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Summary of  
**Synthetic Turf Systems**

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**A Life Cycle Assessment Study Summary Report**

Based on a study  
prepared for Brock USA by  
Rocky Mountain Institute



and

**Athena Sustainable Materials Institute**



July 2007

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## **Contents of Complete Study**

(Complete study is available upon request.)

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## Overview

An independent Life Cycle Assessment (LCA) was conducted by the Rocky Mountain Institute in partnership with Athena Institute in order to determine the environmental implications of constructing an infilled synthetic turf field over a traditional stone base versus constructing the same field over a Brock Performance Base.™ Life Cycle Assessment (LCA) is an analytical tool used to comprehensively quantify and interpret the environmental flows to and from the environment (including emissions to air water and land as well as the consumption of energy and other material resources), over the entire life cycle of a product or service. The ISO 14040 series is the international standard for Life Cycle Assessment. It was developed with international experts on LCA from more than fifty countries over a period of more than 15 years.

The study was conducted for two reasons:

- 1) To provide independent data to decision makers such as architects, school districts and parks departments who can use the study to help them weigh the pros and cons of each construction technique from an environmental perspective.
- 2) To provide Brock USA personnel an analysis of the manufacturing facility using environmental indicators help Brock USA identify key manufacturing processes that can be changed or eliminated in order to further reduce environmental impact in the production of the Brock material. As a result of this study, Brock USA has begun to implement measures to address the various processes and offset negative environmental implications in manufacturing.

The study analyzed two field construction locations, one in the NE (New Jersey) and one in California (San Francisco), each location comparing a Brock Performance Base to a stone base under the same synthetic turf. Hence when data ranges are indicated, it represents the range represented by the two locations. All data was provided from actual projects.

The results of the study are twofold.

- 1) Data is provided that addresses the local effects of the two construction techniques.
- 2) Data is also provided that addresses the global effects of the Brock material.

In other words, since the materials used in a stone base are provided locally, the study analyzed the implications of Brock vs. stone on a local level. However, since Brock USA operates a manufacturing plant in Pennsylvania, the study also encompassed the “global” implications of operating the manufacturing plant. In addition, the study encompassed not only the Brock USA facility, but also their 2nd tier suppliers of the raw materials.

## Key Findings

1. For the local environment, the effects of constructing a field with the Brock material are less than the effects constructing the same field with a stone base. The quantity survey results for the materials necessary to construct the two alternative synthetic turf fields indicated that incorporating Brock USA underlayment resulted in:

- a 50%-60% reduction in the amount of material (soil) excavated;
- a 60%-65% reduction in the amount of aggregate usage; and,
- a 100% reduction in “in-field” drainage pipe usage, depending on location.

Overall these materials savings for the Brock USA underlayment synthetic turf system, relative to the conventional stone base system, translated into an on-site construction and materials transportation energy use savings of 45% -55%, depending on location. For this reason, the LCA indicated positive results for the Brock material in the categories such as Smog Formation

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Potential, Human Particulate Potential (airborne particulates), and Eutrophication Potential (the over fertilization of surface waters).

2. This baseline LCIA indicates that while the addition of Brock USA underlayment adds 5% more mass to the synthetic turf component system, the other savings associated with using the product (e.g., reduced excavation and aggregate use and not having to provide any “in-field” drainage piping) considerably offset the environmental impacts of using the Brock product.

3. The distance aggregate stone needs to be transported to the project site can have a marked effect on the comparative results across the two alternative synthetic turf systems. Moving to progressively longer aggregate-hauling distances beyond the 15 miles used as the distance in the study is to the benefit of the Brock USA underlayment based field.

4. The material and on-site energy savings associated with using the Brock product are significant. Therefore reducing the environmental impact and addressing the issues of “not in my back yard” are significantly mitigated by building a field with Brock vs stone. However, when the effects of the Brock manufacturing facility are taken into account, the “global impact” of constructing a field either with Brock Performance Base or a stone base showed no difference. In other words, the benefits one would see locally do not necessarily translate to the same benefits globally.

5. In light of point 4 above, the study defined the individual processes and materials used in the Brock Manufacturing operation over which Brock USA has control. The life span of the Brock material has a marked effect on the relative impact when compared with stone. Early aging tests have shown the Brock material to last 50 years (vs the 20 years used in the study.) Therefore increasing the life span of Brock will further reduce it’s environmental impact and should be a primary goal in manufacturing.

6. In regards to the overall environmental impact as measured in the five categories supported by TRACI, the Brock manufacturing facility contributed only a small fraction when compared to the suppliers of the raw material, such as the Polypropylene resin and polyurethane binder used in the Brock product. Therefore, alternative suppliers should be analyzed who operate “greener” manufacturing facilities. As an example, the Brock facility contributes only 3.1% toward air quality impact when compared to 95.9% contributed by their suppliers.

7. The study assumed that all materials are landfilled at the end of their life cycle. Therefore recycling and/or upcycling programs should be further developed in order to offset this effect.