Environmental Analysis and Development Potential in the Creswell Area of Harford County, MD

LARC 642: Graduate Landscape Architecture Graduate Studio III
Regional Design Studio 2018, Fall 2018

Supervised by David Myers, Ph.D. PLA ASLA

The University of Maryland, College Park
PALS - Partnership for Action Learning in Sustainability
An Initiative of the National Center for Smart Growth

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# Creswell Project

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**Team:** Sherry Russell, Sarah Turner, Sarah Wallace

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This project was undertaken as part of the UMD PALS program by graduate Landscape Architecture students in LARC 642 in the fall of 2018. It contributes to a series of courses addressing the development potential of the Creswell study area in Harford County. The objectives of this course were threefold:

1. Identify abiotic, biotic, and cultural characteristics that significantly influence development patterns of the Creswell area;

2. Undertake an assessment of developable potential of the Creswell area; and

3. Visually document patterns of land use of the built environment for the understanding of potential development patterns of the Creswell area.

This document is organized along the basis of these three objectives.
The boundary of the Creswell Study Area used in this project was provided to the class. The Creswell Study Area is 12,864 acres. The Creswell Area is geographically defined on the southern boundary by Interstate 95. The western boundary is Route 22 from Interstate 95 to Route 155 at the community of Churchville. The northern boundary is a continuation of Route 22 but also includes Harford Community College and lands immediately adjacent to the west of the College. The western border of the Creswell Area is aligned between areas that are serviced by sewer and areas in the Creswell Area which are not serviced by sewer. In addition to Harford Community College and the communities of Creswell and Churchville, significant sites include Schucks Regional Park and Cedar Lane Regional Park.

Legend
- Creswell Study Area
- Harford County

Creswell Study Area
Abiotic Inventory
There is about a 350 foot difference between the highest and lowest points in the Creswell area. The quarry brings unique slopes to the area. There is some agricultural land with gentle slopes, while there are some steep areas around Harford Community College.
Harford County contains four major river basins - the Bush River Basin, the Gunpowder River Basin, the Lower Susquehanna River Basin, and the Upper Western Shore Basin, which all drain to the Chesapeake Bay Watershed. These larger watersheds are made up of many smaller watersheds. For example, the Bush River Basin is comprised of the Otter Point Creek, Bush Creek, and Church Creek sub-basins.

The majority of the Creswell area is located within the Bush River watershed - 76 percent. The south-western side is located within the Bynum Run watershed (17%). The remaining area are within the Deer (6%) and Swan Creeks (2%) watersheds.
Harford County requires a minimum buffer of 75 feet to streams and wetlands. Certain streams within the county receive a buffer of 150 feet on both sides of its banks. These buffers help keep dirt and other pollutants from entering the surface waters by employing the natural vegetation of the area as a filter. Storm water coming off developed areas are filtered through the natural buffers before these waters reach the stream in a buffered area.

Legend
- Creswell Stream Buffers
- 75 ft. Stream Buffers
- Street Center Lines
- Creswell Boundary
According to the USDA Natural Resources Conservation Service, a hydric soil is one “that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part.” Hydric soils are important to consider when choosing land to develop because they are potentially wetlands, and they can be unstable.

There are approximately 2,380 acres of hydric soils in the Creswell area. Approximately 18% of land in Creswell consists of hydric soils.
The Creswell area is approximately 12,864 acres. About 327 acres is classified as soil that is severely eroded. This means approximately 2.5% of soils are severely eroded.

Erosion can be caused by water, wind or tillage. Harford County is dominated by agricultural practices, so it is likely these have played a large role in the severely eroded soils. These soils should not be developed upon, as they are not stable.

Legend
- Severely Eroded Soils
- Creswell Boundary
There are about 313 acres (2.4%) of slopes greater than 25% in the Creswell area. This is important information because these slopes must be considered when building in the Creswell area. They are not stable and should not be built on, and should be dealt with in an environmentally safe way.

There has been historic flooding and channelization due to farming which has led to gully creation.

There are four main areas in which the slopes greater than 25% are present. These include:
1. Surrounding the active LaFarge-Churchville Quarry
2. Along the Bush Stream from North to South
3. Along the Southwestern portion of the Creswell area
4. Surrounding the land belonging to Maryland Paving Inc. Asphalt Plant

Legend
- **Slopes over 25%**
Green Infrastructure Hubs and Corridors

The Green Infrastructure network is composed of three general features: core areas, hubs, and corridors. Core areas provide high-quality natural habitat. Adjacent to core areas, hubs are large areas with some natural habitat value, potentially located on the outskirts of some agricultural zones. Corridors are generally narrow, linear natural areas that link cores together and allow animal movement between those areas.

Legend

- Creswell
- Harford Hubs
- Harford Corridors

Green Infrastructure Concept
Open water and wetlands account for approximately 137 acres or 1.1% of the total Creswell Area.

Harford County protects many of its sensitive environmental features through the Natural Resources District (NRD) subsection of the Zoning Code (267-62). Harford County was one of the forerunners in establishing local protection of these sensitive environmental areas.

Legend
- **Open Water**: 97 Acres / 0.8%
- **Wetlands**: 40 Acres / 0.3%
Targeted Bioretention

The bioretention areas in Creswell are mostly in the form of swales. Student recommendations for constructed wetlands and swales are shown on the map. As indicated, there are a few places where constructed bioretention areas could be built and be beneficial. Land cover classifications are depicted to better understand the Creswell areas predominate usage of space and land. The chart on the following page describes the Best Management Practices for watersheds.

Under tHarford County’s Stormwater Management Program, new development that requires the management of stormwater runoff must utilize Environmental Site Design (ESD) or construct a Best Management Practice (BMP). These structures include infiltration, flow attenuation, retention, extended detention, detention and underground storage.
### Harford County BMP Site Suitability Criteria


<table>
<thead>
<tr>
<th>BMP</th>
<th>Drainage Area (acre)</th>
<th>Slope (%)</th>
<th>Hydrological Soil Group</th>
<th>Water Table Depth (cm)</th>
<th>Road Buffer (ft)</th>
<th>Stream Buffer (ft)</th>
<th>Wetland Buffer (ft)</th>
<th>Land cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioretention</td>
<td>&lt; 2</td>
<td>&lt; 5</td>
<td>A–D</td>
<td>&gt; 61</td>
<td>&lt; 100</td>
<td>&gt; 100</td>
<td>&gt; 100</td>
<td>Grass, bare earth, parking lots</td>
</tr>
<tr>
<td>Constructed Wetland</td>
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<td>15</td>
<td>A–D</td>
<td>&gt; 122</td>
<td>–</td>
<td>&gt; 100</td>
<td>&gt; 100</td>
<td>Grass, bare earth</td>
</tr>
<tr>
<td>Dry Pond</td>
<td>&gt; 10</td>
<td>15</td>
<td>A–D</td>
<td>&gt; 122</td>
<td>–</td>
<td>&gt; 100</td>
<td>&gt; 100</td>
<td>Grass, bare earth</td>
</tr>
<tr>
<td>Grassed Swale</td>
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<td>4</td>
<td>A–D</td>
<td>&gt; 61</td>
<td>&lt; 100</td>
<td>–</td>
<td>–</td>
<td>Grass, bare earth, parking lots</td>
</tr>
<tr>
<td>Infiltration Basin</td>
<td>&lt; 10</td>
<td>15</td>
<td>A–B</td>
<td>&gt; 122</td>
<td>–</td>
<td>&gt; 100</td>
<td>&gt; 100</td>
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<tr>
<td>Infiltration Trench</td>
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<td>15</td>
<td>A–B</td>
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<td>–</td>
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<td>&gt; 100</td>
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<td>Porous Pavement</td>
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<td>1</td>
<td>A–B</td>
<td>&gt; 61</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>parking lots</td>
</tr>
<tr>
<td>Sand Filter (non-surface)</td>
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<td>A–D</td>
<td>&gt; 61</td>
<td>–</td>
<td>&gt; 100</td>
<td>&gt; 100</td>
<td>Grass, bare earth, parking lots</td>
</tr>
<tr>
<td>Sand Filter (surface)</td>
<td>&lt; 10</td>
<td>10</td>
<td>A–D</td>
<td>&gt; 61</td>
<td>–</td>
<td>&gt; 100</td>
<td>&gt; 100</td>
<td>Grass, bare earth, parking lots</td>
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<tr>
<td>Vegetated Filterstrip</td>
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<td>10</td>
<td>A–D</td>
<td>&gt; 61</td>
<td>&lt; 100</td>
<td>–</td>
<td>–</td>
<td>Grass, bare earth, parking lots</td>
</tr>
<tr>
<td>Wet Pond</td>
<td>&gt; 25</td>
<td>15</td>
<td>A–D</td>
<td>&gt; 122</td>
<td>–</td>
<td>&gt; 100</td>
<td>&gt; 100</td>
<td>Grass, bare earth</td>
</tr>
</tbody>
</table>

Green roofs, rain barrels, and cisterns did not require site targeting. Exclude open water, forests, wetlands, buildings, roads, and railroads from other BMP siting.

**Targeted Bioretention**
Land Cover

The Creswell area is sparsely developed. The majority of land in the Creswell area is either deciduous forested (40.8%), cropland (28.7%) or low density residential (10%).
Easements in Acres

The Creswell Area has significant easement acreages. Thirteen percent of the area (13%) is in easements.

Easements by Type in Acres

Agricultural Easements (79%) account for the greatest percent of easements.

Legend

- Agriculture Preservation Easements
- Historic and MET Easements
- MET Easements Only
- Property Boundaries
- Creswell

Easements
Parks

Stoney Demonstration Forest (317.87 acres)
Objective: To use scientific forest management techniques to demonstrate the integration of the multiple uses of the forest land of SDF, to include the production of commercial forest products, the enhancement of wildlife habitat, the protection of soil and water resources, and the maintenance as a forest recreation site in Harford County, MD. (DNR)

Cedar Lane Park & Sports Complex (112.3 acres)
Maintained and managed by Cedar Lane Sports Foundation (opened in 2008) Has 13 multisport fields and a trail loop around park (1.46 miles) Parking for 1000 cars 500,000+ visitors annually (cedarlanesports.org/sports)

Schucks Road Regional Complex (55 acres)
Multisport fields, pavilion, a 1.2 mile trail (a small portion is a sensory trail), and a playground

Tudor Hall
Once the home of John Wilkes Booth. Listed on the National Register of Historic Places
Adopted Land Use Plan 2016

Typical Views by Land Use Plan

Legend

- Agricultural
- Harford Community College
- Light Industrial
- Mixed Office
- Park
- Univ. Center of NE Maryland
- Rural Village
- Crewswell Boundary
- Creswell Street CenterLines

Agriculture
Harford Community College
Light Industrial
Mixed Office Zoning

Adopted Land Use Plan 2016
Zoning Classification Patterns
Zoning Classification R1: Up to 1.8 DU per Gross Acreage

This R1 zoned development tract contains a total of 182 dwelling units on 182 acres, which yields approximately 1 dwelling unit per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 1.5 dwelling units per acre.

This R1 zoned development tract contains 582 dwelling units on 500 acres, which yields approximately 1.2 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 4.5 dwelling units per acre.
**Zoning Classification R2: Up to 3.5 DU per Gross Acreage**

This R2 zoned development tract contains a total of 1,268 dwelling units on 482 acres, which yields approximately 3 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 5.25 dwelling units per acre.

This R2 zoned development tract contains 1,262 dwelling units on 587 acres, which yields approximately 2.15 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 3.75 dwelling units per acre.

**Typical Townhouses**

**Typical Single Family Homes**
Zoning Classification R3: Up to 5.0 DU per Gross Acreage

This R3 zoned development tract contains a total of 922 dwelling units on 108 acres, which yields approximately 5.4 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 16.75 dwelling units per acre.

Zoning Classification R3

This R3 zoned development contains a total of 105 units on 82 acres which yields approximately 1.3 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 1.25 dwelling units per acre.

Typical Single Family Homes

Typical Townhouses and Detached Housing
Zoning Classification R4: Up to 8.0 DU per Gross Acreage

This R4 zoned development tract contains a total of 180 dwelling units on 58 acres, which approximately yields 3.1 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 5.5 dwelling units per acre.

This R4 zoned development tract contains a total of 1123 dwelling units on 272 acres, which approximately yields 4.1 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 3.75 dwelling units per acre.
Zoning Classifications: Higher than 8.0 DU per Gross Acreage

The top map illustrates dwelling units of up to 8 stories. The photo on the left is mixed use on the ground level. The residential units shown are adjacent to Johns Hopkins University on North Charles Street in the Charles Village neighborhood of Baltimore.

The bottom map illustrates dwelling units of up to 6 stories. The photos below are residential only. The units shown are south of Druid Hill Park in the Reservoir Hill Neighborhood of Baltimore.

Zoning Classifications Higher than R4
Dwelling Unit Assessments
Using major roads for division, the Creswell project area was divided into five sections to investigate potential development at a parcel or multi-parcel scale. In each section, parcels were individually reviewed with the goal of identifying parcels that would most likely to be able to be developed or to be consolidated for development in the next 30 to 40 years. Conversely, parcels that were unlikely to be developed were categorized. These included smaller parcels, developed subdivisions, easements and public lands. A portion of Harford Community College was include in a potential development area (PDA) for the consideration of opportunity for redevelopment as an education community resident center.

Calculating Dwelling Units
Dwelling unit (DU) amounts were calculated using a 50% net amount of units per acre allowance on the zoning. As an example, if a PDA of 100 acres was zoned R4, which allows for 8 dwelling units per gross acre, then a multiplier of 4 (50% of 8 DU) was used in calculating total dwelling units. This estimate assumes allowance for accounting for regulated areas, regulated or unregulated open space areas, and infrastructure. In assessing the development potential of the PDAs we use the current R1-R4 zones and added a fifth hypothetical zoning district of R5 to capture a higher density option. Dwelling unit targets in the graphs on pages 46 and 47 were established as hypothetical goals by PALS and the County to test potential development capacities under different density assumptions.
Area in Acres of Creswell Sections

Southern Creswell 3571 28%
North Western Creswell 2082 Acres 16%
North Eastern Creswell 1437 11%
Western Creswell 2950 23%
Middle Creswell 2833 22%

North Eastern Creswell 1437 Acres 11%
There are approximately 1,748 individual parcel records that were selected in the Creswell Area. The largest parcel is approximately 400 acres with the mean parcel size approximately 7 acres. The actual number of parcels may be incorrect due to GIS clipping from the Project Area.

Legend

- < 10: 1,538 parcels
- 10 - 50: 152 parcels
- 50 - 100: 36 parcels
- 100 - 150: 9 parcels
- 150 - 400: 9 parcels

All Parcels of the Creswell Sections
Easements, Public Property, and Regulated Areas

Easements, public property, and regulated area (required buffers around streams and wetlands) account for approximately 35% of the Creswell area. The map consists of the following:

1. Easements
2. Stream Buffers
3. Wetlands
4. Floodplain
5. Public Property

Legend
- Easements, Public Property, and Regulated Areas
- Creswell Sections

N

4502 Acres
35%

8362 Acres
65%
Public property, regulated area, and green infrastructure (identified through analysis but not protected by ordinance) account for approximately 65% of the Creswell area. The map consists of the following:

1. Easements
2. Stream Buffers
3. Wetlands
4. Floodplain
5. Public Property
6. Green Infrastructure

Legend
- Green Infrastructure and Regulated Area
- Creswell Sections
Southern Creswell
Typical Photographs: Northeastern Creswell

Northeastern Creswell
Dwelling Units by Section and Zoning

Dwelling Units by Section

<table>
<thead>
<tr>
<th>Section</th>
<th>Southern</th>
<th>Middle</th>
<th>Western</th>
<th>Northeast</th>
<th>Northwest</th>
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<tr>
<td>R1</td>
<td>2174</td>
<td>1141.2</td>
<td>749.7</td>
<td>271.8</td>
<td>72.9</td>
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<td>R2</td>
<td>4228</td>
<td>2219</td>
<td>1457.75</td>
<td>528.5</td>
<td>417.2</td>
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<td>R3</td>
<td>6040</td>
<td>3170</td>
<td>2082.5</td>
<td>755</td>
<td>178.5</td>
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<tr>
<td>R4</td>
<td>9664</td>
<td>5072</td>
<td>3332</td>
<td>1208</td>
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<tr>
<td>R5</td>
<td>12080</td>
<td>6340</td>
<td>4165</td>
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Dwelling Unit Targets

Dwelling Unit Targets

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<tr>
<th>Section</th>
<th>Minimum</th>
<th>Modest</th>
<th>Medium</th>
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<td>12000</td>
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<tr>
<td>R2</td>
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<tr>
<td>R5</td>
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<td>16000</td>
<td>20000</td>
</tr>
</tbody>
</table>

Potential Development Areas by Section
It is clear from this analysis that Creswell can achieve and exceed the targeted number of units via a judicious mix densities (e.g. R1 to R4) without needing to zone all potential dwelling areas at R4 or R5.