Thesis Project Portfolio

Meadowcreek Golf Course 17th Hole Redesign

(Technical Report)

Analyzing Golf Courses' Ability to Face the Imminent Challenge of Climate Change

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

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Joseph Holland III

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Department of Civil and Environmental Engineering

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Sociotechnical Synthesis

The state of golf course sustainability can be measured by courses' stormwater management capabilities, which can be evaluated through testing of the quality and quantity of storm water. At Meadowcreek Golf Course, decrepit stormwater management infrastructure damaged the soil and water quality, while undermining the course playing surface. Polluted soil and water on golf courses can lead to harmful algal blooms, cyanobacteria growth, and unhealthy drinking water. These three effects can prove to be hurtful, or even fatal, to local inhabitants. My capstone and STS research examine these factors in depth and provide an informed look into the state of golf course stormwater management.

Meadowcreek Golf Course is a public course in Charlottesville, Virginia. Hole 17 at Meadowcreek Golf Course is home to a headcut exponentially worsened in the last quarter of 2024, due to poor drainage caused by a collapsed pipe under the hole. Flooding due to Hurricane Helene pushed the erosion past the point of no return in September 2024, leading to riverbank collapse and a cut into the fairway of the hole, just before the green. My capstone research combined geotechnical, civil, water, and construction engineering to create three design alternatives for fixing the conditions present and Hole 17. A step pool conveyance system, dry swale, and pipe replacement were considered. Through the capstone research, I created a decision matrix detailing

the pros and cons of each option, to better inform the owner, the City of Charlottesville, on solution options.

My STS research examines the systemic neglect of local golf courses, potentially exacerbated by lax regulations in a private setting. A case study involving the 17th hole of Meadowcreek Gold Course takes a deep dive into the adverse effects of inadequate, outdated stormwater management infrastructure. Water quality, erosion, and local ecosystems all suffered because of crumbling, insufficient infrastructure. While the research focused on one case, it still introduces the question of golf course sustainably practices and accountability. What changes can be made to regulatory oversight, relating to golf courses, that can help mitigate the adverse effects of below par course stormwater management?

The combined view provided by both the STS and capstone research enables a reader to see the magnitude of the problem faced by local golf courses worldwide. Lenient oversight allows outdated stormwater management practice to proliferate. If small golf courses are not held accountable for their own local impacts, many people will suffer. Negative impacts on local populations, stemming from golf courses' poor stormwater management practices, present a large-scale danger. My research sought to bring the public in for a closer look at the stormwater management practices of these courses. Only through a collective realization of the pitiable state of golf course

stormwater management infrastructure can we expect to see any lasting positive results.