

# ***Field Analysis for the Prince George's County Department of Parks & Recreation***

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PALS - Partnership for Action Learning in Sustainability

An initiative of the National Center for Smart Growth

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## Introduction

Maryland-National Capital Parks and Planning Commission (MNCPPC) – Prince George’s County is seeking to improve maintenance practices on its sports fields in order to provide safe, agronomically sound play areas for county residents and amateur sports teams. In coordination with the University of Maryland Program for Active Learning and Sustainability (PALS), the county sought to have a “turf inventory” conducted on its “rectangle” (primarily used for soccer, football, and lacrosse) recreational sports fields. This survey involved using the Sports Field Managers Association Playing Condition Index (PCI). The PCI is compiled using data from a number of qualitative and quantitative field parameters including the following:

- Primary use, field manager experience, general field maintenance practices, and construction infrastructure (this portion of the rubric was answered by PG Parks)
- Species of turfgrass and turfgrass cover
- Species of weeds present and weed cover
- Visual evaluation of the soil profile to 5-6”
- Surface hardness measurements using the Clegg impact hammer.
- Soil volumetric moisture content using a Field Scout TDR Moisture Meter.
- Compaction levels measured with a Field Scout penetrometer.

The primary objective of this survey was to provide PG Parks turfgrass management staff a characterization of the fields with regards to player safety and field conditions related to agronomic practices and field usage. The intention is that the information from this survey will be used in the near future to allocate maintenance resources to provide safe, high quality playing fields

## Background and Objectives

In conjunction with PALS and PG County Parks, this project was designed to assess the overall quality of numerous rectangular athletic fields throughout Prince Georges County’s Parks and Rec. jurisdiction and provide impacting yet budget-friendly recommended solutions.

Throughout the world, every outdoor athletic field is faced with numerous and site-specific challenges including drainage, grading, turf density, thatch management, compaction management, and weather-related setbacks to name a few. Some fields were built on a low land terrain carrying drainage and saturation problems with little options to divert excess water. Other fields have very little protection from harsh direct sunlight and receive little supplication in the ways of hydration. Highly populated communities use these fields on a frequent basis and little recuperation is gained as the field sees more and more stress leading to less than favorable conditions.

### Field Analysis

By making personal visits to each field, a score was created to help gain insight into what these challenges were at each location in hopes to provide a deeper understanding of each field's specific obstacles and help to prioritize maintenance practices and capital improvements. In order to capture these results a survey was conducted and field data collected using a myriad of instruments. Questions on the survey contain certain questions that are specific to the Parks and Rec. department and can be answered "in-house". The remaining questions were answered by the university along with recorded field data transposed via soil specific instrumentation.

To grasp a cooperative understanding of how these tests are performed, a meeting was held with Parks and Rec field managers Shawn Beaumont and Matt Coates to walk through the analysis of a field together. During this visit we were able to calibrate a uniformed scoring method to determine grading parameters. This was also an opportunity to hear out the known issues that most of the fields faced and that certain ratings would be affected due to the time of year this survey was conducted.

With the goal being to visit and analyze 40 fields split amongst multiple students, 27 were visited and analyzed by 1 student with 3 of the fields no longer used for these activities and 1 field's data not turned in by a former student.

## Materials and Methods

Fields were assessed using the Player Conditioning Index (PCI) developed and utilized by the Sports Fields Managers Association (SFMA), a professional organization consisting of sports field managers ranging from parks and recreation associates to professional settings such as the MLB, NFL, MLS, including the FIFA World Cup. Within the PCI, there are a series of questions related visual and physical properties of the field and also questions pertaining to the organization responsible. To generate scores for each assessed field, the questions pertaining to PG County Parks and Rec. were omitted from the scoring. Scores were calculated by only including questions pertaining to the field and not personnel. Scores that ranked from 45-31 ranked in the "Best" category, scores that fell between 30-24 fell into the "Fair" category, and scores that ranked 23 and below were listed as "Needs improvement". The items listed on the evaluation sheet consisted of questions pertaining to personnel and operations, field activity usage, turf density, percentage of weed/disease/insect infestation, soil tests, irrigation, and dates of recent activity to list a few. A sample of the Player Conditioning Index can be seen in Figure 1.

A meeting was held in mid-October, Professor Geoff Rinehart of the University of Maryland along with student Brandon Carbary met with PG county Parks and Rec. managers Shaun Beaumont and Matt Coates to discuss what information was sought and how to conduct the field tests. Beyond the field evaluation questionnaire, there were three measuring devices used to capture an idea on physical properties and conditions of the field itself. The first device used was a time-domain reflectometry (TDR) moisture meter which measures soil hydration content through the timing of electrical responses between its respective probes. Probes are inserted into the soil and a button is pressed when the user is ready to take the reading. This tool is pictured in Figure 2.

## Field Analysis

7. Conduct nutrient analysis/tissue test annually or more often?	0
0 = No	
1 = Yes	
8. Were the results of these test (soil/tissue) ideal?	0
0 = No or N/A	
1 = No, but they are manageable	
2 = Yes	
<b>Your records should include all results from soil, nutrient or tissue test.</b>	
9. Turfgrass species suited to activity (consider activity/season)	3
1 = Unmanageable	
3 = Manageable	
5 = Best selection	
10. Do you regularly seed, sprig, or sod worn areas?	0
0 = No	
3 = Yes	
11. Desirable turfgrass cover of field is currently	5
1 = Dormant	
3 = Over-seeded	
5 = Actively growing	
12. Percent worn turfgrass cover	5
1 = More than 40% is bare soil	
2 = 30 to 39%	
3 = 20 to 29%	
4 = 10 to 19%	
5 = 0 to 9%	

**Figure 1.** A screenshot of a section of the Player Conditioning Index (PCI)



**Figure 2.** TDR moisture meter. Image courtesy of <https://www.prnewswire.com/news-releases/spectrum-launches-tdr-350-soil-moisture-meter-300402107.html>

### Field Analysis

The next device used was a tool called a Clegg hammer or Clegg Impact Soil Tester (CIST) (Figure 3). The Clegg hammer measures surface hardness. This is a vital measurement for the safety of players using the field as it can dictate if the field is too hard for the safety of players. This instrument is read by lifting and dropping a five-pound missile-weight which is connected to a digital reader that delivers recordings in GMax units. The parameters of a good reading are anywhere between 40 and 100 GMax units, indicating the field is safe for play.



**Figure 3. Clegg Hammer** Image courtesy of <https://images.squarespace-cdn.com/content/v1/60bfb553aee4626e5f14ca2b/becf9a0f-0439-41ab-af8b-47d57c2477dc/Clegg-Hammer-Website-PSD-600x600.jpg?format=750w>

The next method of collecting data was measuring soil compaction levels using a soil penetrometer (Figure 4). The soil penetrometer consists of a metal probe attached with handles at its top. The probe is inserted into the soil to a 5-inch depth where the pressure used to push the probe is measure, recorded, and averaged in pounds per square inch (PSI). Once the probe is pulled out, a reading will be displayed on the device's screen and that data is recorded for each location in the field. This gives the manager a good idea on a few elements besides player safety. For example, if a stand of turf appears thin, it may be that the soil needs to be aerated to reduce soil compaction around the roots. Acceptable readings for the penetrometer are anywhere from 25psi to 300 psi.

Clegg hammer, penetrometer, and moisture meter readings were taken at ten different locations on each field as indicated by Figure 7.



**Figure 4.** Image courtesy of [https://shop13861.hstatic.dk/upload\\_dir/shop/ thumbs/FieldScoutSC900\\_1.w610.h610.fill.jpg](https://shop13861.hstatic.dk/upload_dir/shop/ thumbs/FieldScoutSC900_1.w610.h610.fill.jpg)

## Field Analysis

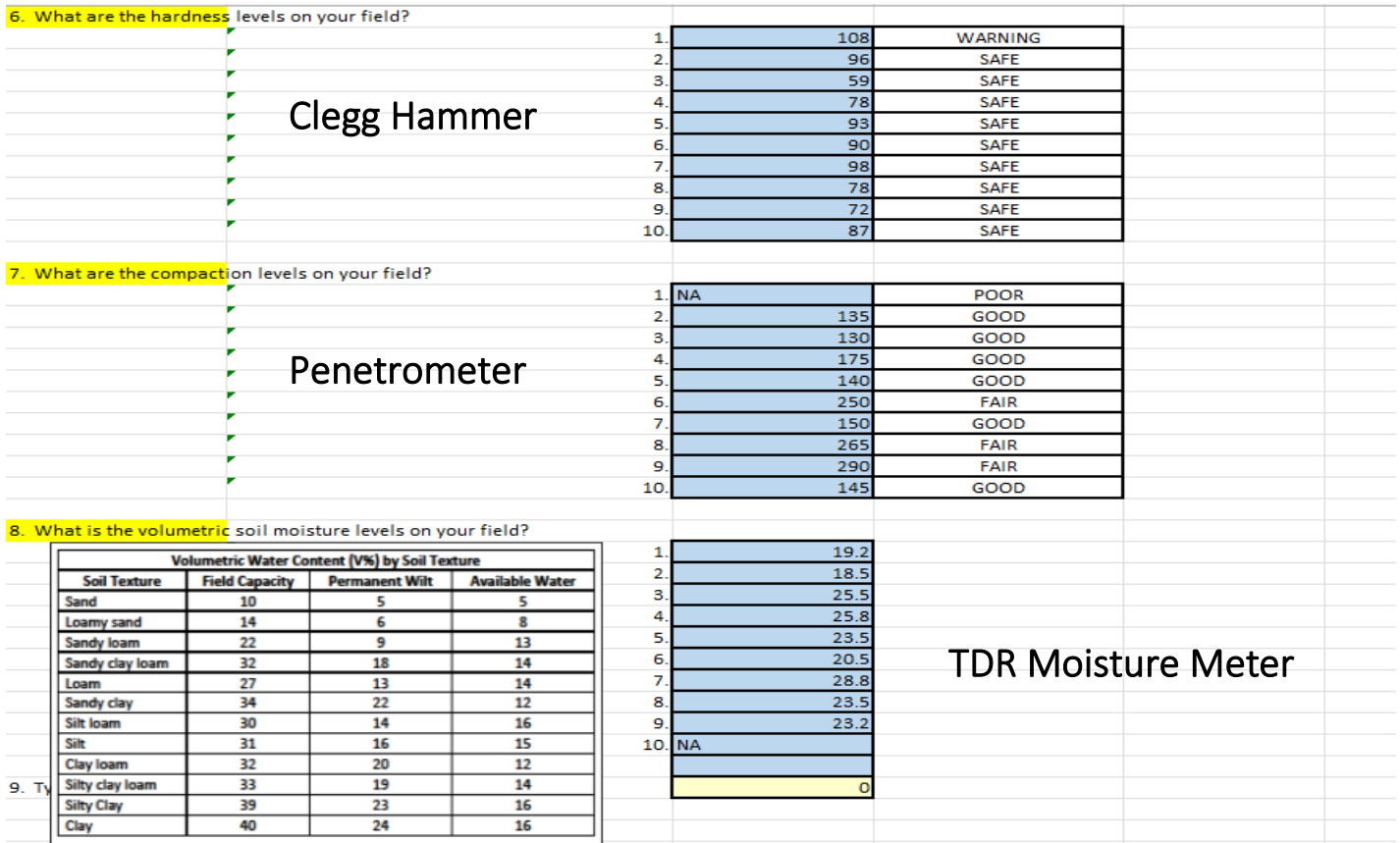


Figure 5. Screenshot of PCI results from instrumental measuring.

In addition to electronic measuring devices, a soil probe was used for visual inspection. The soil probe is a hollow tube designed to extract a soil core sample approximately 1-inch in diameter at a 5-6-inch depth. In analyzing a soil probe sample, it is important to observe soil moisture at various depths, soil consistency and uniformity, thatch levels, and root depth. A healthy probe sample will show a balanced layer of thatch approximately a ½-inch or less, roots that are around 4 inches long, healthy color and aroma, organic matter, and a healthy moisture consistency.



## Field Analysis



**Figure 6:** Photo on the left: displaying where the thatch layer exists. Middle Photo: Healthy sample from TH Duckett displaying an ideal thatch layer, organic matter and sand within the soil profile, and consistent color. Photo on the right: displaying an excessive thatch layer at Enterprise along with a heavy clay soil absent of organic matter and soil amendments.

## Site Analysis

Field assessments began in October and continued through December. This seasonal period brought with it a few restrictions in regard to collecting data. For instance, most turfgrass diseases and insects had dissipated due to the cooler temperature and shorter day lengths associated with the late autumn season. Late autumn also brings about consistently moist soil conditions and less evaporative potential. Beyond these considerations, the field data that was collected was enough to compare evaluations and measurements leading to recommendations for field improvements.

Fields that scored in the “Best” column could easily be noticed on arrival as these fields looked lush and inviting for use. Turf density was immediately visible and there were very few bare spots, low weed infestation, few depressions and disruption to grading and drainage, and adequate instrumental readings. These fields scored safe player ratings for use. Certain fields such as the field at the College Park community center scored higher due to the fact it had a working and managed irrigation system. While the score increases, the fact that it too has drainage issues to be addressed on the perimeter of the property remains. Even the higher rated fields still have some issues to be addressed before they could reach a near perfect score. Fields that scored in the mid-high 20’s placed in the “Fair” column. These fields exhibited a few more weeds in the field, a greater percentage of bare spots, soil depressions, and mixed species of turf such as bermudagrass encroachment. All of the fields in the “Fair” category scored a “3” or worse in the category of weed infestation displaying 20-40% infestation. This occurs when a stand of turf becomes worn and less dense and weed seeds gain room to germinate, flourish, and spread. Unfortunately, this invites some difficult weeds to move in which require physical removal through labor or stronger chemical resolutions. With regards to soil compaction, surface hardness, and moisture, these fields were sufficient for play; however, if conditions are not improved, further loss and detrimental readings will continue.

The “Needs attention” category reveals fields in the county that are deemed relatively unsafe for play and require a proficient plan for improvement-- 26% of the fields evaluated fell into this category, with Daisey Lane being the only field that provided safe measurements for play. Enterprise, Powder Mill, Lane Manor 1, and Lane Manor 2 were mostly bare soil with excessive rocks and stones visible and lying on top of the soil surface.



### Field Analysis

Turf density was null as only the perimeter of these fields had any green matter. Conversely, the electronic measurements collected did not reflect the turfgrass visual conditions that can be seen. Surprisingly, the field at Powder Mill was in use at the time of evaluation even though 90% of the field was soil and deceased crabgrass. Regardless of PCI scores, all fields shared similar problems in terms of usage and needed maintenance. For example, 40% of all fields measured poor to fair in areas 1,2,5,6, and 10 for soil compaction and surface hardness. (As seen in figure 7.)



Colmar 1



Saddlebrook 1



TH Duckett 2



Powder Mill

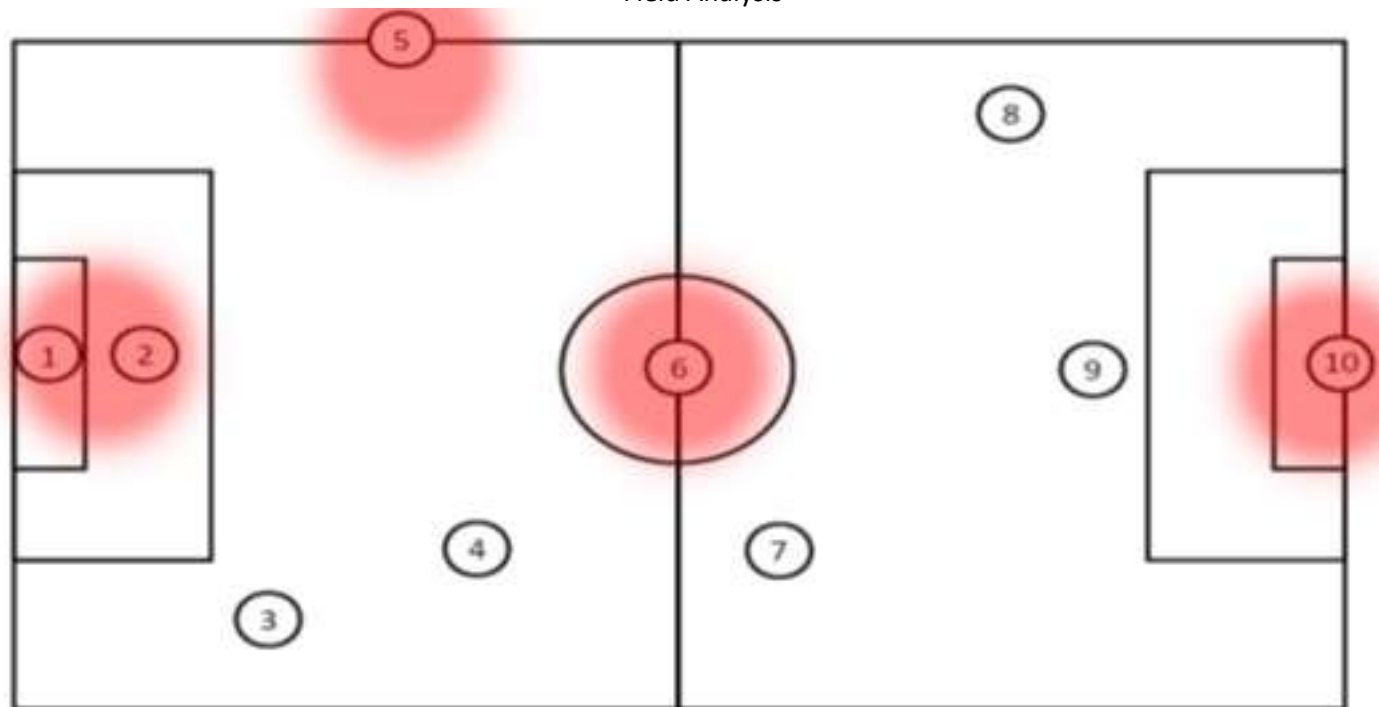


Lane Manor 1



Lane Manor 2

## Field Analysis



**Figure 7.** Map of field measurement locations according to Player Condition Index guidelines. Areas which are highlighted are common problem areas for compaction and surface hardness.

Field Survey Results and Scores		
BEST	FAIR	NEEDS ATTENTION
TH Duckett 2: 42	Landover 2: 29	Beltsville CC: 22
TH Duckett 3: 42	Palmer Park: 28	Enterprise: 20
TH Duckett 1: 38	Beltsville West: 26	Glenarden: 20
College Park CC: 40	Daisey Lane: 26	Powdermill: 15
Fairwood 1: 36	Vansville: 26	Lane Manor1: 15
Fairwood 2: 36	Mt. Ranier: 25	Lane Manor 2: 13
Colmar 1: 36		
Colmar 2: 34		
Saddlebrook 1: 36		
Saddlebrook 2: 36		
Landover 1: 33		

**Figure 8:** Field categories and scores.



## Field Analysis

# Discussion of Options

With 48% of the fields scoring in the “Best” category, this clearly demonstrates PG County Parks and Rec. can and does provide optimum field playing conditions for activity and usage. To elevate the latter 52%, a new approach must be undertaken to broaden the county’s playable fields.

For the “Fair” scored fields the following practices are recommended:

- Core aeration: Decreases soil compaction, increase in water/oxygen infiltration, impose soil amendments to the rootzone.
- Pre-Emergent herbicide application: Application to be made in the early spring to suppress weed seed germination and increase turf density.
- Post-Emergent herbicide application: Application to be made during the season targeting existing weeds. This practice will give room to the existing turf to expand its density.
- Proper seeding using a slit-seeder or similar equipment to efficiently place seed into the soil.
- In season fertilization
- Addition of compost/humic acid to clay soil sites to increase the grass’s ability to uptake nutrients.
- Up-to-date soil testing
- Installation of irrigation
- Root pruning tree lined fields
- Supplemental watering during drought periods
- Possible introduction of wetting agents into the soil to help maintain moisture.
- Pruning of trees and/or branches to allow for increase light and airflow.
- Some sites would benefit with the planting of trees blocking hot afternoon sun.

For the fields in the “Needs Attention” category, the above practices are recommended with additional overhaul procedures. First and foremost, grading and drainage need to be addressed. Soil tests are encouraged to be sent to a lab for analysis results prior to grassing the field.

Once the soil is graded with proper drainage installed, a close evaluation must be determined as to what type of turf is appropriate for the site. It may be that a stand of bermudagrass is appropriate in the summer season while an overseed of perennial ryegrass will suffice for the cooler times of the year. The installation of irrigation is recommended across the board, more so when renovating a field as this will protect the investment and cut down on reactive costs due to turf loss from heat stress.

Although it is a less than favorable suggestion, installing fencing around the fields will give the Parks and Recreation department more control over when fields can be used and to keep pedestrians at bay during times when chemical applications must be made. Along with higher hydration needs in the summer, reducing foot traffic on the stressed turf will reduce turf loss, weed encroachment, and further recuperative maintenance practices.

## Conclusion

While some fields better than others, not one field was perfect and even the worst of the worst can be revamped with proper planning, execution, and on-going maintenance. With the numerous fields held in excellent condition, the obvious limiting factors would be of a fiscal matter as the leadership within the PG

### Field Analysis

County Parks and Rec department is amongst the most talented group in the nation. There is a widespread saying that if you can grow grass in the transition zone, you can grow grass anywhere in the world.

In 2026 the FIFA World Cup will host its competition in North America with 2 fields in Canada, 3 in Mexico, and 11 fields throughout the United States. According to CNN, when a poll was taken in 2004 asking Americans what their favorite sport is, only 2% replied that it was soccer. In 2022, the same poll was taken with 8% saying soccer was their #1. (Enten, 2022) Although predictive numbers have not been collected or made public, there will surely be an uptick in the sport's popularity which directly coincides with an increase in athletics and sports field usage across the country. This is a defining time to choose whether to be reactive or proactive with the influx of play and interest that is sure to come.

## Reference

Enten, H. (2022, December 12). *The US may have lost in the World Cup, but soccer is more popular than ever in America*. CNN. <https://www.cnn.com/2022/12/12/football/soccer-popularity-us-world-cup-spt-intl/index.html>

## Appendix

Carbary, B. C. (2023). *PG County Field Data PCI* [Dataset; Excel].

