4. Stormwater management

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4.1. The developer’s stormwater management plans are not credible.

The stormwater system proposed by the developer will not reduce stream flow as claimed; rather it will increase it, exacerbating existing downstream flooding (Figure 1). Clearly, the developer and UMD (by putting the developer’s promotional material on a UMD website giving it the University’s imprimatur), recognizes that stormwater is a weak point in their plan, since they devote more than 50% of their 10.13 min publicity video trying to justify it. The proposed system does not contribute to UMD’s aspiration to be a “climate ambassador” (President Pines, 2011).

The Developer has issued FALSE and MISLEADING statements on the proposed stormwater system. The design is based on NOAA Atlas 14 rainfall projections that were last updated 26 years ago. [3]A stormwater system that is based on outdated data is NOT designed to the highest standards despite the developers claims – i.e. "*The site will contain a stormwater management system that exceeds 100% of the existing AND FUTURE stormwater management needs complying with the HIGHEST standards.*" [4]

The developer says there will be 2.87cfs less water reaching Guilford Woods Run in a storm. This statement is meaningless without giving the amount of rainfall, the duration of storm, and the return frequency, all of which could reduce the effectiveness stated. The reductions in stream flow in Guilford Run is said to be34.60cfs to 31.73cfs, that is 2.87cfs reduction, only 8.3% and not a significant difference.

USGS records for the Anacostia River at Riverdale, long before it reaches the Potomac and later the Bay, show an annual average flow, of about 8,000cfs, so their system could reduce flow by only 0.03%, hardly justifying their claim that the development will mitigate stormwater downstream in the Anacostia and Chesapeake Bay. The real issue about stormwater and Guilford Run is the increase in flooding of nearby neighborhoods, local stream bank erosion and sediment transport – not a minute decrease in flow into to the Chesapeake Bay.

Communities downstream of the proposed Western Gateway Project, including residences of UMD students, graduate students, faculty, and staff, have experienced historical flooding in 2009, 2010 and as recently as 2020 (Figure 1). Following the 2009 and 2010 floods, Prince George’s County Department of Environment named Guilford Woods as a site for stormwater mitigation but did not pursue this due to “major regulatory hurdles.” [1] Additionally, the 2017 Prince George's County's Resource Conservation Plan states, "….Avoid building green stormwater infrastructure in places that are forested (don't sacrifice forests for a stormwater management structure’’’’)."[2]

Figure 1. A resident of Terrapin Row takes a swim in the floodwaters on Guilford Drive, Sept 10, 2020 (Joe Ryan/ The Diamondback)

For comparison with a real “state of the art” system, consider the case of Madison, WI, home of the Big Ten’s University of Wisconsin. All new developments are required to be built to the 200-yr stormwater event and, to factor in downstream capacity, to not flood structures during a 500-year event. [5] Furthermore, the WI management system recognizes that rainfall will increase with climate change.[5] Key provisions of their Stormwater Ordinance include: “…runoff from the 500-year may encroach on private property but cannot flood a structure….;” “….Overflow of the pipe and road system in the event of a 500-year storm event shall not impact (be permitted) any private habitable structures…;” “…requiring new development to meet the following requirements: maintain predevelopment peak runoff rates for 1, 2, 5, 10, 100 and 200-year events (shorter periods avoid the apparent reductions caused by averaging); to safely pass the 500-year event; and to factor in downstream system capacity to determine the safe capacity of the off-site drainage system.”

UMD's approach to the Western Gateway is insufficient to reduce risks of known flood vulnerabilities along the Guilford Run for current stormwater, and it takes no account of climate change. The National Climate Assessment Report, co-authored/reviewed by UMD professors, indicates that the Northeast, including College Park, is experiencing a greater increase in heavy precipitation events than Madison, WI.

4.2. “Capable to handling a 100-year rain-event” – actually incapable

The developer says their proposed stormwater system is “state-of-the-art”, however, it is undersized. Moreover, the fact that such an elaborate system is needed shows how unsuited the site is for development.

They say the system would be overwhelmed, on average, only once in 100 yrs. However, it seems they vastly underestimate the frequency of heavy storms - maybe because they used NOAA Atlas 14, which is long out of date. Clearly, a stormwater system that is based on outdated data is not designed to the highest standards despite the developer’s claims. ("….The site will contain a stormwater management system that exceeds 100% of the existing AND FUTURE stormwater management needs complying with the HIGHEST standards….")[4]

A simple calculation based on the capacity of the proposed stormwater storage vault and the area of impervious surface proposed by Gilbane, shows it would be filled with heavy rain and the excess would run off directly into the stream much more frequently than an average of 100 years. The amount of rainfall that would fill the proposed storage vault and overflow directly into Guilford Run (Figure 2) is simply the capacity of the vault (said to be 1 million gallons) divided by the area of new impervious surface (10.14 acres) (assuming 100% runoff from the impervious area). After conversions to the same units, the depth of rainwater that would fill the vault is 3.6 inches. This assumes that the vault is not partly filled before the rain and that it is fully drained before the next event - which could be in the next 24hrs.

More appropriate data come from the nearest meteorological stations and include the past 20 years. The realistic frequency of rainfall events can be found by reviewing the rainfall records to find the frequencies of 3.6 inches or more. In Table 1, the results for Beltsville and Hyattsville are shown. The capacity of the proposed storage system would have been exceeded 14 times since 2000. The average frequency of 3.6 inches or more rainfall was once every 3 – 4 years – far more frequent than Gilbane's statement that, on average, the rainfall that would fill their system is once every 100 years. The outdated NOAA Atlas 14, shows the 100yr flood is 8.45 inches in 24hrs, far beyond the capacity of the proposed system.

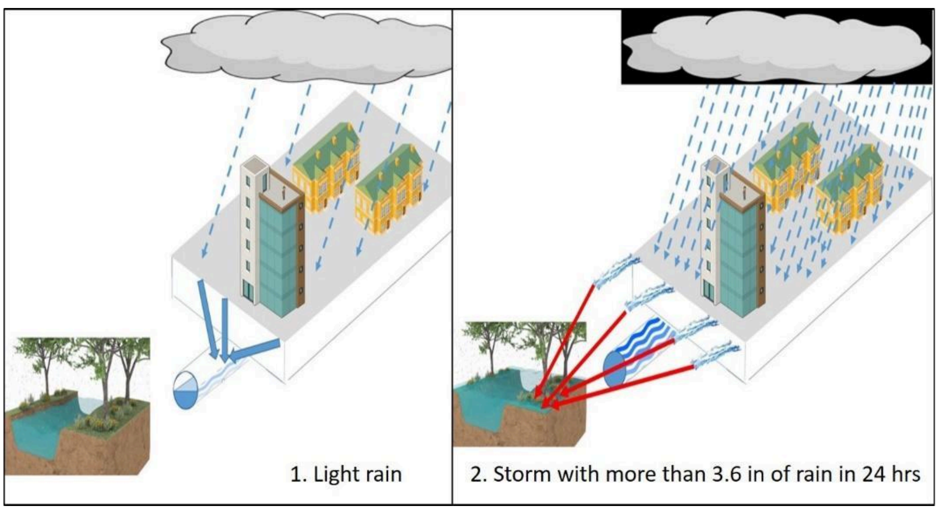


Figure 2. The effect of rainfall that exceeds the capacity of the storage vault. i. In light rain, stormwater would be routed through a drainage system into the belowground vault. ii. When a storm produces 3.6 inches of rainfall or more, the vault would be filled to capacity (1 million gal) and the excess would flow off the built area (10.14 acres) directly into Guilford Run with no possibility of natural infiltration which reduces the flow at present.

Station	Number of years of data	Days with more than 3.6in rain	Extrapolated to 100 yrs
BELTSVILLE	21 yrs	9 days	43 days
HYATTSVILLE	5 yrs 4mo	4 days	75 days
Gilbane	100 yrs	1 day	1 day

Table 1. Frequency of storms with 3.6 inches of rain or more. The proposed vault would fill approximately 43-75 times in 100 yrs and run unimpeded into Guilford Run. Gilbane claim this would only happen, on average, once in 100 years.

4.3. Stormwater runoff processes in Guilford Woods

Gilbane's stormwater system misses key elements of the movement of water across a landscape, both in the sources and subsequent dissipation. Only on a continuous, impervious surface, such as a road, does rainfall simply run off, as allowed in Gilbane's plan (Figure 3, 75-100% impervious). In most natural conditions, including Guilford Woods, there are more components, both in the sources of stormwater and the subsequent flows. By overlooking these, the development plan is fundamentally unrealistic, erring on the side of minimal impact of the development on the stormwater flow in Guilford Run.

There are three key elements of the natural drainage system in Guilford Woods that will be negatively affected by the development and will have large effects on the flow in Guilford Run. These are the sources of water that flows into the Woods, evapotranspiration by the vegetation, and loss of infiltration sites (Figure 4).

4.4. The development plan ignores the main input of stormwater which is from roads and parking lots outside the Woods

Large stormwater pipes enter the Woods. These drain: the east side of Adelphi Road and buildings above the Woods; the large parking lots along Campus Drive; from Mowatt Lane; and large inputs from the University campus. In the past, the Woods have been treated as part of the public stormwater system, used for disposal of runoff from surrounding areas.

Importantly, the stormwater pipes terminate at the margins of the Woods, at significant distances from Guilford Run. At present, water that enters the Woods from these pipes largely infiltrates in temporary pools before much of it reaches the stream (Figure 5). Many small depressions impede the flow (Figure 6) and small wetlands form around the infiltration sites. However, the new impervious surface in the development (10.14 acres) will cover up many of the existing, natural infiltration depressions (Figure 4), so this runoff from outside the Woods will not infiltrate as it does now. Instead, the runoff will be diverted directly into the stream, forming new drainage ditches that will discharge water directly into Guilford Run, with no check. Peak flow rates will be increased (Figure 2.ii). The importance of infiltration in the current hydrology is indicated by the relatively high infiltration capacity of the soils (Figure 7). All except the soil type along the stream are well to moderately well-drained. This is in direct disagreement with Gilbane's repeated claim that the soils are mainly clay and infiltration is minimal.

In future there may be increases in runoff from impervious surfaces outside the Woods. For example, at present, a large sports field which drains into the Woods is being converted to artificial turf. This will reduce infiltration as water crosses the field and increase direct flow into the large infiltration area in the Woods near the boundary with St. Mark's Church and are close to capacity at present.

4.5. Clearing the forest will reduce natural evaporation from trees.

A realistic estimate of evaporation from a forest like Guilford Woods is 40% of the soil water. Without trees, this water would drain into the stream– adding to current flooding downstream. Evaporation from trees also maintains higher humidity and cooling - conditions needed for survival of many forest organisms – animals, insects, birds, fungi, soil microbes etc.

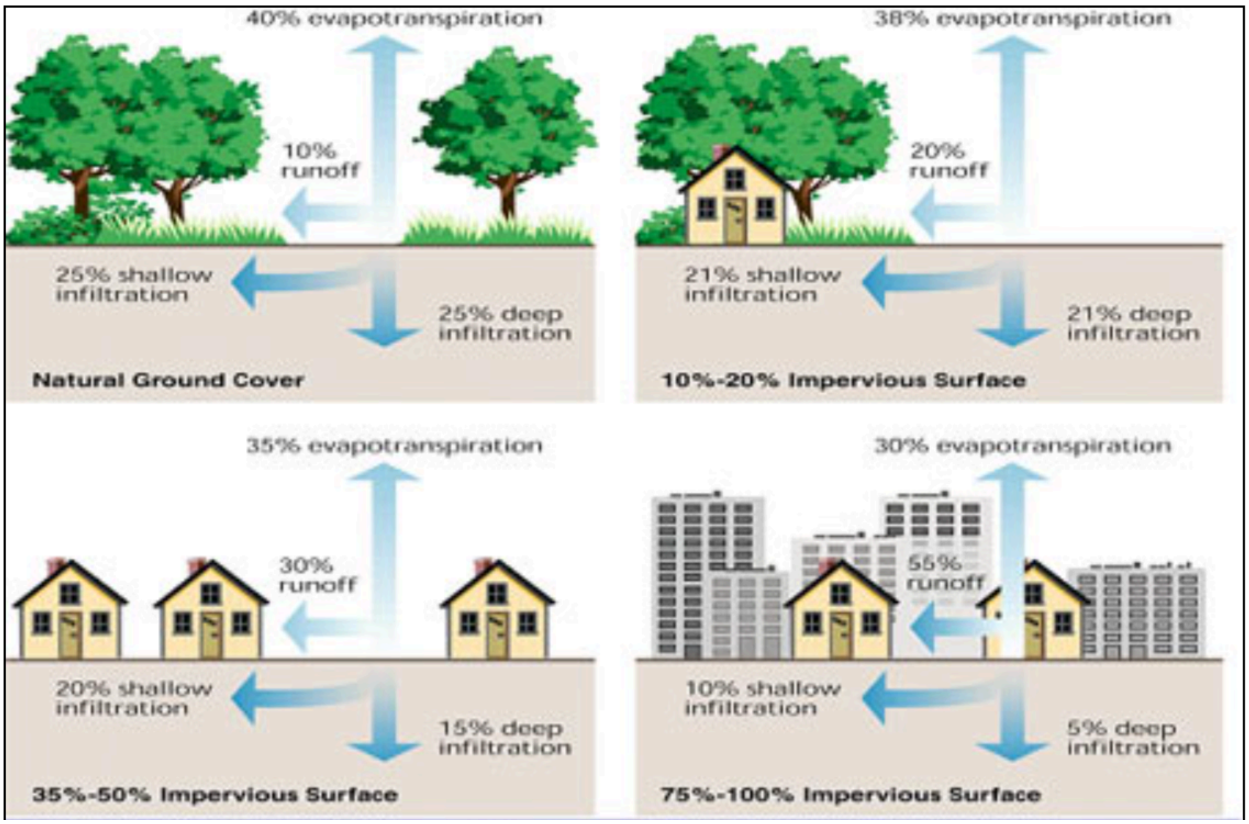


Figure 3. Development increases the volume and rate of runoff from a site, and reduces groundwater recharge and evapotranspiration. Growth and water resources, Watershed Academy Web, Environmental Protection Agency,

https://cfpub.epa.gov/watertrain/moduleFrame.cfm?parent_object_id=170#

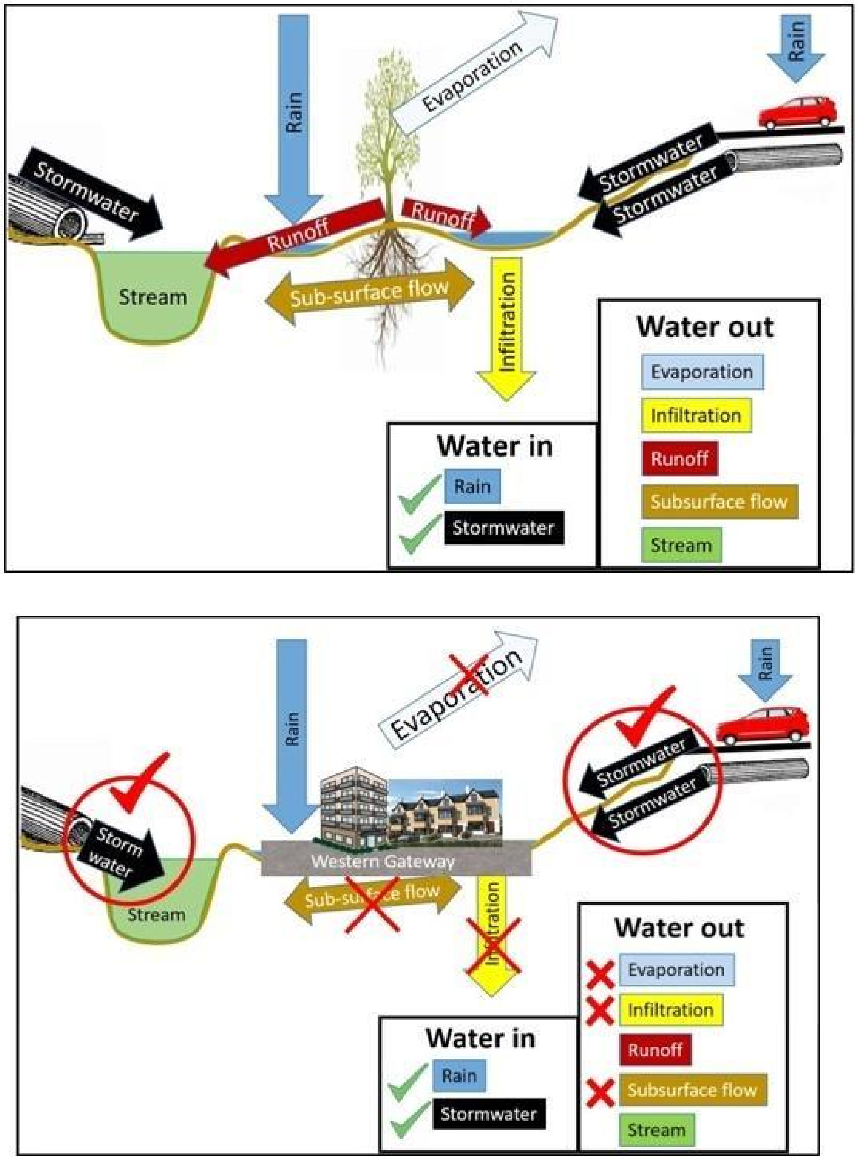


Figure 4. Diagram showing the inflows and outflows of water in Guilford Woods. The upper diagram shows the existing flows. Water enters in rainfall over the Woods and in piped stormwater from impervious surfaces outside the Woods. Water leaves by evaporation, infiltration into the soil, runoff, flow below the surface, and via Guilford Run. The lower diagram shows how the buildings and associated Western Gateway impervious surfaces will close off all paths for water except runoff to the stream. Most importantly, the construction will reduce evaporation from vegetation and infiltration into the soil, while rainfall and piped stormwater will continue to enter the Woods, possibly in greater quantities as rainfall amounts are increasing.

Figure 5. Infiltration of piped runoff and rainfall in a temporary pool. Wetland plants and thick organic layer indicate frequent filling.

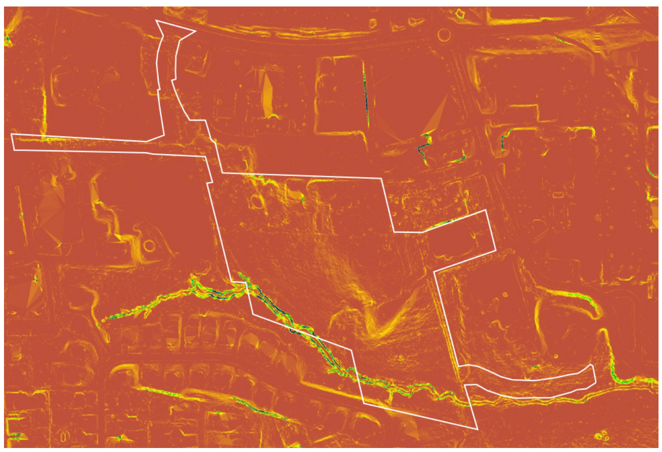
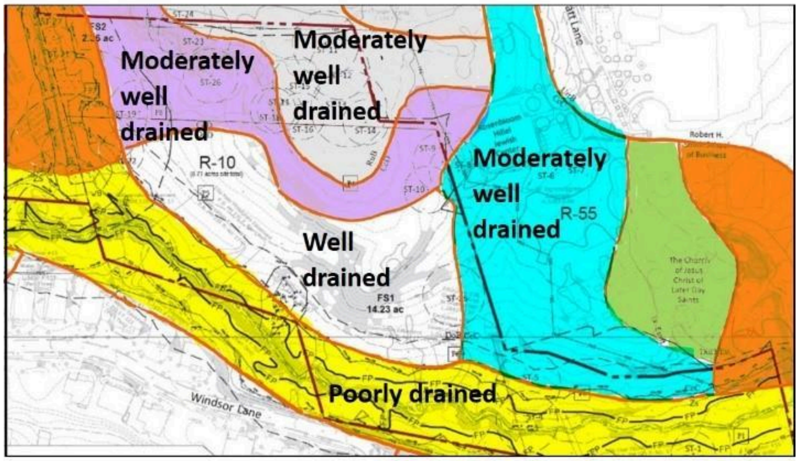


Figure 6. Image of changes in slope. Breaks in slope (orange) that impede runoff are where infiltration may occur.

Guilford Woods Soils



NRCS Soil Names

CcC—Christiana-Downer complex, 5 to 10 percent slopes
CcD—Christiana-Downer complex, 10 to 15 percent slopes
DoD—Downer-Hammonton complex, 10 to 15 percent slopes
RuB—Russett-Christiana-Urban land complex, 0 to 5 percent slopes
ZS—Zekiah and Issue soils, frequently flooded

Figure 7. The soils in Guilford Woods and their drainage properties. All except the Zekiah and Issue soils are well to moderately well drained. Surface runoff from rainfall or stormwater pipes is therefore much less than the amount of water that enters to Woods.