

Thesis Project Portfolio

Stormwater Management of Meadow Creek Golf Course

(Technical Report)

A Site-Specific Analysis of Golf Course Impact within Charlottesville, VA

(STS Research Paper)

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Sociotechnical Synthesis

As infrastructure becomes increasingly developed and climate change imposes an even more severe threat, stormwater management is transitioning into a new era; many previously acceptable methods and solutions need to be revisited to accommodate these environmental changes. The case this thesis portfolio addresses occurs at Meadow Creek, a public golf course located in Charlottesville, where existing stormwater management solutions are no longer viable, creating erosion, flooding, and temporary closures of the 17th hole.

The technical element of this project focuses on designing the best management practice for Meadow Creek. Existing site conditions were conducted through site visits, surveying, nutrient analyses, and hydrologic modeling to understand the water quality and quantity as it travels to the 17th hole. Based on these results, three proposed alternatives to the existing failed pipe were to 1) replace the pipe with a larger diameter, 2) implement a swale, or 3) implement a step pool storm conveyance system (SPSC). A decision matrix of pros and cons was created to allow the client to decide what factors are most important, but our team recommends the SPSC, as it would best slow velocities while addressing nutrient loads, and it is a cost-effective solution. Comments made from industry experts aligned with the choice and proposed a combination SPSC/swale solution to add an aesthetic hazard for gameplay.

The ethical connotations of this project were studied for the STS portion. Golf course management is incredibly variable per course and can dictate whether or not the course has positive environmental and social effects on the surrounding community. Regarding Meadow Creek, there are many factors that must be assessed to determine its impact, and subsequent evaluation of the best function of land use should be done afterwards to make sure the land

serves a purpose with the greatest benefit. Actor-Network Theory – the idea that any phenomenon must be explained by human and non-human actors – was applied to study human (jobs, accessibility, recreation, locals) and non-human (water, soil, wildlife) elements that help determine its productivity. Altogether, Meadow Creek appears to be a sufficient use for the land, though as a counterpoint, sufficiency does not mean the maximum utility has been achieved, propelling further alternatives to be examined to an equal extent.

The combination of both my STS and technical topics hopes to question the idea of progress. Alterations configured by civil engineers will continue to be necessary when considering these changing conditions on a smaller scale, but one should always consider a larger context of whether a system should continue to exist or instead be revamped to better fit the needs of a newer time. With Meadow Creek, the proposed stormwater solutions for the 17th hole should solve the goal of flooding to increase golf course functionality, but on a larger scale, the golf course may not best serve the public. Engineers should always feel compelled to evaluate their work and the larger systems they work within.