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Biodiversity Assessment and Potential Impacts of Paving Killearn Road, Town of Washington, Dutchess County, New York

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Prepared for Mackey, Butts & Wise, LLP on behalf of Christopher Mann

Millbrook, New York

8 July 2021

Introduction

At the request of Mackey, Butts & Wise, LLP, who are advising their client Christopher Mann, Hudsonia conducted a biodiversity assessment and assessment of likely environmental impacts of the proposed paving of Killlearn Road, currently a dirt road in the southeastern portion of the Town of Washington, Dutchess County, New York. Our aim is to identify salient biodiversity values of the road corridor and potential impacts of paving on those values, so that they can be fully considered in the engineering report being commissioned by the Town and in the Town's environmental assessment process. Hudsonia does not normally take advocacy positions in matters of land use and environmental management; rather, we make observations, collect data, analyze biodiversity, and assess potential impacts.

On 7 June we both spent the day along Killlearn Road. Graham also spent 10 and 11 June along the road. In general the weather was warm, calm, and sunny with no precipitation during our field work.

Decisions about the management of rural roads can be informed by the concept of *green roadways*. A green roadway (Sipes and Sipes 2013) should be energy-efficient, have a reduced carbon footprint, and protect:

- Natural resources including trees
- Cultural resources
- Wildlife and habitats
- Motorist safety
- Open space and landscape character

In this report, we focus on the wildlife and habitat aspects of Killlearn Road. We assess the potential impacts on wildlife and plants of paving the road, against the larger-scale changes taking place in our region including intensification of land use and climate change.

Study Area

Killlearn Road runs from Route 343 at the north end in the Town of Washington to Route 24 on the border with the Town of Union Vale. Killlearn Road is 3.3 miles (5.4 kilometers) long including a short paved section at the northern end. The unpaved portion comprises a highly compacted surface with gravelly patches. There are narrow sections bordered by rock ledges, drop-offs, or mature trees. Killlearn Road ranges from ca. 220 meters (m) elevation at the north end to ca. 345 m elevation at the south end.

Habitats

We updated the Tollefson and Stevens (2004) habitat mapping within 100 m on both sides of Killlearn Rd (within the Town of Washington only) by reviewing recent aerial orthophotography and making field observations (figures 1-3 at end of this report). The update produced 11 ecologically significant habitats, down from 12 in 2004: a habitat type called waste ground, in this case bare rock and gravel from house construction, was no longer present. More importantly, upland forest was still the predominant habitat type at 97 acres, but it had decreased in extent by 16%, or 18 acres: a substantial loss of forest. The

majority of the lost forest and other lost habitats had been replaced by newly developed areas—19 new acres—and cultural areas, i.e., large lawns—3 acres. These figures represent increases of 44% in developed area and 60% in cultural areas over previous extents. Several ponds had also been created or expanded, resulting in a net increase of 1 acre, or 27% over the previous extent.

Upland meadow, including hayfields, cropped areas, and oldfields (post-agricultural fields), was the second-most widespread habitat type, at 61 acres, down slightly from the 2008 amount (65 acres).

Two other habitat changes are worth noting. First, in 2004 there were two intermittent woodland pools (a type of vernal pool) within the Killlearn Road corridor, but by 2021 one of those had been enlarged and deepened into a pond, reducing its habitat functions for breeding woodland amphibians. Second, in 2004 there was a large buttonbush pool (1.7 acres), but by 2021 more than half—0.95 acre—of this pool had been deepened and cleared of vegetation to become a pond.

Both of these wetland types can provide critical breeding habitat for several obligate pool-breeding amphibians, including wood frog, spotted salamander, marbled salamander (a New York State Species of Greatest Conservation Need [SGCN]), and Jefferson salamander (NYS Species of Potential Conservation Need). Reptiles such as spotted turtle (SGCN) and eastern ribbon snake (SGCN) use such pools for foraging, rehydrating, and resting. During the breeding season, birds may be more abundant and diverse around intermittent woodland pools than elsewhere in upland forest (McKinney and Paton 2009). Wood duck, mallard, and American black duck (SGCN) use the pools for foraging, nesting, and brood-rearing. The invertebrate communities of these pools can be rich, providing abundant food for songbirds such as yellow warbler, common yellowthroat, Louisiana waterthrush (SGCN), and northern waterthrush. Rare plants may also be supported.

Clearly, there has been much development along Killlearn Road in the last 15 years, with 16% of the forest cleared within 100 m of both sides of the road. Indeed, 11 new houses have been built in that time. That alone has likely increased the traffic volume and noise along the road. Notwithstanding, Killlearn Road still has light traffic volume. In addition, some wildlife species have been affected by these changes. This includes forest songbirds, many of which are sensitive to noise and would withdraw deeper into the forest, if possible; and reptiles and amphibians that are more prone to being run over by substantially increased traffic flow. Wildlife of all types was directly displaced by the clearing of forest. In the lost intermittent woodland pool and buttonbush pool, pool-breeding amphibians may have been displaced or killed, and turtles, waterfowl, and other wildlife have lost some of the local habitat functionality. The changes along Killlearn Road reflect larger scale processes in Dutchess County where wetland pools are being converted to ornamental ponds or other non-wetland habitats, and forests are being cleared and fragmented into smaller patches that have less potential to support rare wildlife and plants. Although the conversion of forest to building envelopes, and wetlands to ornamental ponds, is essentially irreversible, the future management of Killlearn Road offers good opportunities for biodiversity conservation.

Rare turtle potential. Blanding's turtle is listed as a Threatened species in New York, and Dutchess County supports a genetically-unique population. Although the currently documented range of this species in the county is essentially west of our Killlearn Road study area, no Blanding's turtle survey has been performed here thus it is not known if the species is present. Blanding's turtles in Dutchess are often associated with Hoosic gravelly loam soils and deep-flooding shrubby wetland pools (Kiviat 1997, Kiviat and Stevens 2001). The large buttonbush pool on the west side of Killlearn Road (Figure 3), an area of Hoosic soil ca. 300 m west of the road (see <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>), and another area of Hoosic soil ca. 1100 m east of the road indicate the possibility of Blanding's turtle occurrence. Blanding's turtles frequently move 1000 m (about two-thirds mile) or more among wetlands and between wetlands and

upland nesting areas. If there are Blanding's turtles using the wetlands, ponds, and woodland pools near Killearn Road, the turtles would be likely to cross the road and be exposed to injury or death from vehicles strikes.

The small streams near Killearn Road could support wood turtle, a New York Special Concern species. The road is within the potential nesting migration distance of this species in a few places. There is potential habitat for spotted turtle (also Special Concern) in the wet meadow and pond east of the northern portion of the road, in the buttonbush pool, and in other wetlands and ponds near the road. The bog turtle (New York Endangered) occupies sunny, open wetlands with soft, calcium-rich soils. Wet meadows (Figures 1-3) near Killearn Road should be assessed by an expert for potential bog turtle habitat using the standardized U.S. Fish and Wildlife Service procedure. Bog turtles can migrate hundreds of meters between seasonal habitats or during droughts. Planning for Killearn Road should consider potential impacts on all of these turtle species of conservation importance because injury and death due to roads are a pervasive concern for freshwater turtles.

Birds. We observed a wide variety of birds using the habitats adjacent to (within 100 m of) the roadway, including songbirds, woodpeckers, and raptors. Of particular note were several New York State Species of Greatest Conservation Need: brown thrasher, wood thrush (at least 2 locations), scarlet tanager (4), blue-winged warbler (2), and prairie warbler, as well as the regionally uncommon yellow-billed cuckoo (2) and barred owl. In addition to the barred owl we heard, three land-owners reported hearing or seeing at least three different pairs of barred owls. Figures 1-3 (at end) show approximate locations of the bird SGCN and the cuckoo and owl. Barred owls sometimes hunt small animals, such as amphibians, crossing roads, when the owls are vulnerable to being hit by cars.

Cool spots. In one small area we found several plants typically associated with cooler microhabitats, including striped maple (*Acer pensylvanicum*), red-berried elder (*Sambucus racemosa*), and horse balm (*Collinsonia canadensis*). Paving would probably produce a *heat island* effect by accumulating more solar energy that warms the cooler microclimate and makes it unsuitable for these plants as well as any cool-adapted animals that may inhabit the location. Cool spots are important for organisms at the southern edges of their geographic ranges that are likely to be adversely affected by climate warming. There may be other cool spots along Killearn Road that would be warmed by paving the road.

Large trees. If road widening is planned along with paving, then numerous large (> 12" diameter at breast height) trees would need to be felled. Such tree removal up and down the road would diminish shading and further exacerbate other impacts on wildlife and plants, and would further decrease wildlife habitat along the road. Figures 1-3 show the locations, sizes, and species of selected large trees within 1 m of the road edge that may be affected. This is not a comprehensive list of mature or large trees near the road edge. Trees of this size are important habitat elements for many birds, mammals, invertebrates, mosses, lichens, and fungi.

Wet meadow. The wet meadow – upland meadow habitat complex on the east side of the road in the north segment (Figure 1) and elsewhere in the study area has the potential to support rare plants, butterflies and dragonflies of conservation significance, and the spotted turtle (New York Special Concern). Increased traffic and traffic speed, and petroleum pollution (see below), would be hazardous to this habitat complex and its inhabitants.

Road Ecology and Potential Impacts of Paving

Vehicle speed. Some people will drive faster on a paved road than on a dirt road. This will increase the vehicle hazard to wildlife and the resulting injury and death. Although most animals experience this risk, it is likely to be high for the slow-moving opossum, striped skunk, raccoon, turtles, snakes, frogs, and salamanders, as well as for faster-moving animals that sometimes dart in front of vehicles (e.g., deer, foxes, squirrels, chipmunks, many birds) and for scavengers that feed on carcasses of other road-killed animals and predators that are attracted to amphibian migrations. Road mortality is often an important loss factor for populations of turtles, for example, that can tolerate little mortality in excess of that which is not human-caused (e.g., Howell and Seigel 2018). Road mortality can also affect butterflies, owls, and other animals. Several blind curves, i.e. curves with limited sight distance, are present on Killearn Road. Paving will allow faster driving, which could be especially dangerous around such blind curves for both humans (pedestrians, cyclists, and other drivers) and wildlife.

The large intermittent woodland pool close to Killearn Road almost certainly hosts substantial breeding or transient populations of several species of amphibians (wood frog, spring peeper, green frog, spotted salamander, red-spotted newt, and possibly four-toed salamander, Jefferson salamander, and marbled salamander [the last three are SGCN]). All of these amphibians have terrestrial life stages that migrate, sometimes considerable distances (hundreds of meters), to and from woodland pools, buttonbush pools, and other surface waters. Great road mortality of amphibians often occurs where such migrations cross roads, and mortality is proportional to numbers of vehicle trips and vehicle speed thus is likely to increase after paving.

Vehicle noise. Faster-moving vehicles, in general, will be noisier. Noise, even at modest levels, can inhibit wildlife use of roadside habitats. A worldwide review of the impacts of anthropogenic noise on wildlife found that twenty per cent of impacts occurred at noise levels between 40 and 50 decibels, which are very modest noise levels (Shannon et al. 2016). In addition, paving Killearn Road is likely to attract recreational motorcycle riders, who already ride frequently on Little Rest Road, Route 343 and Chestnut Ridge Road. This would likely be an additional source of loud noise. We expect if Killearn Road is paved there would be adverse impacts of noise on some of the bird SGCN such as the wood thrush and quite possibly on other animals.

Number of vehicle trips. Paving Killearn Road may make it more attractive to drivers as a shortcut between Route 343 and Route 24 and, as discussed immediately above, to recreational motorcycle riders seeking to ride on picturesque country roads. This would also increase vehicle traffic on Killearn Road, intensifying the impacts just discussed.

Habitat fragmentation. Many organisms need large areas of contiguous habitat to maintain viable populations in the long term. Some animals that will cross dirt roads avoid crossing paved roads, as Brehme et al. (2013) documented for two rodent species. This phenomenon would reduce gene flow and the dispersal movements that help to balance populations with their habitats and to replenish population segments reduced by other causes. Dunn and Danoff-Burg (2007) also found that diversity of a group of beetles was lower near paved roads compared to dirt roads of comparable size.

Warm pavement. Road pavement warms on sunny days and releases that heat after dark. Snakes are attracted to warm pavement when the evening air begins to cool, and this behavior results in much road mortality of snakes (Mccardle and Fontenot 2016). Because oil-and-gravel, or asphalt, pavement is darker than the now light-colored dirt surface, a paved Killearn Road would warm up more and attract and kill more snakes than Killearn Road in its current condition. This phenomenon may also affect other small

animals (e.g., turtles, frogs, some insects). Warm pavement in daylight may attract basking dragonflies and butterflies that would also be subject to road mortality.

It should be noted that the lower *albedo* (the reflecting of solar energy) associated with dark, paved surfaces compared to lighter, dirt surfaces, will also warm the near-road microclimate, potentially eliminating cool spots and adding in a small way to global climate warming (see Xu et al. 2020).

Polarized light pollution. Recently, researchers have documented that smooth dark pavement polarizes light, and that this *polarized light pollution* (PLP) attracts aquatic insects to lay eggs on the road surface instead of in water (Kriska et al. 1998, Szaz et al. 2015). Aquatic insects associated with the intermittent woodland pools, buttonbush pool, streams, and ponds close to Killearn Road would be affected.

Weed spread. Environmental weeds (invasive plants) often spread along trails and roads of all kinds. Of three pestiferous woody weeds sampled by Lundgren et al. (2004), two were more strongly associated with paved roads than with unpaved roads. We believe the greater impacts of paved roads compared to unpaved roads discussed here would generally be more conducive to weed spread.

Road widening. The engineering report being commissioned by the Town may well recommend widening or straightening Killearn Road in a few places. This would result in the removal of mature trees and their habitat functions for mammals, birds, insects, mosses, and lichens (see above). As a part of the environmental assessment for paving the road, the Town should inventory all trees (species, diameter, location) potentially to be removed. Road widening would also further fragment the forests, because some animals cannot cross or are reluctant to cross wider roads.

Petroleum pollution. Oiled or asphalted roads leak petroleum hydrocarbons which pollute soil and water (Langen et al. 2015). These compounds are toxic to animals and plants. Petroleum pollution from paving Killearn Road would affect the wetlands, streams, and ponds, including ornamental ponds, close to the road, as well as terrestrial habitats.

Impacts of producing petroleum. Asphalt requires large amounts of petroleum products in its production and application. Asphalt production emits greenhouse gases (Yang et al. 2016, Hu et al. 2019) and has other impacts, including air pollution, that occur distant from petroleum use on roads.

Paving operations. A paving operation would create temporary noise and visual disturbance to wildlife. This impact could be substantial if it occurs during breeding season of the songbird SGCN. Impacts could also occur to sensitive species during migration or winter, such as birds of prey that hunt or scavenge along roads.

A paving operation would also create an additional equipment hazard to slow-moving animals such as reptiles and amphibians. Moreover, the fresh oil or asphalt may foul animals or “glue” them to the edges of the pavement.

Positive Impacts of Paving

There may be limited positive environmental impacts of paving Killearn Road. A paved road may generate less dust and sediment than a dirt road (Gesford and Anderson 2007), with less resulting damage from such dust and sediment to plants and animals. A paved road might attract birds to pick up grit (gravel) less than on a dirt road, reducing their exposure to vehicle strikes.

It is unclear whether a paved road or a dirt road would require more deicing salt use in winter. Gesford and Anderson (2007) recommended best practices for the maintenance of unpaved roads to reduce environmental impacts.

These limited positive impacts are likely to be more than offset by the adverse impacts described in this report.

Conclusions

Paving Killearn Road would have a number of significant adverse impacts on wildlife and plants. These would include the permanent impacts caused by greater vehicle speed and possibly more vehicle use killing more reptiles, amphibians, birds, and other animals, and an increase in noise that disturbs birds and other wildlife. Also of concern is the noise and visual disturbance to birds and other wildlife during the paving process. The adverse impacts of paving would be additive to the earlier biodiversity impacts of habitat conversion for residential development. Paving Killearn Road seems contrary to green road principles and would have important negative effects on biodiversity especially rare native wildlife and plants.

Acknowledgments

We are grateful to Christopher Mann for showing us his property and making access arrangements with other landowners, and to all the landowners who granted access.

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Figure 1. Killearn Road north segment. Mapping shows habitats within 100 meters of the road.

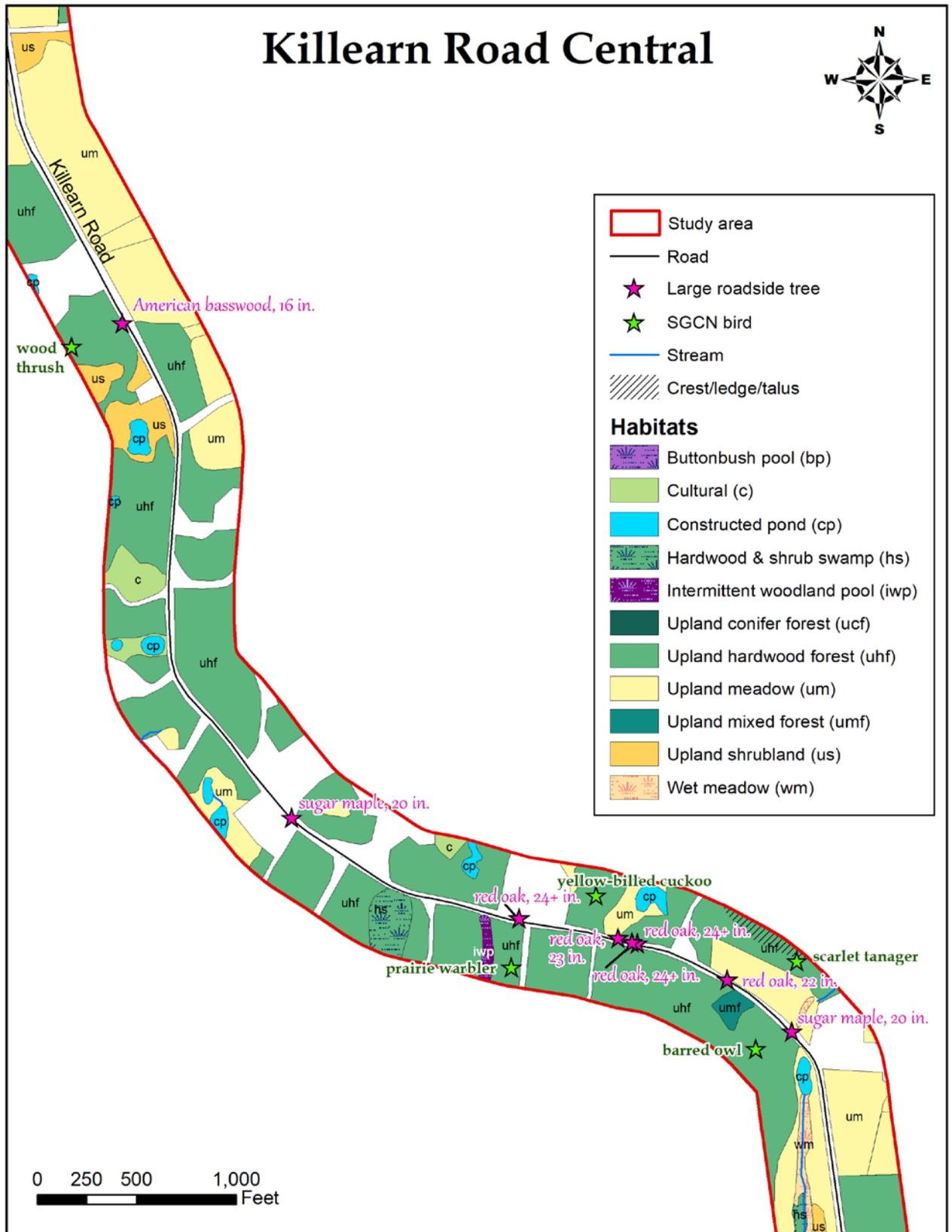


Figure 2. Killearn Road middle segment.

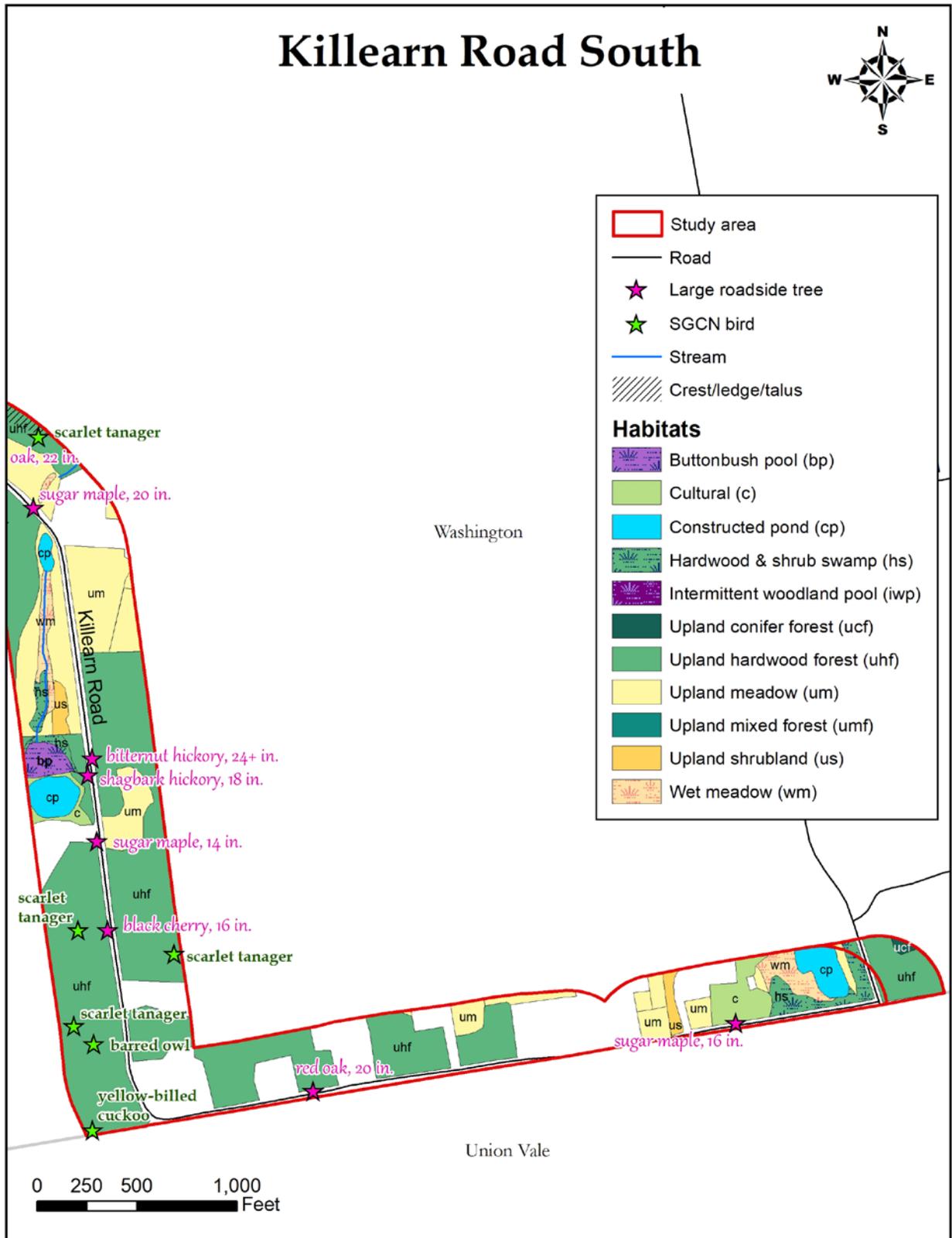


Figure 3. Killearn Road south segment.