Comments
08-T-0213

2008 MAR 12 AM 9:32

7 Sunny Knoll
Ithaca, NY 14850
March 11, 2008

Hon. Jaclyn A. Brilling
Secretary to the Commission
New York State Public Service Commission
3 Empire State Plaza
Albany, NY 12223-1350

Re: Case # 08-T-0213, Cornell Combined Heat and Power Project (CCHPP)

Dear Secretary Brilling:

The Cornell Combined Heat and Power Project will have environmental benefits, such as less dependence on coal as a heating source and fewer coal trucks making deliveries to the university's heating plant. The project will also enable the university to use its own, co-generated electricity for reduced reliance on the main electricity grid and to prepare for future increases in demand for energy.

We support the project from a sustainability perspective. But the approach being taken in the ecologically sensitive area of the wetlands and forest between Turkey Hill Road and Genung Road does not do nearly enough to protect the environment.

We believe that horizontal directional drilling (HDD) rather than open-cut construction should be used for this environmentally sensitive section of the route. The project is supposed to be a step toward sustainability. Directional drilling would be far more consistent with that emphasis than destructive clear-cutting of trees and open-cut construction in wetlands. It is a viable and environmentally beneficial alternative.

Directional drilling should be able to be done at a tolerable cost for this $80 million project. The likely amount of any added cost can certainly be justified by the preservation of the surrounding land—designated a Unique Natural Area by the county.

A Cornell spokesman said in a Nov. 18, 2006 *Ithaca Journal* article that environmental damage from the pipeline construction will be minimized because most of the pipeline will be laid along an existing high-voltage transmission line. The potential for environmental damage as a consequence of the pipeline is acknowledged throughout the Cornell application to the Public Service Commission, with the same suggestion that there will be fewer problems in the part of the route that follows the high-voltage line.

The section of the pipeline that crosses the most undisturbed and environmentally sensitive areas, however, is not along the high-voltage transmission line. It is in this section of pipeline east of Turkey Hill Road that HDD needs to be used to avoid environmental damage.

The entire length from Turkey Hill Rd. to the field along Genung Rd. where the metering and regulating station will be located, or a total of 3,600 feet (counting the entry point west of Turkey Hill Rd.), needs to be directionally drilled to protect wetlands from damage and to minimize destruction of forest. This area is part of the watershed for Cascadilla Creek, which is one of Tompkins County's major creeks; it contains headwaters that drain into brooks, marshes, and ultimately the creek.

Mitigation and restoration of wetlands and forests present special challenges; and the damage from construction is of course greater than in open fields. We are concerned about the difficulty of restoring the contours of the land, maintaining the runoff into the brooks, and ensuring the original flow patterns of the brooks as they run through our land and establish our marshes. There is little way that the original state can be replicated once a 40-foot or wider channel has been created by heavy machinery and all trees and vegetation removed. The plan now specifies a 40-foot clearing for the open-cut construction in this section of the route, but there are 30-foot-by-30-foot kickouts every hundred feet that widen the route effectively to 70 feet.

We own land north of and contiguous with Cornell land between Turkey Hill Rd and Genung Rd. Our land includes Cascadilla Creek, two of the brooks feeding Cascadilla Creek crossed by the pipeline, large marshy areas created by the brooks, and a major floodplain. These brooks in the Cornell application are referred to simply as wetlands (Wetlands D and E). There are other brooks and headwaters crossed by the pipeline that create similar wetlands, one immediately to the east and one to the west of our land. The brook behind Knoll Tree Rd. includes a large marsh and floodplain. The headwaters in the pipeline route also contribute water to the area's wetlands through springs, groundwater, and surface water.

These brooks lack both well-defined banks and streambed where the pipeline crosses. Although the banks become more defined south of the pipeline route, the brooks are more nearly sheet flow in the area of the pipeline crossing before forming into a brook with more defined banks north of the proposed crossing. Restoring a shallow layer of water so that the flow patterns are identical to the original state seems highly unlikely.

The land immediately north of the proposed pipeline and continuing to, and including, Cascadilla Creek and its floodplains, has been designated a Unique Natural Area (UNA-126) by Tompkins County. The UNA includes the land we own and much of the Cornell land, as well as land to the west and east. Cornell makes no reference to the existence of the UNA in its application. This UNA is specified as "very vulnerable to disturbance" by the county, a description which is not standard for UNAs.

There are approximately 240 acres of contiguous forest within the area circumscribed by Turkey Hill, Ellis Hollow, Genung, Knoll Tree, and Ellis Hollow Creek roads. This land is owned by Cornell, us, and other private owners. It is an area large enough to support large numbers of breeding birds and other species of animals, as well as plant species. This is largely secondary growth forest.

The current pipeline design specifies only 460 feet of directionally drilled pipe, essentially the length needed to go under Turkey Hill Rd. and extend a short way east under a wetland. This section, a wetland which has sandy soil, would be particularly hard to de-water for trench construction. Therefore, that construction method would cost more than HDD. Trench construction would be used through the forest in all but this section.

Cornell's HDD consulting engineer presented Cornell with six plans of differing lengths of directional drilling, ranging from 460 feet to 3,600 feet. Cornell has submitted the shortest length in its application.

There is now less directional drilling in the plan than was presented at the April 2007 open house held by Cornell. In the April version, 1,300 feet were proposed to be directionally drilled between Turkey Hill Rd. and Genung Rd. Although this was shorter than needed, it was a positive step. The current plan is a retreat from what is needed to deal with the environmental problems that will be caused by the pipeline in the wetlands and forest between these roads.

In an earlier alteration to the plan, the pipeline route between Turkey Hill and Genung roads was changed last year from the initial design. Originally, the proposed route was along the southernmost border of the forest (the southernmost border of land owned by Cornell), but it was subsequently moved up to 400 feet north into the interior of the forest along much of the route in this section. Thus the forest fragmentation is greater than in the original plan.

Environmental Issues

Mitigation of forested wetlands

Wetland expert Jon Kusler makes the following observations about the difficulty of mitigation in "Developing Performance Standards for the Mitigation and Restoration of Northern Forested Wetlands" (http://www.aswm.org/propub/jon_kusler/forested_wetlands_08016.pdf):

> Forested wetlands are much more difficult to restore than earlier-successional wetlands such as marshes (p. 29).
>
> The lengthy time requirement for ecosystem maturation and for evaluation of success is not the only factor that makes restoration of forested wetlands difficult. The restoration of appropriate hydrologic conditions may be the most critical factor in forested wetland restoration. Sensitivity to hydrologic regimes is long-term (pp. 29-30).

A study of wetland mitigation in which 55 wetland managers were surveyed on the success of mitigation options found that "emergent and open water wetlands were the most successfully mitigated in palustrine and estuarine systems; forested wetlands were the least successfully mitigated" ("Guidelines for Selecting Compensatory Wetlands Mitigation Options," http://ttap.colostate.edu/Library/TRB/nchrp_rpt_482.pdf, p. 10).

The authors conclude that "forested wetlands require more precision in grading and more time to develop. Saplings may not be able to tolerate the fluctuations in hydrology tolerated by mature trees. Furthermore, forested wetlands may ultimately require 50-100 years to fully mature, which makes it difficult to know if any given site will be ultimately successful" (p. 11).

Where wetlands are interconnected, as they are in the pipeline route bordering UNA-126, the effects of disruption can be even more pronounced. Kusler notes in his paper that connectivity among wetlands is needed to "enhance the long-term stability of wetland and riparian systems" (p. 39).

In the forested section where the pipeline is proposed to cross the two primary brooks that soon run through our land, the slope of the land and the brook banks themselves are subtle and, as noted previously, in spots lacking well-defined banks and beds. The brooks acquire a more distinctive shape as they increase in volume as they run north (until spreading wide in the marshes on our land nearer to Cascadilla Creek). The brook and headwater contours would be hard, if not impossible, to replicate following construction.

The potentially long-lasting effects of open-cut pipeline construction on wetlands can arise, among other causes, as the result of mistakes made by the construction company or of rain while the work is under way. The inability to follow best-management practices include failure to separate topsoils from subsoils; spreading of wetland topsoils in areas other than directly above the trench they came from; the installation of too few trench breakers; failure to restore the bottom contours of the wetlands; and compaction of soil.

An inadequate number of trench breakers or improperly installed ones can cause significant environmental damage by reducing the ability of wetlands to retain water; the trench acts as a conduit, pulling water away. The breakers also control soil erosion and corrosion of the pipe by stopping water from migrating along the pipeline. Inadequate installation can result in washing out of the soil that holds the pipe securely in place.

A common cause of soil rutting and compaction is the failure of construction crews to stay on wooden mats, which are used to distribute the weight of construction equipment to minimize soil disturbance during construction. The application specifies mats. But even with proper use of mats, some compaction will occur.

Segregation and placement of wetland subsoils and topsoils are important in the restoration of wetlands. The topsoils contain the native seeds and correct soil properties for the re-establishment of native plants. Erosion control measures that fail can allow sediments onto the wetlands or create erosion gullies that may become chronic.

The crowning of soil after backfilling of the trenches can alter the hydrology and flow patterns, as can any change in grade.

Contamination of wetlands by introduced species is a risk of trench construction. Although state and federal regulations require that the machinery used in open-cut pipeline projects be steam washed to remove propagules, there is nevertheless a chance that non-native plants and organisms could survive the cleaning process. The project's proposal to plant wetland species and to mulch the wetlands will not necessarily bar invasive plants or other harmful species, including damaging insect species.

Wetlands will remain after the pipeline project in some degree and configuration. But the flow patterns could be altered for the indefinite future, possibly permanently, by redirecting water from the neighboring wetlands or having other negative effects.

Clear-cutting and its effects on bird species

The clear-cutting of the forest and the resulting removal of bird habitat is another serious issue of concern. Forest-interior birds in particular suffer when there is clear-cutting. More edge habitat results in lowered avian diversity, as pointed out in the Cornell Lab of Ornithology publication *A Land Manager's Guide to Improving Habitat for Scarlet Tanagers and other Forest-Interior Birds* (http://www.birds.cornell.edu/conservation/tanager/tanager.pdf):

> The plight of many forest-nesting songbirds has brought into question the benefits of certain traditional wildlife management techniques. For example, historically land managers were trained to "develop as much 'edge' habitat as possible because wildlife is a product of the places where two habitats meet" (Giles 1971). Creating edges increases local diversity by attracting game species such as rabbits and deer, as well as a variety of nongame birds species such as Song Sparrows and Northern Cardinals. We now know, however, that forest-interior species may disappear from areas that contain extensive edge habitat. Gates and Gysel (1978) proposed the idea that edges may serve as "ecological traps" for some breeding birds by providing a variety of attractive habitat characteristics, while at the same time subjecting the birds to higher rates of nest predation and parasitism. Evidence from numerous studies indicates that the detrimental effects of an edge can extend from 150-300 feet (45-90 m) into the forest interior (p. 9).

Forest-interior and other area-sensitive bird species could decline in number as a result of the pipeline clear-cutting. Since the usable areas of a forest for species with sensitivity to habitat fragmentation are beyond 150–300 feet from the forest edge (the interior forest), the amount of habitat loss may be substantial. The higher figure of 300 feet appears most frequently in ornithology studies and is the one used in the Cornell application to the PSC. In the following calculations, we use the 300-foot number.

Edge-avoiding species would lose a 640-foot width (300 + 300 + 40) of forest along the route from markers 3+00 to 28+00 (2,500 feet), a loss of approximately 30 acres (accounting for the route nearing the fields at the eastern end). This represents a direct loss of habitat for edge-adverse species.

A total of approximately 56 forested acres will be separated from the main forest over this same section of pipeline (taking into account the 300-foot edge), the fragmentation reducing the contiguous forest from 240 acres to approximately 184 acres.

The bisecting of the forest into two smaller fragments has multiplied consequences for edge-averse species beyond the actual total of forest acreage lost. The probability that a species will exist in a given area (for example, a given acre of area) increases as a function of *total* forest size because of greater breeding success in larger forests, among other reasons (e.g., Chandler S. Robbins et al., 1989, "Habitat Area Requirements of Breeding Forest Birds of the Middle Atlantic States," *Wildlife Monographs* 103, pp. 1-34).

Effects of clear-cutting and trench construction on amphibians and reptiles

Salamanders, newts, frogs, and toads live in the wetlands crossed by the pipeline and in those south of and affected by the pipeline. These species, already in decline throughout the country because of development and associated pressures on their habitat, will also be impacted by the clear-cutting of trees and trench construction in the wetlands.

Maintaining adequate habitats for amphibians includes protecting "small isolated wetlands while also incorporating adjacent upland habitats and promoting a forested landscape connection to other wetlands. A seasonal wetland without appropriate surrounding upland habitat will lose its amphibian and reptile fauna. Amphibians and many reptiles spend most of their lives in a zone of 450 feet or more around the wetland. This is the core terrestrial zone. The buffer around the wetland should be considered the zone outside of the core." (*Habitat Management Guidelines for Amphibians and Reptiles of the Northeastern United States*. J. C. Mitchell et. al., 2006. Partners in Amphibian and Reptile Conservation, Technical Publication HMG-3, p. 29.)

Besides vernal and seasonal pools, there are perennial wetlands, springs, and seepages either in or close to the pipeline route.

Additional habitat protection guidelines from the publication above include:

> Do not use heavy machinery within wetland boundaries or in sensitive riparian areas. Such weight and scouring of the land surface alters wetland habitats and invites invasive plants to establish a foothold. They also crush amphibians and reptiles already present (p. 43).

> Protect unique habitat features embedded within the forest, such as ephemeral wetlands, springs, seepages, and rock outcrops. These microhabitats are special places for many species of amphibians and reptiles. They act as critical areas; without them these species will not be present (p. 72).
>
> Encourage canopy cover where appropriate to encourage cool, moist forest floor in terrestrial buffer and life zones. Amphibians need to be constantly moist. Such habitat conditions in these areas will minimize mortality due to dessication" (p. 28).
>
> Do not alter spring flows and do not disturb the associated seepage areas. These small habitats are critical to several species of salamanders. Alteration of any kind will cause population decline and potential extirpation (p. 48).
>
> Minimize fragmentation of large forests. Fragmentation creates small populations with all the problems of inbreeding and susceptibility to disease and predation (p. 67)
>
> A large clearcut in Maine [photograph caption] creates a completely different environment from the original, and likely impacts species needing the structure, canopy, moisture, and humidity of a forest (p. 9).

The forest is a dynamic system that offers full and partial canopies, gaps from tree fall, mammal tunnels (which serve as hiding places and hibernacula), an understory of herbaceous plants, layers of leaves in various stages of decomposition, and rich soil.

Trees as regulators of water

The trees in the forest have ecological value beyond their importance as wildlife habitat. Among their functions is the stabilizing of watersheds. Because of the humus layer in forest cover and the soil-retaining powers of the trees' long roots, forests are important for preserving adequate water supplies through maintenance of water tables. They also play a crucial role in reducing downstream stormwater impacts and protecting water quality by filtering sediments and pollutants

Directional Drilling

Directional drilling in a land installation

Based on numerous conversations we have had with pipeline experts over the past year, no trees or vegetation need to be cut above a deeply buried HDD pipe. In fact, doing so would defeat a key purpose of an HDD installation on land. Monitoring of the pipeline, for both HDD and trenched, would be done by hand and also remotely.

For monitoring of external corrosion, either hand-held instruments or rectifier boxes would be used. If these are employed instead of a sacrificial anode system, only one or two would be needed between the heating plant and the regulating station on Genung Rd. They would be easily accessed from the road, just as gas companies do in monitoring pipelines. For monitoring of internal corrosion, electronic "smart pigs" would be run along the interior of the pipe every five or so years. Potential leaks, regardless of which construction method is used—and purportedly rare for HDD—can be checked by a drop in pressure volume at the Cornell heating plant.

Our understanding is that if clear-cutting is done over the HDD section of the Cornell pipeline, regardless of total length, it will be to save money by not having to move the open-cut equipment from Turkey Hill Rd. to the field on Genung Rd. to do the final section in the field by open-cut construction.

The possibility that the pipe would ever need to be repaired is extremely remote, based on all information from pipeline experts. In such an unlikely event, the repair methods, depending on where the break was, would involve pulling back the pipe with a track hoe and replacing it; using a robotic machine to do a spot repair with a two-foot liner, which would be cured and sealed in place; or doing a parallel directional drill. If repairs on HDD pipes were anything but extremely rare, however, no one would use HDD.

Safety experts say that no state or federal regulatory, safety, or monitoring reasons exist to clear-cut above a deeply buried HDD line.

The experts we have spoken with include Joy Kadnar, director of the Pipeline Safety Program Evaluation division at the Pipeline and Hazardous Material Safety Administration in Washington, D.C.; Byron Coy, director of the Eastern Region, Pipeline and Hazardous Material Safety Administration, in West Trenton, N.J.; Jeffrey Kline, the Pipeline Safety Program, NYS Department of Public Service; Douglas Sipe, outreach manager and project manager, the Division of Gas, Environment, and Engineering, the Office of Energy Projects, the Federal Energy Regulatory Commission, in Washington, D.C.; Richard Kuprewicz, analyst of pipeline safety and president of Accufacts, in Redmond, Wash.; Dr. Samuel Ariaratnam, associate professor of trenchless technology, Arizona State University, in Tempe, Ariz., and co-author of *Horizontal Directional Drilling Consortium HDD Good Practices Guidelines*; John Jameson, president of Entec, a major HDD engineering firm, in Calgary, Alberta (Canada); and John D. Hair, a leading HDD engineer and president of J. D. Hair & Associates, in Tulsa, Okla.

Cost difference between directional drilling and trench construction

Greater expense for HDD construction was the reason given at the November pipeline open house held by Cornell for why only 460 feet is currently planned. The cost difference is being said by the project to be double or triple the cost for trench construction. Arrangements for bids have not been made with any HDD companies, however.

With the project's permission, we called the project's HDD consulting engineer to talk about the estimated cost of the 3,600-foot section if directionally drilled. He said that it would be around $800,000, excluding the pipe. The contingency fund, to cover worst-case scenarios, would be $450,000. Because the soil studies indicate that HDD would probably not present technical challenges, it seems unlikely that such a large contingency fund would be drawn upon to complete the work. That is particularly true if a capable directional drilling company did the work. A fixed-bid price would be an alternative to a time-and-materials contract, in which case a contingency fund would be built into the price and remove uncertainty about the amount. The drilling company's contingency fund could well be lower.

The HDD engineer stated that based on the studies done to date, the area is very buildable and not technically challenging.

The test results so far show that at the recommended drilling depth, there is no problematic amount of gravel, which if present would provide inadequate support for the drill bit. In addition, there is enough glacial till to provide added stability for the drill but not so much that it would slow work down.

We spoke to a major open-cut construction company, Otis Eastern Service, to ask for a ballpark estimate of what trench construction would cost for the pipeline and were given a figure of around $100 per foot, excluding the pipe. Presumably the price could be higher in an actual bid, depending upon the degree of mitigation. This $100 figure compares to the current estimate of $220 per foot for directional drilling.

The possible difference between open-cut and directional drilling is under $400,000 in a pipeline project that will cost $80 million in the current design. The added cost would be for the additional 3,140 feet (3,600 – 460) of directional drilling at a differential cost of no more than approximately $120 per foot. (The pipe itself for the 3,600 feet, in either open-cut or drilled construction, will cost $200,000 but is not involved in the preceding comparison.)

Given the 50-year anticipated lifespan of the pipeline, the above amount is a relatively small difference.

The project's HDD engineer has completed the design for the 3,600 feet-length. Therefore, a design for the full length necessary to protect the most environmentally sensitive section is already available.

The $80 million cost of the overall project includes $20 million that was recently added to cover renovation of the heating plant and miscellaneous expenses. The price difference between directional drilling and trench construction is not only small in the total budget, but the university is fortunate in having numerous and substantial funding sources to underwrite its projects. This added cost should be a reasonable price to pay for preserving the wetlands and forest, including the surrounding wetlands.

The directional drilling company that is widely considered the best in North America, Michels Directional Crossings, has a regional office only a couple of hours away. The company is known not only as outstanding in skill—setting world records for distance, among other achievements—but also for honoring its bids. It does both short and long drill runs and therefore would be well able to install the pipe for the 3,600-foot length. Bids have not yet been obtained from Michels or other HDD companies.

A high proportion of the short, 3.2-mile pipeline route will be in open fields and on Cornell's own property. In addition, the route is straight and flat. Thus the pipeline will be relatively easy and economical to build. That is all the more reason that Cornell can afford to take extra care of protecting an environmentally sensitive area. Paying a modest amount more for a construction method to preserve wetlands—which do not exist here in a vacuum but are interconnected with neighbors' wetlands—and a forest should be within reason.

Summary of Issues

(1) The pipeline route between Turkey Hill and Genung roads borders a county-designated Unique Natural Area.

(2) This section of the route crosses the watershed of Cascadilla Creek, one of the county's major creeks, and brooks that feed surrounding wetlands.

(3) The brooks in Wetlands D and E are in part sheet flow where the pipeline crosses, lacking the well-defined banks and streambed that would lend themselves to restoration.

(4) Forested wetlands are difficult, if not impossible, to mitigate.

(5) The interconnected wetlands provide essential habitat to amphibians and reptiles. Habitat protection guidelines advise not to use heavy machinery within wetland boundaries or in sensitive riparian areas.

(6) The contiguous forest of 240 acres supports a rich diversity of bird and plant species.

(7) According to the consensus of pipeline safety experts, a deeply buried HDD pipe does not require a cleared right-of-way for monitoring or other safety purposes.

(8) Horizontal directional drilling will prevent the potential re-directing of brooks away from neighboring wetlands and avoid clear-cutting of the forest.

(9) The site is conducive to directional drilling, based on soil-boring and seismic tests.

(10) Directional drilling should be financially feasible for the pipeline project.

We have attached specific comments on Cornell's application, with quotes by page number. Also attached are an inventory of plant and animal species found on the land between Turkey Hill Road and Genung Road; information from the county on the Unique Natural Area; copies of Dec. 17, 2007 and April 27, 2007 letters we wrote to the Cornell project managers that contain details and references concerning these issues; and pipeline experts consulted. There is some overlap of material in those communications to Cornell and this letter.

We respectfully request that the PSC require the Cornell project to use directional drilling between Turkey Hill and Genung roads to protect environmentally sensitive land on both the Cornell land and neighboring lands.

Sincerely,

Zorika Henderson

Zorika Henderson

Charles Henderson

Charles Henderson

cc: John Strub

Encl.: Attachment 1: Specific comments on the Cornell application to the PSC
Attachment 2: List of observed species on the Cornell land, adjacent forested lands, and floodplain
Attachment 3: Tompkins County Unique Natural Area information (UNA-126)
Attachment 4: April 27, 2007 letter to Cornell (electronically submitted to (Cornell)
Attachment 5: Dec. 17, 2007 letter to Cornell
Attachment 6: List of primary pipeline experts consulted

Attachment 1

Specific comments on the Cornell application to the PSC

Quotes from the Cornell application are in italics.

Introductory pages of application (pages 1–42)

Page 3: Section 1.2 Route Description

The application focuses on three streams. There are however, other significant, if smaller, brooks or streams that are of equal concern. Two of these are referred to in the application as Wetlands D and E; they flow to and through our land to Cascadilla Creek.

Page 13: *A comprehensive wetlands and wildlife study was completed by Stearns & Wheler Environmental Engineers and Scientists, LLC, (October 2007) to access potential impacts to the local ecosystems, including wildlife, streams, sensitive species, and special forests and trees. The Wetlands Assessment Report is included in this application as Appendix E.*

We provide in Attachment 2 a considerably more extensive list of species found on the Cornell land and adjacent lands, based on our own observations. Any such compilation, of course, can only be a partial listing of species.

Page16: *There will be no mechanized land clearing in forested Wetlands B, C, D, F, H, and R. Any clearing of vegetation within these wetlands will be performed by hand, using chainsaws, with salvageable timber and firewood transported from the woodlot with low pressure track mounted equipment, truck or skid-steer.*

There will still be clear-cutting and excavation over a wide construction corridor, as well as bordering a county-designated Unique Natural Area. To prevent damage in the areas of Wetlands B–F, directional drilling should be used.

Moreover, there is no justifiable reason to exclude Wetland E (omitted from the list in the preceding quote) from receiving maximum care. Appendix E of the Cornell application contains maps for the other wetlands but not for Wetland E. The wetland does appear in, for example, Tables 2 and 3 of the Stearns & Wheler report and in drawing No. 6113-02-5117 (the easternmost part of Figure 2-2 of the application). Wetland E may have become inadvertently omitted in the other locations. This wetland is the primary source of water for one of our marshes. Wetland D is the primary source of water for a second marsh on our land. These brooks ultimately run into Cascadilla Creek. While smaller than the stream at 10+40, these are also perennial streams and should be handled as such.

It is also important to note that Wetland D, shown on the Cornell application maps and in the tables as ending short of 16+50, actually extends westward to approximately 17+50 or farther. (This is based on the actual markers on the pipeline route.)

Page 16: *The proposed gas pipeline will not alter the hydrology of the wetlands through which it must pass.*

We do not believe it is possible to make such assurances if trench construction is used. We address this in more detail in the "Forested Wetlands" section of our letter. The only way to make such assurances is to use directional drilling for the installation.

Page 18: *A 10-20 foot wide swath located over the pipeline will be maintained through annual mowing for visual inspections of the pipeline. The balance of the cleared right-of-way, however, will be allowed to re-grow and re-establish natural plant communities through natural succession. The cleared right-of-way will open up canopy in some forested areas but, it is not likely to have significant adverse impact on avian breeding, as none of those forested areas are interior forest, and all are near existing edge (ecotone) habitats.*

This statement does not accurately characterize the breeding success of interior forest birds. There are approximately 240 acres of contiguous forest within the area circumscribed by Turkey Hill, Ellis Hollow, Genung, Knoll Tree, and Ellis Hollow Creek roads. The forest is limited to that size by these roads, as noted by Stearns & Wheler. But it is an area large enough to support large numbers of breeding birds and other species of animals, as well as many plant and tree species. The comment is misguided that the presence of roads nearby makes fragmentation irrelevant.

Edge-avoiding species would lose a 640-foot width (300 + 300 + 40) of forest along the route from markers 3+00 to 28+00 (2,500 feet), a loss of approximately 30 acres (accounting for the route nearing the fields at the eastern end). This represents a direct loss of habitat for edge-adverse species.

A total of approximately 56 forested acres will be separated from the main forest over this same section of pipeline (taking into account the 300-foot edge), the fragmentation reducing the contiguous forest from 240 acres to approximately 184 acres.

The bisecting of the forest into two smaller fragments has multiplied consequences for edge-averse species beyond the actual total of forest acreage lost. The probability that a species will exist in a given area (for example, a given acre of area) increases as a function of *total* forest size because of greater breeding success in larger forests, among other reasons (e.g., Chandler S. Robbins et al., 1989, "Habitat Area Requirements of Breeding Forest Birds of the Middle Atlantic States," *Wildlife Monographs* 103, pp. 1-34).

Page 19: *The backfilled trench will be graded to restore preexisting contours and surface draining patterns.*

No evidence is provided for how this could be guaranteed. The issue is discussed in more detail in the "Forested Wetlands" section of our letter.

Pages 20–21: *In an effort to minimize the impact to the woodlot located between Genung Road and Turkey Hill Road (Hardesty Property), Cornell has proposed a construction corridor of 40-foot width, in contrast to a typical construction width of 65-feet.*

The forested area in question involves more than the original 70-acre Hardesty property (although it is central) and is more than a "woodlot." "Woodlot" implies a tract of land on which trees are used for firewood or lumber. The forest in question has been used for neither. The trees range in age from around 50 to 150 years; the younger trees are those on land that was last in use for agriculture.

That being said, while attempts to reduce the damage from open-cut construction are welcome, the reduction from 65 feet to 40 feet does little to help. Some trees will be saved, but the damage of creating a wide construction corridor through the forest is done; fragmentation has occurred; species are harmed; and wetlands are damaged. In addition, while the nominal width may be 40 feet, the presence of kickouts 30-feet square approximately every 100 feet along the route makes the effective width 70 feet.

Page 21: *No federally-listed threatened or endangered species occurring along the pipeline corridor.*

This cannot be stated with assurance. A comprehensive inventory of species would have to be done during each season over a period of time to make such a determination. The inventory that has been presented does not approach such care. For example, only nine bird species are listed in the Cornell inventory, in an area that is rich with bird species.

Page 33: Section 3.3 Project Benefits (reducing carbon dioxide, the Kyoto Protocol, and sustainability)

Certain types of land use, particularly deforestation, contribute to the accumulation of greenhouse gases in the atmosphere. Clear-cutting of trees not only releases carbon dioxide but also reduces important reservoirs of carbon storage, so that less carbon can be absorbed from the atmosphere. Sustainability needs to encompass the wise treatment of land. When there is land of recognized ecological value and a construction method exists to spare it at a feasible cost, the better method should be used.

Appendixes A–D

Because we believe HDD is essential for the route east of Turkey Hill Rd., we make no specific comments on the details of open-cut construction in these appendixes.

Appendix E: Wetlands Assessment Report (Stearns & Wheler report)

Page 1: *The remainder of the pipeline work will have temporary impacts on wetlands and wildlife.*

The creation of the pipeline corridor removes many trees. That alone reduces habitat for wildlife, particularly the species whose populations are most at risk of decline. Also, of greater consequence as the result of clear-cutting is the fragmentation of the forest, reducing breeding area for birds. The open-cut installation of pipeline through wetlands, including brooks, creates disruptions of water flow northward to marshes and Cascadilla Creek that may never be fully re-established. This damage will not occur in a vacuum. The wetlands are interconnected, and any change in flow could affect neighboring properties.

Page 2: *While the cleared right-of-way will open up forest canopy in some forested areas, it is not likely to have a significant adverse impact on avian breeding, as none of these forested areas are interior forest, and all are near existing edge (ecotone) habitats.*

See comments above, under page 16 of the introductory pages.

Page 3: *With the exception of the portion of the route that is located east of Turkey Hill Road, most of the route runs roughly parallel a near or adjacent to an existing overhead power line right-of way.*

This statement is correct. The key point, however, is that it is the section of pipeline not along the existing power line right-of-way that passes through currently undisturbed environmentally sensitive areas. It is for this reason that directional drilling is essential east of Turkey Hill Rd.

Page 16: *Other direct impacts to wetlands may result from clearing of forested areas within and adjacent to wetlands located east of Turkey Hill Road. This is the only portion of the proposed pipeline corridor that passes through a relatively uninterrupted area of mature successional forest. As such, it may result in an impact to the wildlife habitat value of this wooded area by opening up the tree canopy in a large contiguous forest area (forest canopy fragmentation). Such action creates edge, or ecotone habitat within forest interior habitat, potentially allowing invasion of avian species adapted to living in ecotone habitats, such as Brown Headed Cowbirds (Molothrus ater). Edge species may compete with or displace forest interior species from this area. This is not likely to be a significant impact, however, because while this block of woods contains forest interior habitat (forested habitat that is more than 300 feet from an edge), it is relatively small in size, and its surrounded by roads, which creates edges and interrupt the forest interior habitat.*

This issue is addressed above.

Page 16: *Clearing of the right-of-way also provides some benefits to wildlife. Cleared rights-of-way provide travel corridors that may be used by wildlife. Increased edge habitat also results in an increased diversity of habitat structure and species biodiversity, so the habitat may support more species of wildlife than it currently does.*

Cleared corridors may facilitate access to the interior forest by species that harm those living in the interior—cowbirds (as noted), raccoons, and others—but these are the very species not needing an assist, and they harm those more endangered such as interior-dwelling songbirds. There is already edge habitat on the outer boundary—as is the case for all forests—so diversity would not be expected to increase.

Page 17: *Impacts on breeding wildlife, such as nesting birds, will be minimized by reducing the width of the cleared right-of-way within all wetland areas to 45, rather than 65 feet*

The forest would be fragmented with a 40-foot clearing, and the kickout areas would expand the clearing to 70 feet. This is no solution.

Attachment 2

Observed Species between Turkey Hill and Genung roads on Cornell forested lands, adjacent forested lands, and floodplain

COMMON NAME	SCIENTIFIC NAME

Ferns, Club Mosses, Mosses, Fungi, and Lichens

Ferns

maidenhair fern	*Adiantum pedatum*
lady fern	*Athyrium filix-femina*
spinulose shield fern	*Dryopteris carthusiana*
Clinton's wood fern	*Dryopteris clintoniana*
leather wood fern	*Dryopteris intermedia*
sensitive fern	*Onoclea sensibilis*
cinnamon fern	*Osmunda cinnamomea*
interrupted fern	*Osmunda claytoniana*
royal fern	*Osmunda regalis*
Christmas fern	*Polystichum acrostichoides*
polypody fern	*Polypodium virginianum*
bracken fern	*Pteridium aquilinum*
New York fern	*Thelypteris noveboracensis*

Club mosses

ground pine	*Diphasiastrum tristachyum*

Mosses

tree moss	*Climacium americanum*
log moss	*Hypnum imponen*
pin cushion moss	*Leucobryum glaucum*
oily bark moss	*Platygyrium repens*
common fern moss	*Thuidium delicatulum*

Fungi

cinnabar-red chanterelle	*Cantharellus cinnabarinus*
shaggy mane	*Coprinus comatus*
hen of the woods	*Grifola frondosa*
sweet tooth	*Hydnum repandum*
lobster mushroom	*Hypomyces lactifluorom*
voluminous-latex milky	*Lactarius volemus*
chicken mushroom	*Laetiporus sulphureus*

giant puffball	*Langermania gigantea*
shaggy parasol	*Macrolepiota rachodes*
morel	*Morchella esculenta*
common mycena	*Mycena galericulata*
jack o' lantern	*Omphalotus olearius*
mustard-yellow polyspore	*Phellinus gilvus*
angel's wings	*Pleurocybella porrigens*

Lichens

powdery axil-bristly lichen	*Myelochroa aurulenta*
hammered shield lichen	*Parmelia sulcata*
red pith lichen	*Phaeophyscia rubropulchra*
rough speckled shield lichen	*Punctelia rudecta*

Aquatic Plants

broad-leaf plantain	*Alisma plantago-aquatica*
narrow-leaf plantain	*Plantago lanceolata*
watercress	*Rorippa nasturtium-aquatica*

Grasses, Rushes, and Sedges

Grasses

perennial bentgrass	*Agrostis perennans*
sweet wood-reed	*Cinna arundinacea*
silky wild rye	*Elymus villosus*
fowl manna grass	*Glyceria striata*
stout blue-eyed grass	*Sisyrinchium angustifolium*

Rushes

common rush	*Juncus effusus*
path rush	*Juncus tenuis*
dark-green bulrush	*Scirpus atrovirens*
mosquito bulrush	*Scirpus hattorianus*

Sedges

brome-like sedge	*Carex bromoides*
bladder sedge	*Carex intumescens*
shallow sedge	*Carex lurida*
Pennsylvania sedge	*Carex pennsylvanica*
stellate sedge	*Carex radiata*
fox sedge	*Carex vulpinoidea*

Wild Flowers and Other Forbs

white baneberry	*Actaea pachypoda*

tall hairy agrimony	*Agrimonia gryposepala*
garlic mustard	*Alliaria petiolata*
wild columbine	*Aquilegia canadensis*
common burdock	*Arctium minus*
Jack-in-the-pulpit	*Arisema triphyllum*
swamp milkweed	*Asclepius incarnata*
common milkweed	*Asclepius syriaca*
blue wood aster	*Aster cordifolius*
tall white aster	*Aster lanceolatus*
beggar-ticks	*Bidens sp.*
false nettle	*Boehmeria cylindrica*
marsh marigold	*Caltha palustris*
blue cohosh	*Caulophyllum thalictroides*
celandine	*Chelidonium majus*
white turtlehead	*Chelone glabra*
American golden-saxifrage	*Chrysosplenium americanum*
wild basil	*Clinopodium vulgare*
cinquefoil	*Cinquefoil potentilla*
jimsonweed	*Datura stramonium*
Queen Anne's lace	*Daucus carota*
depford pink	*Dianthus armeria*
teasel	*Dispsacus sylvestris*
fairybells	*Disporum lanuginosum*
beechdrops	*Epifagus virginiana*
fireweed	*Erechtites hieraciifolia*
whitetop fleabane	*Erigeron annuus*
trout lily	*Erythronium americanum*
Joe-pye-weed	*Eupatorium maculatum*
common boneset	*Eupatorium perfoliatum*
white wood aster	*Eurybia divaricata*
flat-top fragrant goldenrod	*Euthamia graminifolia*
spotted joe-pye weed	*Eutrochium maculatum*
wild strawberry	*Fragaria virginiana*
bedstraw	*Galium sp.*
sweet woodruff	*Galium odoratum*
wild geranium	*Geranium maculatum*
white avens	*Geum canadense*
rough avens	*Geum laciniatum*
purple avens	*Geum rivale*
common sneezeweed	*Helenium autumnale*
dame's-rocket	*Hesperis matronalis*
spotted jewelweed	*Impatiens capensis*
elecampane	*Inula helenium*
yellow flag iris	*Iris pseudocorus*
blue flag iris	*Iris versicolor*
motherwort	*Leonurus cardiaca*
Canada lily	*Lilium canadense*
butter-and-eggs	*Linaria vulgaris*
Loesel's twayblade	*Liparis loeselii*
great blue lobelia	*Lobelia siphilitica*
ragged robin	*Lychnis flos-cuculi*

northern bugleweed	*Lycopus uniflorus*
partridge berry	*Mitchella repens*
forget-me-not	*Myosotis sp.*
golden ragwort	*Packera aurea*
arrowleaf	*Peltandra virginica*
talus slope beard-tongue	*Penstemon digitalis*
ditch-stonecrop	*Penthorum sedoides*
Pennsylvania smartweed	*Persicaria pennsylvanica*
arrow-leaf tearthumb	*Persicaria sagittata*
jumpseed	*Persicaria virginiana*
lopseed	*Phryma leptostachya*
common pokeweed	*Phytolacca americana*
hawkweed oxtongue	*Picris hieracioides*
Canada clearweed	*Pilea pumila*
mayapple	*Podophyllum peltatum*
Jacob's ladder	*Polemoniacae caeruleum*
gay wings	*Polygala paucifolia*
tall buttercup	*Ranunculus acris*
blackeyed Susan	*Rudbeckia hirta*
bloodroot	*Sanguinaria canadensis*
mad-dog skullcap	*Scutellaria lateriflora*
bluestem goldenrod	*Solidago caesia*
giant goldenrod	*Solidago gigantea*
rough-leaved golden-rod	*Solidago rugosa*
white panicle aster	*Symphyotrichum lanceolatum*
calico aster	*Symphyotrichum lateriflorum*
New England aster	*Symphyotrichum novae-angliae*
hairy white old field aster	*Symphyotrichum pilosum*
purple-stem aster	*Symphyotrichum puniceum*
skunk cabbage	*Symplocarpus foetidus*
tall goldenrod	*Solidago altissima*
rough-leaved golden-rod	*Solidago rugosa*
giant goldenrod	*Solidago gigantea*
skunk cabbage	*Symplocarpus foetidus*
common dandelion	*Taraxacum officinale*
tall meadow-rue	*Thalictrum pubescens*
rue-anemone	*Thalicram thalicroides*
foamflower	*Tiarella cordifolia*
eastern poison ivy	*Toxicodendron radicans*
starflower	*Trientalis borealis*
purple trillium	*Trillium erectum*
white trillium	*Trillium grandiflorum*
coltsfoot	*Tussilago farfara*
false hellebore	*Veratrum viride*
giant mullein	*Verbascum thapsus*
blue vervain	*Verbena hastata*
white vervain	*Verbena urticifolia*
speedwell	*Veronica sp.*
sweet white violet	*Viola blanda*
round-leaved yellow violet	*Viola rotundifolia*

Selkirk's violet	*Viola selkirkii*
common blue violet	*Viola sororia*

Shrubs and Vines

speckled alder	*Alnus rugosa*
black chokeberry	*Aronia melanocarpa*
Japanese barberry	*Berberis thunbergii*
American bittersweet	*Celastrus scandens*
silky dogwood	*Cornus amomum*
red-twig dogwood	*Cornus stolinifera*
beaked hazelnut	*Corylus cornuta*
February Daphne	*Daphne mesereum*
autumn olive	*Elaeagnus umbellata*
common winterberry	*Ilex verticillata*
spicebush	*Lindera benzoin*
Japanese honeysuckle	*Lonicera japonica*
Tartarian honeysuckle	*Lonicera tatarica*
Virginia creeper	*Parathenocissus quinquefolia*
multiflora rose	*Rosa multiflora*
swamp rose	*Rosa palustris*
Allegheny blackberry	*Rubus allegheniensis*
bristly dewberry	*Rubus hispidus*
American red raspberry	*Rubus idaeus*
black cap raspberry	*Rubus occidentalis*
purple-flowering raspberry	*Rubus odoratus*
pussy willow	*Salix discolor*
elderberry	*Sambicus canadensis*
nightshade	*Solanum dulcamara*
arrowwood	*Viburnam dentatum*
nannyberry	*Viburnum lentago*
American cranberry bush	*Viburnum trilobum*
wild summer grape	*Vitis aestivalis*

Trees

box elder	*Acer negundo*
red maple	*Acer rubrum*
silver maple	*Acer saccharinum*
sugar maple	*Acer saccharum*
downy serviceberry	*Amelanchier arborea*
shadblow	*Amelanchier canadensis*
yellow birch	*Betula alleghaniensis*
flowering dogwood	*Cornus florida*
gray dogwood	*Cornus racemosa*
ironwood	*Carpinus caroliniana*
scarlet hawthorn	*Crataegus pedicellata*
pignut hickory	*Carya glabra*
shagbark hickory	*Carya ovata*
eastern redbud	*Cercis canadensis*
thornapple	*Crataegus oxyacantha*

scarlet hawthorn	*Crataegus pedicellata*
American beech	*Fagus grandifolia*
glossy buckthorn	*Frangula alnus*
white ash	*Fraxinus americana*
black ash	*Fraxinus nigra*
green ash	*Fraxinus pennsylvanica*
butternut	*Juglans cinerea*
red cedar	*Juniperus virginiana*
American witch-hazel	*Hamamelis virginiana*
black walnut	*Juglans nigra*
apple	*Malus sp.*
wild crabapple	*Malus sp.*
black gum	*Nyssa sylvatica*
hop-hornbeam	*Ostrya virginiana*
Norway spruce	*Picea abies*
eastern white pine	*Pinus strobus*
American sycamore	*Platanus occidentalis*
eastern cottonwood	*Populus deltoides*
bigtooth aspen	*Populus grandidentata*
quaking aspen	*Populus tremuloides*
wild black cherry	*Prunus serotina*
red oak	*Quercus rubra*
white oak	*Quercus alba*
swamp white oak	*Quercus bicolor*
black oak	*Quercus velutina*
common buckthorn	*Rhamnus cathartica*
black locust	*Robinia pseudoacacia*
black willow	*Salix nigra*
northern white cedar	*Thuja occidentalis*
American basswood	*Tilia americana*
eastern hemlock	*Tsuga canadensis*
American elm	*Ulmus americana*
maple-leaf viburnum	*Viburnum acerifolium*

Butterflies

Hoary Edge	*Achalarus lyciades*
Milbert's Tortoiseshell	*Aglais milberti*
Least Skipper	*Ancyloxypha numitor*
Meadow Fritillary	*Boloria bellona*
Silver-bordered Fritillary	*Boloria selene*
Brown Elfin	*Callophrys augustinus*
Eastern Pine Elfin	*Callophrys niphon*
Spring Azure	*Celastrina ladon*
Summer Azure	*Celastrina neglecta*
Common Wood Nymph	*Cercyonis pegala*
Harris' Checkerspot	*Chlosyne harrisii*
Orange Sulphur	*Colias eurytheme*
Clouded Sulphur	*Colias philodice*
Eastern Tailed-Blue	*Cupido comyntas*
Monarch	*Danaus plexippus*

Northern Pearly Eye	*Enodia anthedon*
Silver-spotted Skipper	*Epargyreus clarus*
Dreamy Duskywing	*Erynnis icelus*
Columbine Duskywing	*Erynnis lucilius*
Baltimore	*Euphydryas phaeton*
Dun Skipper	*Euphyes vestris*
Harvester	*Feniseca tarquinius*
Leonard's Skipper	*Hesperia leonardus*
Indian Skipper	*Hesperia sassacus*
Common Buckeye	*Junonia coenia*
Viceroy	*Limenitis archippus*
White Admiral	*Limenitis arthemis arthemis*
Red-spotted Purple	*Limenitis arthemis astyanax*
Bog Copper	*Lycaena epixanthe*
Bronze Copper	*Lycaena hyllus*
American Copper	*Lycaena phlaeas*
Little Wood Satyr	*Megisto cymela*
Mourning Cloak	*Nymphalis antiopa*
Compton Tortoiseshell	*Nymphalis vaualbum*
Eastern Tiger Swallowtail	*Papilio glaucus*
Black Swallowtail	*Papilio polyxenes*
Spicebush Swallowtail	*Papilio troilus*
Orange-barred Sulphur	*Phoebis philea*
Tawny Crescent	*Phyciodes batesii*
Pearl Crescent	*Phyciodes tharos*
Cabbage White	*Pieris rapae*
West Virginia White	*Pieris virginiensis*
Hobomok Skipper	*Poanes hobomok*
Long Dash	*Polites mystic*
Peck's Skipper	*Polites peckius*
Tawny-edged Skipper	*Polites themistocles*
Checkered White	*Pontia protodice*
Eastern Comma	*Polygonia comma*
Question Mark	*Polygonia interrogationis*
Gray Comma	*Polygonia progne*
Common Checkered-Skipper	*Pyrgus communis*
Little Yellow	*Pyrisitia lisa*
Acadian Hairstreak	*Satyrium acadica*
Banded Hairstreak	*Satyrium calanus*
Eyed Brown	*Satyrodes eurydice*
Striped Hairstreak	*Satyrium liparops*
Coral Hairstreak	*Satyrium titus*
Atlantis Fritillary	*Speyeria atlantis*
Aphrodite Fritillary	*Speyeria aphrodite*
Great Spangled Fritillary	*Speyeria cybele*
Northern Cloudywing	*Thorybes pylades*
European Skipper	*Thymelicus lineola*
Red Admiral	*Vanessa atalanta*
Painted Lady	*Vanessa cardui*
American Lady	*Vanessa virginiensis*

Moths

Luna moth	*Actias luna*
Pink-spotted hawkmoth	*Agrius cingulata*
Eight-spotted Forester	*Alypia octomaculata*
Polyphemus moth	*Antheraea polyphemus*
Waved sphinx	*Ceratomia undulosa*
Colona	*Colona haploa*
Virginia Ctenuchid	*Ctenuchid virginica*
Snowberry Clearwing	*Hemaris diffinis*
Hummingbird Clearwing	*Hemaris thysbe*
Cecropia Silkmoth	*Hyalophora cecropia*
Mottled Prominent	*Macrurocampa marthesia*

Damselflies

Eastern Red Damsel	*Amphiagrion saucium*
Ebony Jewelwing	*Calopteryx maculata*
Aurora Damsel	*Chromagrion conditum*
Stream Cruiser	*Didymops transversa*
Azure Bluet	*Enallagma aspersum*
Marsh Bluet	*Enallagma ebrium*
Skimming Bluet	*Enallagma geminatum*
Eastern Forktail	*Ischnura verticalis*
Elegant Spreadwing	*Lestes inaequalis*
Swamp Spreadwing	*Lestes vigilax*

Dragonflies

Canada Darner	*Aeshna canadensis*
Lance-tipped Darner	*Aeshna constricta*
Shadow Darner	*Aeshna umbrosa*
Common Green Darner	*Anax junius*
Unicorn Clubtail	*Arigomphus villosipes*
Calico Pennant	*Celithemis elisa*
Delta-spotted Spiketail	*Cordulegaster diastatops*
American Emerald	*Cordulia shurtleffii*
Racket-tailed Emerald	*Dorocordulia libera*
Common Baskettail	*Epitheca cynosura*
Prince Baskettail	*Epitheca princeps*
Eastern Pondhawk	*Erythemis simplicicollis*
Spine-crowned Clubtail	*Gomphus abbreviatus*
Lancet Clubtail	*Gomphus exilis*
Uhler's Sundragon	*Helocordulia uhleri*
Northern Pygmy Clubtail	*Lanthus parvulus*
Dot-tailed Whiteface	*Leucorrhinia intacta*
Slaty Skimmer	*Libellula incesta*
Common Whitetail	*Libellula lydia*
Twelve-spotted Skimmer	*Libellula pulchella*

Blue Dasher	*Pachydiplax longipennis*
Clamp-tipped Emerald	*Somatoclora tenebrosa*
Cherry-faced Meadowhawk	*Sympetrum internum*
Autumn Meadowhawk	*Sympetrum vicinum*

Birds

Cooper's Hawk	*Accipiter cooperii*
Sharp-shinned Hawk	*Accipiter striatus*
Northern Saw-whet Owl	*Aegolius acadicus*
Red-winged Blackbird	*Agelaius phoeniceus*
Wood Duck	*Aix sponsa*
Mallard	*Anas platyrhynchos*
Ruby-throated Hummingbird	*Archilochus colubris*
Great Blue Heron	*Ardea herodias*
Tufted Titmouse	*Baeolophus bicolor*
Cedar Waxwing	*Bombycilla cedrorum*
Ruffed Grouse	*Bonasa umbellus*
Canada Goose	*Branta canadensis*
Great Horned Owl	*Bubo virginianus*
Red-tailed Hawk	*Buteo jamaicensis*
Red-shouldered Hawk	*Buteo lineatus*
Green Heron	*Butorides virescens*
Northern Cardinal	*Cardinalis cardinalis*
Common Redpoll	*Carduelis flammea*
Pine Siskin	*Carduelis pinus*
American Goldfinch	*Carduelis tristis*
House Finch	*Carpodacus mexicanus*
Purple Finch	*Carpodacus purpureus*
Veery	*Catharus fuscescens*
Hermit Thrush	*Catharus guttatus*
Swainson's Thrush	*Catharus ustulatus*
Brown Creeper	*Certhia americana*
Belted Kingfisher	*Ceryle alcyon*
Killdeer	*Charidrius vociferus*
Evening Grosbeak	*Coccothraustes vespertinus*
Northern Flicker	*Colaptes auratus*
Northern Bobwhite	*Colinus virginianus*
American Crow	*Corvus brachyrhynchos*
Blue Jay	*Cyanocitta cristata*
Black-throated Blue Warbler	*Dendroica caerulescens*
Cerulean.Warbler	*Dendroica cerulea*
Yellow Warbler	*Dendroica petechia*
Pine Warbler	*Dendroica pinus*
Blackpoll Warbler	*Dendroica striata*
Black-throated Green Warbler	*Dendroica virens*
Bobolink	*Dolichonyx oryzivorus*
Pileated Woodpecker	*Dryocopus pileatus*
Gray Catbird	*Dumetella carolinensis*
Least Flycatcher	*Empidonax minimus*
Rusty Blackbird	*Euphagus carolinus*

American Kestrel	*Falco sparverius*
Common Yellowthroat	*Geothlypis trichas*
Wood Thrush	*Hylocichla mustelina*
Baltimore Oriole	*Icterus galbula*
Orchard Oriole	*Icterus spurius*
Least Bittern	*Ixobrychus exilis*
Varied Thrush	*Ixoreus naevius*
Dark-eyed Junco	*Junco hyemalis*
Red Crossbill	*Loxia curvirostra*
Red-bellied Woodpecker	*Melanerpes carolinus*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Wild Turkey	*Meleagris gallopavo*
Swamp Sparrow	*Melospiza georgiana*
Song Sparrow	*Melospiza melodia*
Black-and-white Warbler	*Mniotilta varia*
Brown-headed Cowbird	*Molothrus ater*
Great Crested Flycatcher	*Myiarchus crinitus*
Snowy Owl	*Nyctea scandiaca*
Eastern Screech-Owl	*Otus asio*
Indigo Bunting	*Passerina cyanea*
Ring-necked Pheasant	*Phasianus colchicus*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Eastern Towhee	*Pipilo erythrophthalmus*
Scarlet Tanager	*Piranga olivacea*
Black-capped Chickadee	*Poecile atricapillus*
Purple Martin	*Progne subis*
Prothonotary Warbler	*Protonotaria citrea*
Common Grackle	*Quiscalus quiscula*
Eastern Phoebe	*Sayornis phoebe*
Ovenbird	*Seiurus aurocapillus*
American Redstart	*Setophaga ruticilla*
Eastern Bluebird	*Sialia sialis*
Red-breasted Nuthatch	*Sitta canadensis*
White-breasted Nuthatch	*Sitta carolinensis*
Yellow-bellied Sapsucker	*Sphyrapicus varius*
American Tree Sparrow	*Spizella arborea*
Chipping Sparrow	*Spizella passerina*
Field Sparrow	*Spizella pusilla*
Barred Owl	*Strix varia*
European Starling	*Sturnis vulgaris*
Brown Thrasher	*Toxostoma rufum*
House Wren	*Troglodytes aedon*
American Robin	*Turdus migratorius*
Barn Owl	*Tyto alba*
Eastern Kingbird	*Tyrannus tyrannus*
Tennessee Warbler	*Vermivora peregrina*
Red-eyed Vireo	*Vireo olivaceus*
Canada Warbler	*Wilsonia canadensis*
Mourning Dove	*Zenaida macroura*

Mammals

Coyote	*Canis latrans*
Beaver	*Castor canadensis*
Virginia Opossum	*Didelphis virginiana*
Porcupine	*Erethizon dorsatum*
Woodchuck	*Marmota monax*
Marten	*Martes americana*
Striped Skunk	*Mephitis mephitis*
Meadow Vole	*Microtus pennsylvanicus*
Pine Vole	*Microtus pinetorum*
Long-tailed Weasel	*Mustela frenata*
Little Brown Bat	*Myotis lucifugus*
American Mink	*Neovison vison*
White-tailed Deer	*Odocoileus virginianus*
Muskrat	*Ondatra zibethicus*
Raccoon	*Procyon lotor*
Eastern Chipmunk	*Tamias striatus*
Gray Squirrel	*Sciurus carolinensis*
Red Squirrel	*Sciurus vulgaris*
Eastern Cottontail Rabbit	*Sylvilagus floridanus*
Red Fox	*Vulpes vulpes*

Amphibians

Frogs and Toads

American Toad	*Bufo americanus*
Gray Tree Frog	*Hyla versicolor*
Northern Leopard Frog	*Lithobates pipiens*
Red-spotted Newt	*Notophthalmus viridiscens*
Spring Peeper	*Pseudacris crucifer*
American Bullfrog	*Rana catesbeiana*
Green Frog	*Rana clamitans*
Wood Frog	*Rana sylvatica*

Salamanders

Jefferson's Salamander	*Ambystoma jeffersonianum*
Northern Spring Salamander	*Gyrinophilus porphyriticus*
Red-backed Salamander	*Plethodon cinereus*
Northern Two-lined Salamander	*Eurycea bistineata*

Reptiles

Turtles

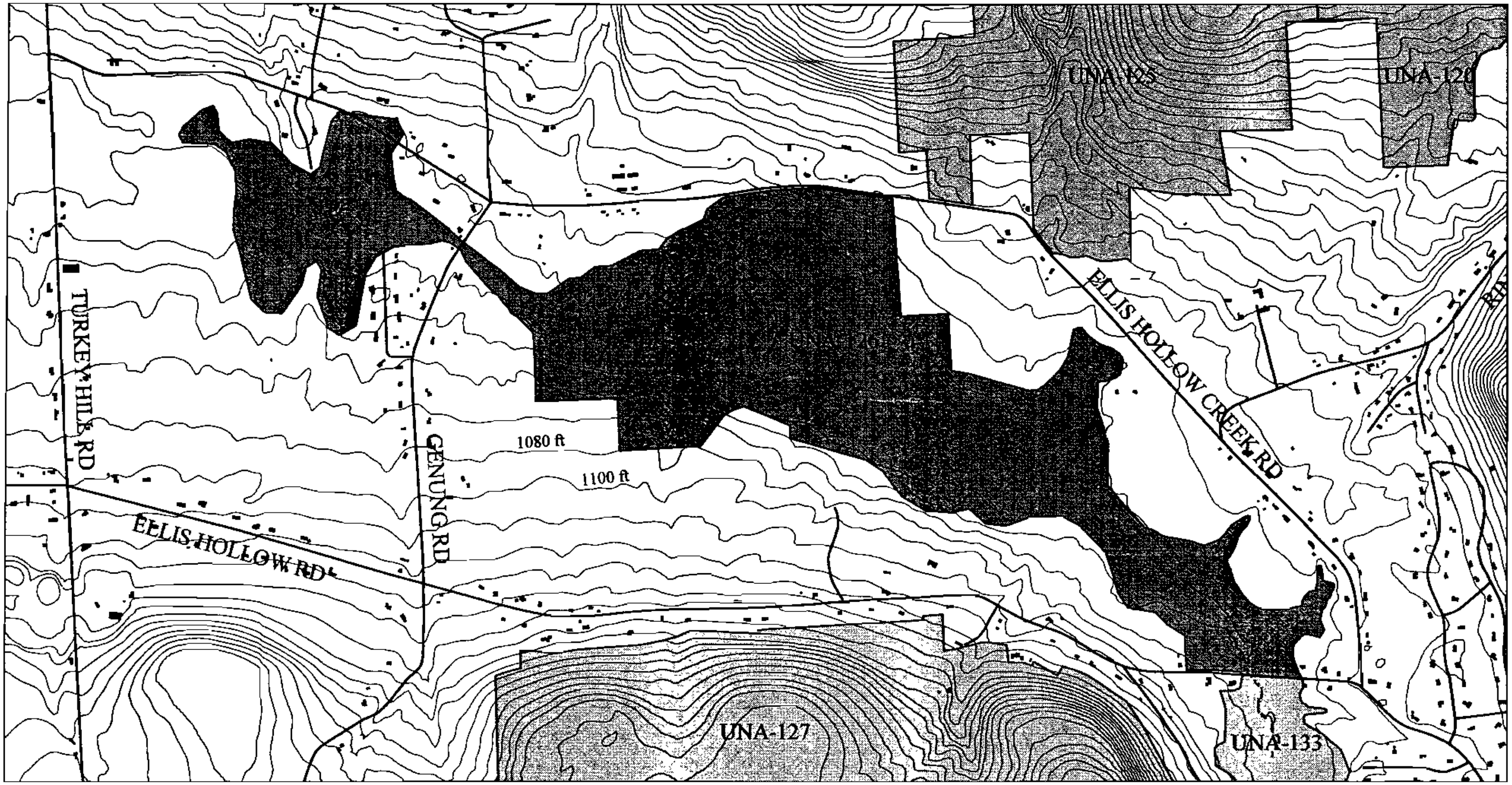
Snapping Turtle	*Chelydra serpentina*
Wood Turtle	*Glyptemys insculpta*

Snakes

Eastern Milk Snake	*Lampropeltis triangulum*
Smooth Green Snake	*Opheodrys vernalis*
Northern Brown Snake	*Storeria dekayi*
Common Garter Snake	*Thamnophis sirtalis*

Attachment 3

Unique Natural Area (UNA-126)



Town of Dryden

UNA-126 Ellis Hollow Swamp

Tompkins County Environmental Management Council
Inventory of Unique Natural Areas in Tompkins County
Last Updated: September 1999

Unique Natural Area UNA-126
Other Unique Natural Area(s)
Building Footprint
20 Foot Contour
Road

UNA boundaries were delineated by field biologists based on a review of air photographs, digital GIS base map data (roads, building footprints, 20 foot contours and streams) and field visits. UNA boundaries are approximate and should be used for general planning purposes only. As a practical matter the county does not warrant the accuracy or completeness of the information portrayed. The end user of this map agrees to accept the data "as is" with full knowledge that errors and ommissions may exist, and to hold harmless the County for any damages that may result from an inappropriate use of this map.

N

1:18000

1000 0 1000 Feet

SITE NAME: Ellis Hollow Swamp **SITE CODE:** UNA-126

DATA LAST UPDATED: 1/3/00 **OLD SITE CODE:** DR-14

LOCATION

Municipality: Town of Dryden
USGS Quad: Ithaca East
Tax Parcel Numbers Included in this Site:

Latitude: 42 26 02 N
Longitude: 76 24 14 W
Latitude: 42 25 43 N
Longitude: 76 23 41 W

Tax parcel data is accurate as of July 1, 1999. For up-to-date information on tax parcel descriptions and ownership, contact the Tompkins County Assessment Department. When a UNA covered less than 0.025 ac. of a parcel, the parcel was excluded from this list.

DR 65.-4-7	DR 66.-1-1.2	DR 66.-1-10	DR 66.-1-12	DR 66.-1-14	DR 66.-1-15	DR 66.-1-17.4
DR 66.-1-17.6	DR 66.-1-18	DR 66.-1-19	DR 66.-1-2.1	DR 66.-1-20.1	DR 66.-1-20.2	DR 66.-1-21.1
DR 66.-1-6.2	DR 66.-1-7.1	DR 66.-1-7.2	DR 66.-1-8	DR 66.-1-9.1	DR 66.-1-9.8	DR 67.-1-75.1
DR 67.-1-76	DR 67.-1-78.1	DR 67.-1-79	DR 67.-1-80.10	DR 67.-1-80.11	DR 67.-1-80.21	DR 67.-1-80.22
DR 67.-1-80.23	DR 67.-1-80.24	DR 67.-1-80.5	DR 67.-1-80.7	DR 67.-1-80.8	DR 67.-1-81.2	DR 67.-1-81.7
DR 75.-1-35.1	DR 75.-1-36.1	DR 75.-1-36.2	DR 75.-1-37.2	DR 75.-1-41		

SITE AND VEGETATION DESCRIPTION

This area is known historically for its rich flora. Small elevation changes in the undulating topography near Cascadilla Creek result in significant changes in wetness and vegetation. Upland forest, swamp forest, shrub swamp, small patches of rich sloping fen, wet meadow, and marsh are all found here. Forest of sugar maple and beech is prevalent on the low rises, with hemlock, white pine, red maple, cucumber magnolia, and red oak also present. Hemlock, red maple, and yellow birch dominate the swamp forest. American elm, black ash, spicebush, swamp buckthorn, black chokeberry, cranberry viburnum, and swamp gooseberry are other characteristic species found there. Speckled alder is dominant in the shrub swamp. In the wet meadow and marsh, characteristic species include spotted joe-pye weed, swamp aster, common bulrush, swamp milkweed, and various sedges (Carex spp.).

REASONS FOR SELECTION

- Birding site
- Diverse fauna
- State-designated wetland
- Rare or scarce community types
- Rare or scarce plants
- Scenic/Aesthetic value
- Historic botanical/zoological site
- Old-growth forest

SPECIAL LAND-USE INFORMATION

Special Land-Use Designations and Features

- The Tompkins County Greenway Coalition has identified a biological corridor which includes this site.
- The New York Natural Heritage Program has determined that this site may contain rare plants, animals, and/or significant ecological communities.
- A mature forest stand with trees over 150 years old is found on this site.
- This site is wholly or partially located within a Cornell owned and designated off-campus natural area.

Water Resources

- A stream runs through this site.
- Wetlands identified on the National Wetlands Inventory are found on this site.
- All or some of this site lies within Flood Zone A (100-year flood) as identified by FEMA.
- All or some of a Class 1 NYS Freshwater Wetland lies on this site. Class 1 is the most valuable class assigned.
- A NYS protected stream runs through this site.

CONSERVATION OF THE SITE

Sensitivity of Site to Visitors: This site is considered very vulnerable to disturbance by visitors.

Special Conservation/Management Needs: Visitor access to the site should be restricted or eliminated. The site does not have an adequate protective buffer.

PHYSICAL CHARACTERISTICS OF THE SITE

Size (acres): 351.867 **Elevation (ft.):** 964 to 1085 **Aspect:** north and south

Topographic Features

Rolling low ridges on shallow slopes and a broad, flat wetland.

Geological Features

Morainal ridges and knolls, possibly an esker section.

Slope %	Topographic Position
☑ Flat	☐ Crest
☑ 3 to 15	☐ Upper Slope
☐ 15 to 25	☐ Mid Slope
☐ Over 25	☑ Lower Slope
	☑ Bottom

Soils Present on the Site

Soil characteristics of the site were determined manually and are approximate. In the future, digital soil data will provide more accurate information.

Soil Name	Hydric (Wet)	Erodibility	Drainage
Wayland and Sloan silt loams	Hydric	Non-highly erodible	Somewhat poorly drained to very poorly drained

Erie channery silt loam, 3 to 8 percent slope	Potential hydric inclusions	Potentially highly erodible	Somewhat poorly drainec
Ellery, Chippewa, and Alden soils, 0 to 8 percent slope	Hydric	Potentially highly erodible	Poorly drained to very poorly draine
Madalin mucky silty clay loam	Hydric	Non-highly erodible	Poorly drained and very poorly drained
Eel silt loam	Potential hydric inclusions	Non-highly erodible	Moderately well drained

BIOLOGICAL CHARACTERISTICS OF THE SITE

General Cover Types

Wetland forest

Wetland shrub thicket

Wet meadow

Upland forest

Marsh

Old-field forest

Open water

Ecological Communities

Detailed information regarding each community type's rareness may be found in Appendix F. For up-to-date information on ecological communities, contact the NY Natural Heritage Program (518-783-3932).

Rarity: (Key: No checkmarks indicate that no communities fall within those categories.)

☑ Global - At least one community designated as rare or scarce at the global level by The Nature Conservancy is found on this site.

☑ State - At least one community designated as rare or scarce at the state level by The Nature Conservancy and the New York Natural Heritage Program is found on this site.

☑ Local - At least one community designated as rare or scarce at the local level by the Tompkins County EMC and the Cornell Plantations is found on this site.

Ecological Communities Inventoried on this Site:

Community Name	Description	Global	State	Local Rarity
Hemlock-hardwood swamp	A swamp on mineral soils overlain with peat that occurs in depressions which may receive ground water discharge. The swamp may be flooded in spring and dry by late summer. The forest commonly occurs on very acid (pH<4.5) woody peat at margins of small rain fed basins. The canopy is usually fairly closed and there is a sparse shrub and ground layer. Characteristic trees are hemlock, yellow birch, and red maple, black ash, and, formerly, American elm. Locally, white pine may be one of the dominant trees. Tall shrubs of acid wetlands such as highbush blueberry, black chokeberry and Viburnum cassinoides are present. The herb layer may be sparse and species-poor. Characteristic herbs are Canada mayflower, cinnamon fern, and goldthread.	G4G5	S4	L4
Rich sloping fen	These small, gently sloping, mineral rich wetlands, with shallow peat deposits, occur on a slope of calcareous gravel. Fed by small springs or groundwater seepage rich in minerals, these headwater wetlands have cold water constantly flowing through them. Usually there are scattered trees and shrubs. Species diversity is usually very high. Characteristic species include: sedges, cottongrass, cattail, satin grass, marsh fern, crested fern, tall meadow rue, purple avens, skunk cabbage, and globeflower. Rich fens are fed by water from highly calcareous springs or seepage rich in minerals with high pH, (6.5 to 8). They are underlain by glacial gravels with peat deposits. This community is often found with other fen communities which may form a mosaic on one site	G3	S1S2	L2
Shrub swamp	A shrub dominated wetland that occurs along a lake or river, in a wet depression, or as a transition between wetland and upland communities. The substrate is usually mineral soil or muck. Alder, willows, or red-osier and silky dogwoods are common dominant species. Other characteristic shrub species include gray dogwoods, meadowsweet, highbush blueberry, winterberry, spicebush, viburnums, and buttonbush. A few red maple trees may be present. The herb layer is lush and diverse, and typically includes species found in sedge-grass meadows.	G5	S5	L4
Shallow emergent marsh	A shallow marsh is better drained than a deep emergent marsh; water depths may range from 15cm to 1m during flood stages, but the water level usually drops by mid- to late-summer and the substrate is exposed. Characteristic plants include bluejoint grass, reed canary grass, cutgrass, manna grass, spikerushes, bulrushes, sweetflag, wild iris, and water smartweed. Marsh communities occur on mineral soils or fine-grained organic soils that are permanently saturated. They are often found near the Finger Lakes or in wetlands near a drainage divide. Because water levels may fluctuate, exposing substrate and aerating the soil, there is little or no accumulation of peat	G5	S5	L4

Impounded swamp	A swamp with at least 50% cover of trees where the water levels have been artificially manipulated or modified. Red maple is a characteristic tree. Often there are many standing dead trees. Purple loosestrife and duckweed may be dominant in the understory.	G5	S5	L4
Impounded marsh	A marsh with less than 50% cover of trees in which water levels have been artificially manipulated or modified. Purple loosestrife and reed canary grass or cut grass may dominate.	G5	S5	L4
Successional northern hardwoods	A forest with more than 60% canopy cover of trees that occurs on sites that have been cleared or otherwise disturbed. Dominant trees are usually two or more of the following: red maple, white pine, white ash, gray birch, quaking aspen, big-tooth aspen, and, less frequently, sugar maple and white ash. Tree seedlings and saplings may be of more shade tolerant species. Shrubs and ground cover species may be those of old-fields. In abandoned pasturelands apples and hawthorns may be present in the understory.	G5	S5	L4
Sedge meadow	A wet meadow with permanently saturated and seasonally flooded organic soils in wetlands that receive mineral nutrients via groundwater or streams. There is usually little peat accumulation and floating mats are not formed. Sedge meadows typically occur along streams and near the inlet and outlets of lakes and ponds. The dominant species is a tussock-sedge, Carex stricta, usually with about 50% cover. Other characteristic herbs include sedges (C. lacustris and C. rostrata), bluejoint grass, sweetflag, joe-pye weed, tall meadow rue, and bulrushes.	G5	S4	L3L4
Wetland headwater stream	The aquatic community of a small, swampy brook with a low gradient, slow flow rate, and cool to cold water that flows through a fen, swamp or marsh near the stream origin. Springs may be present. The substrate is clay, gravel or sand, with silt, muck, peat, or marl deposits along the shore. Characteristic plants include watercress, Chara. Persistent emergent vegetation is lacking.	G4	S4	L4
Midreach stream	The aquatic community of a stream that has a well-defined pattern of alternating pool, riffle, and run sections. Waterfalls and springs may be present. Typical aquatic macrophytes include waterweed and pondweeds. Persistent emergent vegetation is lacking.	G4	S4	L4

Plant Species

Although substantial effort was made to identify significant plant species on this site, it is possible that additional rare or scarce species exist that do not show up in this report. A field check is always recommended prior to modifying the landscape. Detailed information regarding each species' rareness and status may be found in Appendix D. For up-to-date information on species, contact the NY Natural Heritage Program (518-783-

Rarity: (Key: No checkmarks indicate that no species fall within those categories.)

☐ Global - At least one plant species designated as rare or scarce at the global level by The Nature Conservancy is found on this site.

☐ State - At least one plant species designated as rare or scarce at the state level by The Nature Conservancy and the New York Natural Heritage Program is found on this site.

☑ Local - At least one plant species designated as rare or scarce at the local level by the Tompkins County EMC and the Cornell Plantations is found on this site.

Legal Status:

☐ Federal - At least one plant species designated as threatened or endangered by the U.S. Department of the Interior is found on this site.

☑ State - At least one plant species designated in New York State as endangered, threatened, rare or exploitably vulnerable is found on this site.

Significant Plant Species Inventoried on this Site:

Scientific Name	Common Name	Global/State/Local Rarity	Local Comments	State Legal Status
Aronia melanocarpa	black chokeberry	L3	Scarce	None
Viburnum trilobum	cranberry viburnum, highbush cranberry	L4		None
Cypripedium pubescens	large yellow ladyslipper	L3	Scarce	Exploitably vulnerable
Ribes glandulosum	skunk currant	L3	Scarce	None
Rhamnus alnifolius	swamp buckthorn	L4		None
Ribes hirtellum	swamp gooseberry	L3	Scarce	None

Animal Species

The UNA Inventory currently does not contain much specific data regarding animal species (and very little regarding rare or scarce species) on UNA sites. Therefore, this data should be viewed as preliminary and incomplete. A field check is always recommended prior to modifying the landscape. Detailed information regarding each species' rareness and status may be found in Appendix E. For up-to-date information on species, contact the NY Natural Heritage Program (518-783-3932).

Animal Description: This site provides important nesting, feeding, and wintering habitat for a large diversity of bird species. It is also a deer over-wintering area. A high diversity of insect species are present. The animal species found on this site are considered normal for the area.

Rarity: (Key: No checkmarks indicate that no species fall within those categories.)

☐ Global - At least one animal species designated as rare or scarce at the global level by The Nature Conservancy is found on this site.

☐ State - At least one animal species designated as rare or scarce at the state level by The Nature Conservancy and the New York Natural Heritage Program is found on this site.

Legal Status:

☐ Federal - At least one animal species designated as threatened or endangered by the U.S. Department of the Interior is found on this site.

☐ State - At least one animal species designated by NYS as threatened or endangered is found on this site.

Animal Species Inventoried on this Site:

Scientific Name	Common Name	Global/State Rarity	Federal/State Legal Status	Comments
			LUn SUn	

Castor canadensis	Beaver	LUn	SUn	
Sylvilagus floridanus	Eastern Cottontail	LUn	SUn	
Mustela vison	Mink	LUn	SUn	
Wilsonia canadensis	Canada Warbler	MBTA	SUn	PIF Species of Concern
Hemiptera	True Bug			
Trichoptera	Caddisfly			
Ephemeroptera	Mayfly			
Megaloptera	Dobsonfly Larvae			

TOMPKINS COUNTY
ENVIRONMENTAL MANAGEMENT COUNCIL

121 East Court Street Ithaca, New York 14850
Telephone (607) 274-5560 Fax (607) 274-5578

June 21, 2000

C JR & Z HENDENDERSON
7 SUNNY KNOLL RD
ITHACA NY
14850

Dear Tompkins County Landowner,

The Tompkins County Environmental Management Council (EMC), an advisory board to the County Board of Representatives, has just completed an extensive environmental survey of the Unique Natural Areas (UNAs) in the county. These Unique Natural Areas are outstanding examples of the natural resources and scenic vistas found in Tompkins County. The UNA survey originally began in 1973, was expanded in 1990, and was recently revised.

Botanists, naturalists, and geologists participating in this project documented 192 UNAs in Tompkins County. Distinguishing features of these UNAs include wildflowers, trees, wetlands, forests, fields, streams, and the rare and scarce plant and animals species that inhabit them. The survey team conducted on-site visits with landowner permission, and also used information gained from aerial photographs, topographic maps, and historical biological records. The results of this analysis are described in a single report entitled *The Unique Natural Areas Inventory of Tompkins County, Revised 2000.*

Your property at SUNNY KNOLL RD in the Town of Dryden, New York is part of Ellis Hollow Swamp, UNA-126. Features of this Unique Natural Area include:

- Birding site
- Rare or scarce plants
- Diverse fauna
- Scenic/Aesthetic value
- State designated wetland
- Historic botanical/zoological site
- Rare or scarce community types
- Old growth forest

For your records and personal interest, we have enclosed the full description of UNA-126 as it appears in the UNA report. We hope that you will find this section of the UNA report helpful in informing you about the unique features of your property.

Each UNA description in the report includes a map, a description of the site, the primary reasons why it was selected as a UNA, land-use features, and key conservation suggestions. The EMC hopes that the information in this document will help landowners and municipalities protect the natural beauty of Tompkins County. The UNA information may also help to inform individual property owners about portions of their land that are most sensitive to land use change.

The Unique Natural Areas Inventory is designed as an easy-to-use information tool to help landowners, developers, and planners better understand potential environmental impacts on our natural resources. Much of the information contained in the document can help with land-use decisions. The report should be particularly useful in consideration of sites where state environmental laws are applicable, or when environmental permits are required for development or other environmental disturbances. Although the UNA designation itself has no legal or regulatory power, some UNAs do include wetlands that are currently protected by the New York State Department of Environmental Conservation, or by the US Army Corps of Engineers. Some UNAs are preserves and forests that are privately held or state-owned. Public access to private property is always at the discretion of the landowner.

Copies of the report can be found at the Tompkins County Public Library, your local library, and municipal offices. The enclosed brochure provides a summary of how the inventory was developed, and lists contact numbers for town offices where you can view the report in its entirety.

If you have additional questions about the UNAs, please call (607) 274-5579 and leave a message for the EMC. An EMC member will return your call as soon as possible.

Sincerely,

Susan Hayden Brock

Susan H. Brock, Chair
Tompkins County Environmental Management Council

encl:
- report for UNA-126
- UNA brochure

<u>Attachment 4</u>

April 27, 2007 letter to Cornell University

7 Sunny Knoll
Ithaca, NY 14850
April 27, 2007

Edward R. Wilson, Plant Manager
Utilities Enterprises
C.H.P. Humphreys Service Building
Cornell University
Ithaca, NY 14853

Dear Ed,

I would like to request a copy of the soil-boring results that were taken for the section of the proposed gas pipeline route between Turkey Hill Rd. and Genung Rd. The results will provide additional information for evaluating horizontal directional drilling (HDD). I would follow up with experts in directional drilling whom I have been speaking to.

The optimal approach for the pipeline would be to directionally drill for the whole 3,500-foot distance between the two roads rather than just the 1,300 feet now tentatively proposed. Taking the underground drilling only 1,300 feet east of Turkey Hill Rd. will not spare the headlands that feed two brooks, the large marshy areas created by the brooks, a major floodplain, and Cascadilla Creek itself (all on the property owned by my husband and me), nor the headlands farther to the east for the major brook and wetlands behind Knoll Tree Rd.

The forest crossed by the remaining 2,200 feet of pipeline would still be clearcut at a minimum width of 50 feet under the current plan.

Information on the soil and rock conditions is also available through well and bridge records. Based on well-casing records in the area, the bedrock is probably not shallow. Casing depth normally corresponds to bedrock depth. From records of the Water Well Program of the DEC in Albany, the casing depths for several Ellis Hollow Rd. wells near the proposed route are 22 feet, 26 feet, and 32 feet. The pipeline will be at least 100 yards closer to the creek valley than the Ellis Hollow Rd. wells, however, and the bedrock in creek valleys often does not begin until several hundred feet belowground. The bedrock should presumably be deeper on most of the pipeline route than on the Ellis Hollow Rd. properties. Casing depths for two Genung Rd. wells near the route are 121 feet and 150 feet.

Well records for newly drilled wells have only been required by the DEC since 2000, or more figures would be available.

The property owned by Bruce and Kathryn Howlett, immediately to the south of the Turkey Hill Rd. entry for the pipeline, has a well casing that is 90 feet deep. Bruce said at the open house when speaking with John Heintz and me that he thought the depth was 20 feet but checked his records later and confirmed that it is in fact 90 feet.

The bedrock is more than 46.5 feet deep below the Turkey Hill Rd. bridge, which is around half a mile north of the pipeline route. That is the general test depth for soil borings. The results were provided to me by John Lampman, a civil engineer with the Tompkins County Highway Department. I can send you a copy of the test-boring log if it would be of value in the analysis of the soil and rock conditions.

I realize you have preliminary information from the test boring for the pipeline that indicates bedrock at 8 feet. From everyone I have spoken with, and from the well and highway data, it would seem there may be a question of terminology. It would be common to have cobbles at that 8-foot depth, but it would seem unlikely that bedrock exists at that depth over much, if any, of the proposed route.

An alternative explanation is that the core-sampling company used an overly small sampler or other inadequate tools that signaled "refusal" when an individual rock was hit, causing the contractor to misinterpret the reading.

Complete results would yield information about the types and hardness of the rocks. For example, certain types of rock are an advantage in directional drilling, because they stabilize the drill bit.

It appears, based on comments made at the open house, that there also may be some information lacking about the feasibility and cost of directional drilling. My guess is that the pipeline project managers may be pleasantly surprised at the cost compared to open-cut construction.

I have been told by HDD pipeline engineers and construction company managers that open-cut construction is less expensive than trenchless construction mainly in open terrain, such as fields. But in the case of forests and wetlands, the cost of open-cut construction goes up significantly, because of the additional work, employees, equipment, and materials required for the tree clearing; excavating; stockpiling of topsoil and spoils; environmental mitigation during construction, including storm water management; removal of disturbed rocks; and restoration of wetlands after the work is completed (to the extent that the wetlands can in fact be fully restored).

The diameter of pipe can also result in a price difference between the two methods. A 48-inch pipe, for example, is more complicated to install through HDD than by the trench method, with the price accordingly higher. An 8-inch pipe, however, is considered relatively simple and straightforward to drill and therefore can be very competitive in price to open-cut methods.

If there is a layer of clay at a depth of 30–40 feet deep, directional drilling could actually cost less than trench construction.

But even if directional drilling did cost somewhat more, the extra amount will be minor compared to the cost of the overall project, especially when amortized over the 50-year service of the pipeline that Cornell anticipates. The gains from directional drilling in protecting the forest and wetlands are significant.

Currently, the plan is to drill at a depth of 5 feet. A number of experts have said that this depth isn't feasible for actual directional drilling, however, because of the radius involved. The drill has to enter the ground at 12 degrees and exit at 12 degrees. Also, frac-out, or inadvertent release of the clay-and-water drilling fluid, is a certainty at 5 feet. The preferable depth for drilling in wetlands is 30–50 feet. Drilling at 50 feet adds no more to the cost than drilling at shallower depths.

The fact that a length of only 1,300 feet has been proposed for drilling may be a reflection of the type of companies that have been contacted for preliminary bids, perhaps companies that don't have the experience and larger rigs or other equipment that the main HDD companies use. Smaller companies also would lack the expertise and could potentially charge more than the leading directional drilling companies.

Directional drilling is often done at lengths of several thousand feet; the distance of 3,500 feet is regarded as relatively easy by the major companies and can be accomplished in a single run. An extra bore pit would be unnecessary.

I think the Cornell pipeline project managers and others involved with the project have done an excellent job of not only soliciting community response to the pipeline design but also listening to, and incorporating, changes based on several of the expressed concerns. The current proposal leaves serious environmental concerns still to be dealt with, but ones that should be able to be alleviated fully by true directional drilling over the entire length of this section and without greatly increasing the cost of the project. I am sure Cornell desires to use the best environmental approach if it is at all feasible.

As with the project information provided to the public so far to enable input, the soil test results are essential for being able to evaluate the feasibility of directional drilling done in the best way possible.

John Heintz said at the open house that he and others on the project would welcome additional technical information. In that spirit, I look forward to providing what I hope will be regarded as constructive comments on the design.

Best regards,
Zorika Henderson

Attachment 5

December 17, 2007 letter to Cornell University

7 Sunny Knoll
Ithaca, NY 14850
December 17, 2007

Edward R. Wilson, Plant Manager
Central Heating Plant/Chilled Water Plants
Facilities Services
Humphreys Service Building
Cornell University
Ithaca, NY 14853

Dear Mr. Wilson:

Several positive design changes on the pipeline project were presented at the November 8 meeting. They include enhanced landscaping around the metering and regulating station and reduced height of the buildings in the station. Neighbors who live closest to the station will appreciate these changes.

The current plan, however, is a step back from what is needed to deal with the environmental problems caused by the pipeline in the wetlands and forest between Turkey Hill Rd. and Genung Rd.

There is now less horizontal directional drilling (HDD) than was presented at the April meeting. The entire length from Turkey Hill Road to the field along Genung Rd. where the station will be located needs to be directionally drilled to protect wetlands from damage and to minimize destruction of forest. This area is a watershed for Cascadilla Creek and contains headwaters that drain into brooks and ultimately the creek.

Directional drilling should be able to be done at a tolerable cost for this $60 million project. The likely amount of any added cost can certainly be justified by the preservation of the surrounding land—designated a Unique Natural Area by the county—and community good will. The project is being presented as a step toward sustainability. Directional drilling would be far more in keeping with that emphasis than destructive clear-cutting of trees and open-cut construction in wetlands. It would be unfortunate if sustainability were compromised by needlessly destructive methods of laying the pipe when there is a viable and environmentally beneficial alternative.

My husband and I own the land north of and contiguous with Cornell land between Turkey Hill Rd and Genung Rd. Our land includes Cascadilla Creek, two of the brooks feeding Cascadilla Creek crossed by the pipeline, large marshy areas created by the brooks, and a major floodplain. There are other brooks and headwaters crossed by the pipeline that create similar wetlands, one immediately to the east and one to the west of our land. The brook behind Knoll Tree Rd. includes a large marsh and floodplain. The headwaters in the pipeline route also contribute water to the area's wetlands through springs, groundwater, and surface water.

The land immediately north of the proposed pipeline and continuing to, and including, Cascadilla Creek and its floodplains, has been designated a Unique Natural Area (UNA-126) by the county. The UNA includes the land we own and much of the Cornell land, as well as land to the west and east.

The current pipeline design specifies only 460 feet of directionally drilled pipe, essentially the length needed to go under Turkey Hill Rd. and extend a short way east under a marshy area. This section, a wetland which has sandy soil in the upper strata, would be particularly hard to de-water for trench construction, and therefore that construction method would cost more than HDD. Open-cut, trench construction would be used through the forest in all but the 460-foot section.

The design involves a 20-foot-wide clear-cutting of trees in the 70-acre forest over the section of pipeline installed through directional drilling and a 40-foot-wide clear-cutting the rest of the way.

The length needed to preserve the wetlands and forest between Turkey Hill Rd. and Genung Rd. is 3,600 feet. This 3,600-foot distance includes the starting point, or bore hole, for the drill run on the west side of Turkey Hill Rd., as does the 460-foot length.

Mitigation and restoration of wetlands and forests present special challenges; and the damage from construction is of course greater than in open fields. We are concerned about the difficulty of restoring the contours of the land, maintaining the runoff into the brooks, and ensuring the original flow patterns of the brooks as they run through our land and establish our marshes. There seems little way that the original state can be replicated once a 40-foot or wider channel has been created by heavy machinery and all trees and vegetation removed.

Wetlands. Wetland expert Jon Kusler makes the following observations about the difficulty of mitigation in "Developing Performance Standards for the Mitigation and Restoration of Northern Forested Wetlands" (http://www.aswm.org/propub/jon_kusler/forested_wetlands_08016.pdf):

> Forested wetlands are much more difficult to restore than earlier-successional wetlands such as marshes (p. 29).
>
> The lengthy time requirement for ecosystem maturation and for evaluation of success is not the only factor that makes restoration of forested wetlands difficult. The restoration of appropriate hydrologic conditions may be the most critical factor in forested wetland restoration. Sensitivity to hydrologic regimes is long-term (pp. 29-30).

A study of wetland mitigation in which 55 wetland managers were surveyed on the success of mitigation options found that "emergent and open water wetlands were the most successfully mitigated in palustrine and estuarine systems; forested wetlands were the least successfully mitigated" ("Guidelines for Selecting Compensatory Wetlands Mitigation Options," http://ttap.colostate.edu/Library/TRB/nchrp_rpt_482.pdf, p. 10).

The authors conclude that "forested wetlands require more precision in grading and more time to develop. Saplings may not be able to tolerate the fluctuations in hydrology tolerated by mature trees. Furthermore, forested wetlands may ultimately require 50-100 years to fully mature, which makes it difficult to know if any given site will be ultimately successful" (p. 11).

Where wetlands are interconnected, as they are in the pipeline route bordering UNA-126, the effects of disruption can be even more pronounced. Kusler notes in his paper that connectivity among wetlands is needed to "enhance the long-term stability of wetland and riparian systems" (p. 39).

In the forested section where the pipeline is proposed to cross the two primary brooks that soon run through our land, the slope of the land and the brook banks themselves are subtle and in spots lacking well-defined banks and beds. The brooks acquire a more distinctive shape as they increase in volume as they run north (until spreading wide in the marshes on our land nearer to Cascadilla Creek). The brook and headwater contours would be hard, if not impossible, to replicate following construction.

The potentially long-lasting effects of open-cut pipeline construction on wetlands can arise, among other causes, as the result of mistakes made by the construction company or of rain while the work is under way. The inability to follow best-management practices include failure to separate topsoils from subsoils; spreading of wetland topsoils in areas other than directly above the trench they came from; the installation of too few trench breakers (collars placed around the pipe); failure to restore the bottom contours of the wetlands; and compaction of soil.

An inadequate number of trench breakers can cause significant environmental damage by reducing the wetlands' ability to retain water; the trench acts as a conduit, pulling water away. The breakers also control soil erosion and corrosion of the pipe by stopping water from migrating along the pipeline. Installing too few can result in washing out of the soil that holds the pipe securely in place.

A common cause of soil rutting and compaction is the failure of construction crews to stay on wooden mats, which are used to distribute the weight of construction equipment to minimize soil disturbance during construction. Even with proper use of the mats, however, compaction will occur.

Segregation and placement of wetland subsoils and topsoils are important in the restoration of wetlands. The topsoils contain the native seeds and correct soil properties for the re-establishment of native plants. Erosion control measures that fail can allow sediments onto the wetlands or create erosion gullies that may become chronic.

The crowning of soil after backfilling of the trenches can alter the hydrology and flow patterns, as can any change in grade.

Contamination of wetlands by introduced species is a risk of trench construction. Although state and federal regulations require that the machinery used in open-cut pipeline projects be steam washed to remove propagules, there is nevertheless a chance that non-native plants and organisms could survive the cleaning process.

Wetlands will remain after the pipeline project in some degree and configuration. But the flow patterns could be altered for the indefinite future, possibly permanently, by redirecting water from the neighboring wetlands or having other negative effects.

Clear-cutting. The clear-cutting of the forest and the resulting removal of bird habitat is another serious issue of concern. Forest-interior birds in particular suffer when there is clear-cutting. More edge habitat results in lowered avian diversity, as pointed out in the Cornell Lab of Ornithology publication *A Land Manager's Guide to Improving Habitat for Scarlet Tanagers and other Forest-Interior Birds* (http://www.birds.cornell.edu/conservation/tanager/tanager.pdf):

> The plight of many forest-nesting songbirds has brought into question the benefits of certain traditional wildlife management techniques. For example, historically land managers were trained to "develop as much 'edge' habitat as possible because wildlife is a product of the places where two habitats meet" (Giles 1971). Creating edges increases local diversity by attracting game species such as rabbits and deer, as well as a variety of nongame birds species such as Song Sparrows and Northern Cardinals. We now know, however, that forest-interior species may disappear from areas that contain extensive edge habitat. Gates and Gysel (1978) proposed the idea that edges may serve as "ecological traps" for some breeding birds by providing a variety of attractive habitat characteristics, while at the same time subjecting the birds to higher rates of nest predation and parasitism. Evidence from numerous studies indicates that the detrimental effects of an edge can extend from 150-300 feet (45-90 m) into the forest interior (p. 9).

Forest-interior and other area-sensitive bird species could decline in number as a result of the pipeline clear-cutting. Since the usable areas of a forest for species with sensitivity to habitat fragmentation are beyond 150-300 feet from the forest edge (the interior forest), the amount of habitat loss may be substantial. The higher figure of 300 feet appears most frequently in ornithology studies. In the following calculations, the average of the figures in the Cornell publication will be used, 225 feet.

Edge-avoiding species could lose a 490-foot width (225 + 225 + 40) of forest through almost the entire 3,600 feet of pipeline between Turkey Hill Rd. and Genung Rd. (for example, a loss of approximately 20 acres from the fragment created to the north of the pipeline route). In addition, the bisecting of the forest into two smaller fragments has multiplied consequences for edge-averse species. The probability that a species will exist in a given area increases as a function of total forest size because of greater breeding success, among other reasons (e.g., Chandler S. Robbins et al., 1989, "Habitat Area Requirements of Breeding Forest Birds of the Middle Atlantic States," *Wildlife Monographs* 103, pp.1-34).

The trees in the forest have ecological value beyond their importance as wildlife habitat. Among their functions is the stabilizing of watersheds. Because of the humus layer in forest cover and the soil-retaining powers of the trees' long roots, forests are important for preserving adequate water supplies through maintenance of water tables.

Directional drilling technology. Directional drilling of the pipeline between Turkey Hill Rd. and Genung Rd. would spare the wetlands and forest.

HDD technology is increasingly used in place of destructive trenching wherever there is concern about the environment or a desire to protect areas of commercial value, such as wetlands, forests, sensitive wildlife habitats, lake crossings, river crossings, canal crossings, road and railway crossings, tree farms, and golf courses.

No trees or vegetation need to be cut above an HDD pipe, and in fact doing so would defeat a key purpose of an HDD installation on land. Monitoring of the pipeline, for both HDD and trenched, would be done by hand and also remotely.

For monitoring of external corrosion, either hand-held instruments or rectifier boxes would be used. The latter are boxes attached to utility poles along roads. If these are used instead of a sacrificial anode system, only one or two would be needed between the heating plant and the regulating station on Genung Rd. They would be easily accessed from the road, just as Dominion and other gas companies do in monitoring pipelines. For monitoring of internal corrosion, electronic "smart pigs" would be run along the interior of the pipe every five or so years. Potential leaks, regardless of which construction method is used—and rare for HDD—can be checked by a drop in pressure volume at the Cornell heating plant.

My understanding is that if clear-cutting is done over the HDD section of the pipeline, regardless of total length, it will be to save money by not having to move the open-cut equipment from Turkey Hill Rd. to the field on Genung Rd. to do the final section in the field by open-cut construction. Permits for road travel from the county highway department would be involved, but these are inexpensive and promptly issued.

The possibility that the pipe would ever need to be repaired is extremely remote. In such an unlikely event, the repair methods, depending on where the break was, would involve pulling back the pipe with a track hoe and replacing the pipe; using a robotic machine to do a spot repair with a two-foot liner, which would be cured and sealed in place; or doing a parallel directional drill. If repairs on HDD pipes were anything but extremely rare, however, no one would use HDD. Far more likely is a rupture on a trenched pipeline from a third-party excavation accident. Deeply buried HDD pipes have an advantage over shallowly installed trenched pipes in being safe from such a breach.

No state or federal regulatory, safety, or monitoring reason exists to clear-cut above a deeply buried HDD line. The following pipeline experts can confirm this fact:

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Richard Kuprewicz is a pipeline safety expert. He analyzes all aspects of pipeline safety, from conceptual design to operational issues. His name was provided by Joy Kadnar of the Pipeline and Hazardous Material Safety Administration.

The NYSEG Cortland project. Unforeseen events in HDD were one concern expressed by a project manager at the November meeting. He cited difficulties that NYSEG had with a gas-line project in Cortland. I spoke to the individual at NYSEG who had been the source of the information to find out the details.

The project had been undertaken without any soil-boring tests or seismic studies. The only soil data available were from the past construction of a nearby bridge.

Construction companies that were hired to install the pipeline apparently had little experience in directional drilling. The first hit gravel and quit. (Some gravel is typical in the upper strata of soil.) The second fared better and was able to deal with the gravel. But this company, too, lacked the necessary skills and equipment. For example, it failed to use the correct ratio of bentonite clay and water for its drilling fluid and had to bring in a consultant for help. Some cobbles 6-8 inches in diameter were encountered, which slowed the job somewhat but the work was able to proceed farther.

The second company was unable to complete the job, however, after it hit what was later thought to be the foundation of a former building. Evidently it was using the wrong drill bit. Rock drill bits are needed to cut through concrete or fieldstone foundations. Professional HDD companies use an assortment of drill bits, and they drill through abandoned foundations all the time.

HDD is heavily used throughout the country and the world, which would not be the case if it were impractical. It is considered a mainstream alternative to trench construction and the method of choice in environmentally sensitive areas.

An HDD installation in which there are soil-boring tests evaluated by a skilled geophysicist, a design that is done by an experienced HDD engineer, and an installation that is performed by an experienced HDD company that knows how to drill in the identified soil strata and has sophisticated equipment, should be able to avoid significant problems.

Directional drilling cost. Greater expense for HDD construction was the reason given at the November pipeline meeting for why only 460 feet is currently planned. The cost difference is being said by the project to be double or triple the cost for trench construction. Arrangements for bids have not been made with any HDD companies, however. The cost estimates, based on general price charts, are not a substitute for a precise bid, or for the kind of useful technical and contract information that could be obtained from the companies.

Also at the November meeting, an engineer with the project said he thought that a contingency fund would have to equal100 percent of the base price.

With the project's permission, I called the project's HDD consulting engineer to talk about the estimated cost of the 3,600-foot section if directionally drilled. He said that it would be around $800,000, excluding the pipe. The contingency fund, to cover worst-case scenarios, would be $450,000, well below the amount indicated at the November meeting.

I also asked if he thought the soil-boring results and seismic studies indicated that the route could be drilled, and he said that based on the studies done to date, the area is very buildable and not technically challenging. The additional soil-boring tests that will be done soon will give the geophysicist consultant more information to calibrate his model on the bedrock depth and soil densities. These results will provide a better estimate of cost.

Once the tests are finished, perhaps the contingency fund could be reduced, since it would no longer have to hedge because of the missing data. Moreover, a good directional drilling company knows what types of challenges might be encountered, and its bid will take those into account.

The test results so far show that at the recommended drilling depth, there is no problematic amount of gravel, which if present would provide inadequate support for the drill bit. In addition, there is enough glacial till to provide added stability for the drill but not so much that it would slow work down.

I spoke to a major open-cut construction company to ask for a ballpark estimate of what trench construction would cost for the pipeline and was told around $100 per foot, excluding the pipe. The price could be higher in an actual bid, depending upon the degree of mitigation. This figure compares to the current estimate of $220 per foot for directional drilling.

The possible difference between open-cut and directional drilling is under $400,000 in a pipeline project that will cost $60 million. The added cost would be for the additional 3,140 feet (3,600 – 460) of directional drilling at a differential cost of no more than approximately $120 per foot. (The pipe itself for the 3,600 feet, in either open-cut or drilled construction, will cost $200,000 but is not involved in the preceding comparison.)

Saving money is always desirable, and the project managers are trying hard do so. But given the 50-year anticipated lifespan of the pipeline—a figure that has been stated by the project managers and also is typical in the pipeline industry—the above amount is a relatively small difference.

It ultimately comes down to what is valued. According to news reports about the Milstein Hall project, the university is considering spending millions of extra dollars to alter the design to streamline the approval process with the City of Ithaca. Preserving a forest should also be worth spending money on, and it would involve an amount much smaller than the redesign of this building.

Michels Directional Crossings. In the year that I have been researching the issue of pipeline construction, the name that has been cited repeatedly by pipeline engineers as the best in North America for HDD construction is Michels Directional Crossings. Michels has made major innovations in directional drilling, including drilling the longest single HDD run to date in the industry, 8,400 feet. Contrary to what has been assumed by the Cornell project, Michels does do short drill runs as well as long ones. And the company is interested in bidding on the project. The 3,600-foot length would be drilled in a single run, requiring no bore pit in addition to the one immediately west of Turkey Hill Rd.

Michels has done thousands of HDD projects since 1986 and has never failed to complete one. Further, the company honors its bids; the lump sum is the lump sum.

Since its regional office is nearby and the bid and site visit would be free, it seems unfortunate that no arrangement for a bid has been requested. I had provided the company's name previously to the project, but plans for a bid have not been pursued. Although bids are valid for only 30 days, obtaining one would nevertheless be informative.

The contact information for the Michels company is:

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Additional experts. The Cornell project has an excellent HDD engineer as a consultant. If the project managers would like more information or verification of certain points, the following people could be contacted:

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Professor Ariaratnam is the co-author of *Horizontal Directional Drilling Consortium HDD Good Practices Guidelines*. He was program chair of the 2007 No-Dig Show, sponsored by the North American Society for Trenchless Technology.

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John Hair has been involved in hundreds of HDD installations since 1987, including in wetlands.

It appears that Cornell's plan is to submit a pipeline design to the PSC that is as inexpensive as possible and hope that it will get approved. Instead, why should the university not on its own initiative take the modest additional steps and be proactive on the environment? Cornell has the potential for a wonderful sustainability story with this project, both locally and beyond, if it uses directional drilling through the length of the wetlands and forest.

There is already an indication of the public response. WHCU ran a segment on the project after the April 18 meeting, and Cornell was praised for its environmentally friendly use of directional drilling. At that point, the plan was to directionally drill 1,300 feet.

The university could reap dividends in fund raising and grants by telling this positive conservation story to alumni and prospective corporate donors. Prospective students and their parents would also be favorably impressed with the university's commitment to environmental leadership.

The forest is used for ecological studies, an area of research which will only increase in importance over time.

Someday, when contiguous tracts of forests and wetlands elsewhere have greatly declined in number, the caring stewardship of this land will be heralded as a decision of foresight and wisdom on the part of the university.

Sincerely,

Zorika Henderson

Zorika Henderson

cc: James Adams
Kyu-Jung Whang

Encl.: UNA-126 information

Attachment 6

Primary pipeline experts consulted about HDD and cleared right-of-way

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