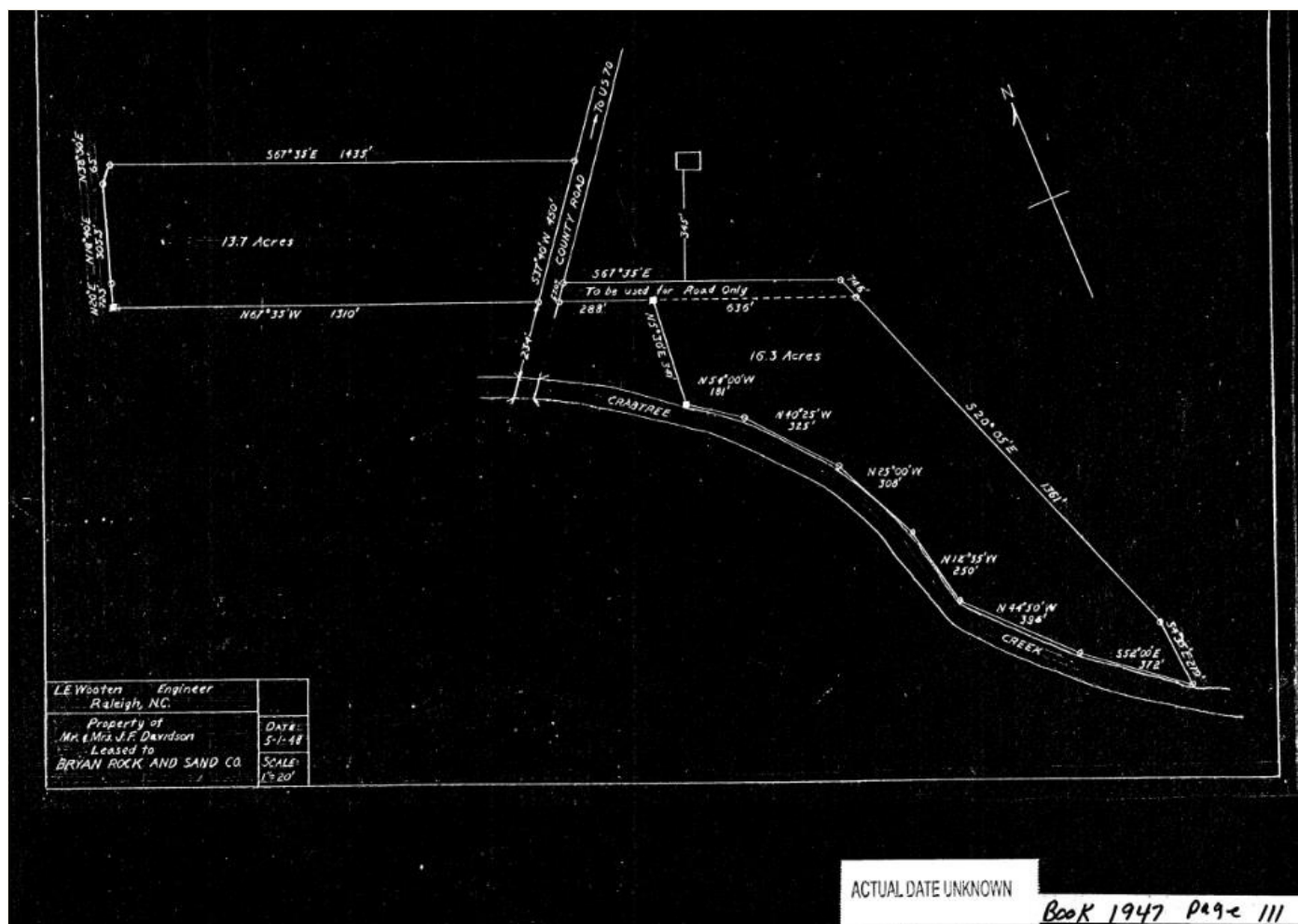


Figure 3. The 1947/48 survey for the quarry lease: the current quarry plus the current site. From the Wake County Registry, Map Book 1947.

Hydrologically, this gorge-side site received flows from a significant area of Oak Park as well as the onsite lands, both through surface flow and subsurface flows. Greenway users are familiar with this, given the extensive sheet flow that crosses the greenway after storms. Recognizing these offsite flows, the developers of Oak Park put abundant drainage easements between and behind most houses being built on the western side of the subdivision back in the 1970s. While Oak Park Road itself is supplied with curb and gutter, the hydrologic connectivity from Oak Park may extend beyond the road. At present, in its heavily forested condition, these lands experience significant evapotranspiration that reduces downslope water movement. Deeply rooted trees across the site routinely also take up dissolved nitrate, which would otherwise enter the creek through subsurface or stormwater flows. Clearcutting will eliminate ET and enhance offsite flows and nitrogen loads.



Figure 4. Excerpt from Sheet 38 from the Wake County Soil Survey (1970), showing the site – north of Crabtree Creek and south of the cleared square of the radio towers – as Wake E (described as less than 10 to 20 inches of soil over bedrock, at slopes up to 30 degrees). The asphalt plant site also shows east of Duraleigh Road, north of the creek.

That effect will be exacerbated when widely and deeply rooted trees on adjacent private lands die once their roots are cut and otherwise damaged, the whole hillside is dewatered, and trees are subjected to stronger wind exposure and damage by the project-associated alterations.

The fully weighted “wet” load on the planned retaining walls at the top of the site – up to 20 or 25 feet tall – associated with rock, soil and stormwater will be prodigious. Recent experience in 30-degree slopes like this in Western North Carolina has shown that water moving into the zone between weathered and unweathered bedrock can act as a lubricant, potentially facilitating rapid downslope displacement at a variety of scales from slumping to debris flows. I have made initial inquiries to experts in that field to help ascertain these risks.

The site also houses a legacy toxicant contamination site on the western edge by Duraleigh Road, where an asphalt plant and testing laboratory ran from 1959 until 1977 when it was destroyed by fire. (Please see the detailed technical paper on that heavy industrial site.) While the exact spread and load is uncertain, as it has never been subjected to modern, detailed toxicant testing, the aggregate potential toxicant load is significant, across a wide array of toxicant types. The Phase 1 Environmental Site Assessment the applicants purport to have completed – without any onsite testing – does not provide the information needed to understand the risks involved to workers, neighbors, greenway users, stream ecology and downstream water users of all types, including the recreational fisher that heavily use those waters. Comprehensive analysis of in-place toxicants is required, with a long-term management plan put in place to protect those potentially affected during and after construction. Earth and rock moving could well release and redistribute whatever toxicants remain, with much ending up in Crabtree Creek, adding to the alphabet soup of toxicants already in place.

Managing stormwater on this site will be challenging, given that it receives not only its own direct rainfall but additional large flows from upslope into Oak Park. The only management strategy that the applicant has proposed for RX5 type development relies upon concrete vaults under structures or underground. Building those into the hard rocks of this tract will be extremely expensive and challenging, and their operation, management and maintenance even more so. When groundwaves

associated with the continuing quarry blasting (through the middle 2050s) compromise the performance of those structures, repairs will prove difficult, and performance will nearly certainly be compromised. Stormwater is already overabundant in this portion of the sewage collection system, with high inflow and infiltration and sewage spills already occurring.

Finally, stormwater could also be an imminent hazard to the integrity of the project structures, especially the retaining walls, regardless of design (given the requirement for the high retaining walls mentioned above under any RX5 scenario). We have seen and photographed failing retaining walls in Raleigh, and have considerable doubts about the ability of engineered structures here under not only the loads expected under storm conditions, but after damage induced by groundwaves from blasting at the quarry. At a minimum, any retaining walls built would have to accommodate drainage from the upslope parts of the watershed in addition to the normal loads exerted by the hill.