On Water and Development: A cautionary, microcosmic tale for a watershed near you

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The wise use of water is quite possibly the truest indicator of human intelligence, measurable by what we are smart enough to keep out of it, including oil, soil, toxics, and old tires.

— DAVID ORR, *REFLECTIONS ON WATER AND OIL*

Human societies that create waste are those which destroy the soil-water matrix of their locality and become expansive centers for the devastation of those around them.

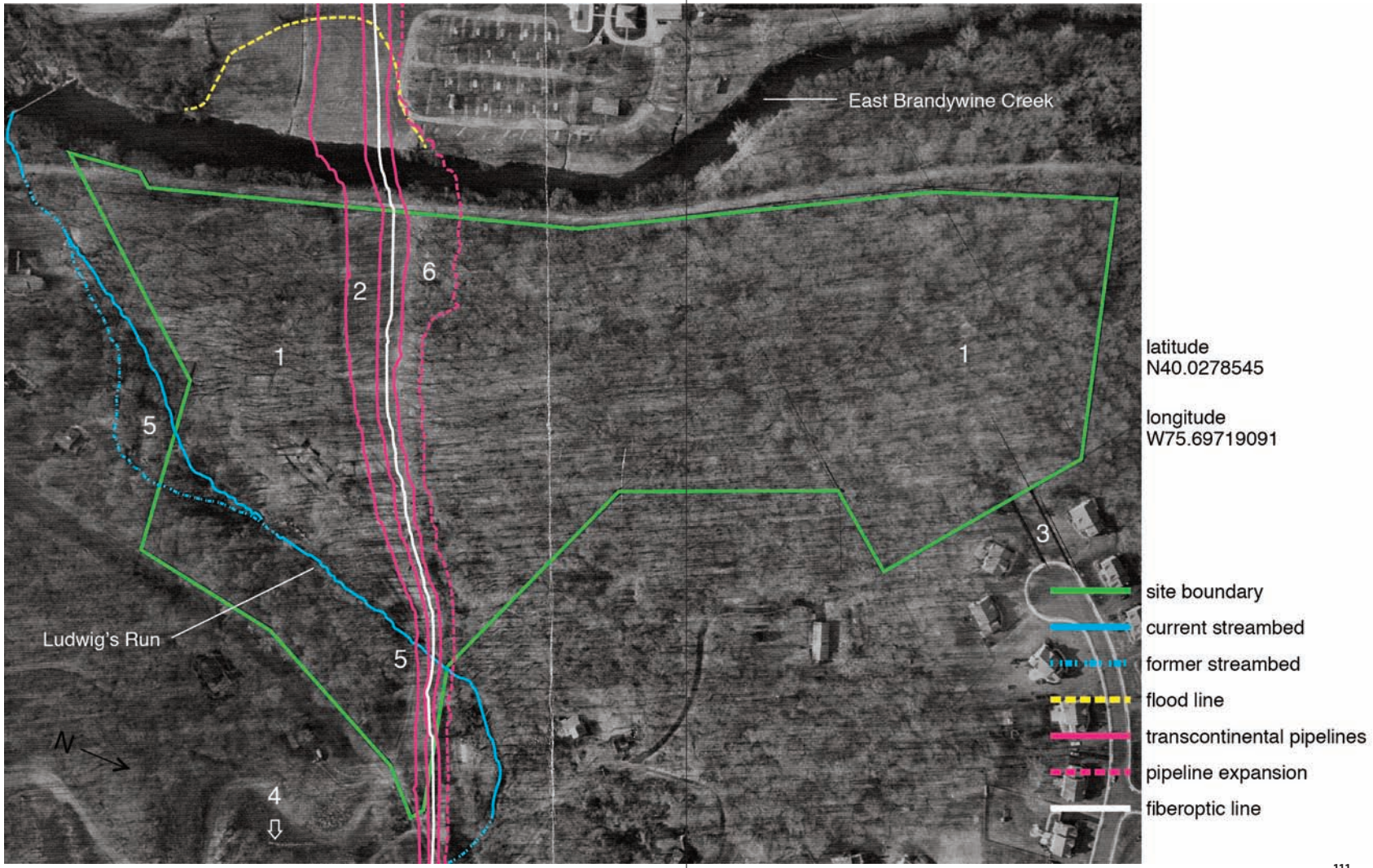
— IVAN ILLICH, *DISVALUE*

There are over 320,000 kilometers of underground pipeline for natural gas and hazardous liquids in the US, Canada, and Mexico, each intersecting countless large and small bodies of water, disrupting and threatening watersheds, nullifying landowners' rights, and casting severe doubt on the wisdom of our utility infrastructure and land practices. At one location, where 900 meters of this system intersects with a small, forested site in the mid-Atlantic region of the United States, human and environmental forces are combining to create a precarious yet increasingly common situation.

1. We begin underground, in the soil. According to the Department of Agriculture Survey, this site has well-drained soil, with Glenelg and Brandywine stone loam occupying ridgelines and moderately steep

Above Four hundred meters upstream, a 300-meter clearcut for site development intersected the transcontinental pipeline corridor. Although the approved plans indicated limited tree removal, this stipulation was not enforced by local authorities.

slopes, leading down to the Wehadkee silt loam that constitutes the banks and alluvial confluence of an adjacent stream, Ludwig's Run, with a broader creek, the east branch of the Brandywine. Composed of a thin mat of leached leaf mold, weathered granite, gneiss and mica schist, as well as the occasional infusion of decaying wildlife, the earth readily absorbs rainwater and is moderately fertile. Sporadic large boulders of sandstone, known as floaters, make cultivation unfeasible, and so periodically the site's timber is selectively harvested. Overhead, the black, red, white, and chestnut oak forest is rapidly shifting to beech, ash, and hickory with an understory of red maple, dogwood, American chestnut, elm, and sassafras. This lower, messier zone of the forest is a valuable habitat for resident and migratory birds, including cardinals, bluebirds, woodthrushes and hummingbirds. There are also red fox, box turtles, mountain laurel, seventeen-year cicadas, and cicada wasps. We are in the East Brandywine watershed, which empties ponderously southeastward into the Delaware River.


East Brandywine Creek
1
2
6
1
5
3
Ludwig's Run
5
N
4
latitude
N40.0278545
longitude
W75.69719091
site boundary
current streambed
former streambed
flood line
transcontinental pipelines
pipeline expansion
fiberoptic line

Over the past sixty years, the flow of water through this property has been increasingly disrupted by converging global, regional, and site-specific forces.

2. Since 1950, three transcontinental natural gas pipelines and one fiberoptic bundle have been embedded in the eastern portion of the site in an easement ranging from 23 to 32 meters wide. Averaging 86 cm in diameter and just under a meter below grade, the pipelines are part of a continuous utility corridor connecting New York City with the Gulf of Mexico. Above ground, much of this easement has been maintained by the pipeline company as a meadow that, like other railway and highway corridors, has become a conduit for the rapid dispersion of invasive vegetation. At water's edge, the picture is more disturbing.

Above Downstream, erosion to streambanks and the threat of damage to private property necessitated state-funded site remediation.

3. Fifty years of upstream development has taken a toll on site hydrology. Ludwig's Run, formerly a seasonal brook, is now a year-round stream and has repeatedly "jumped" from its bed due to intensifying storms and faulty stormwater management practices higher in the watershed. The earliest-built communities upstream included few or no stormwater controls. More recently, developers have followed local ordinance, yet their predisposition is to costly, over-engineered solutions that manhandle water by reshaping rather than complementing local site conditions, and their measures have not protected the stream corridor from the increased hydraulic flows they introduced.

4. Between 2003 and 2005, human hubris and extreme weather combined to threaten private and public infrastructure and potable water. Whether the series of traumatic "five-hundred-year" or "thousand-year" storms reflected broader global patterns or "acts of God"—a phrase heard frequently from engineers and officials—these events were magnified by unrestricted clearcutting and inadequate site man-

agement in new construction immediately upstream, causing severe erosion to banks, lowering the streambed dramatically, and risking environmental devastation by exposing the natural gas pipelines to the possibility of rupture in the stream. When local residents presented documentation of the cumulative failures of the recently built hydraulic features, officials offered the boilerplate response that the controls were designed and implemented according to approved standards. Unfortunately, just as the map is not the territory, the "approved standards" do not necessarily apply for a given soil type or site topography.

5. During this period, the Department of Environmental Protection and County Conservation District proactively provided emergency permits to homeowners for (repeated) bridge repairs, and coordinated a state-funded stream remediation project. Fortunately, "Band-aid" solutions by Williams-Transco were rejected by the DEP in favor of lowering the pipelines and employing low-impact features, such as cross vanes.

6. Nonetheless, despite the US$250,000-plus spent by state agencies and individual owners to restore balance to this degraded waterway, upon completion of the remediation Williams-Transco immediately began efforts to expand its easement to add a new line. Subsequent pushback from landowners and authorities has convinced pipeline officials that it would be expedient to replace an existing 76.2 cm natural gas pipeline with a new 106.6 cm line. However, current plans call for removal of more than 1,500 trees, renewed disturbance to this fragile segment of Ludwig's Run, and the temporary rerouting of the East Brandywine Creek less than 1.6 km above the drinking water intake for residents downstream. Although serious flaws have been found in the plan, and objections raised by government agencies, owners, and elected local and state officials, the pipeline company has declared its intent to employ eminent domain to achieve its objective, increasing private gain under the guise of "public use" and at the expense of the public good.

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