TOWARD SUSTAINABLE URBANISM: MEASUREING PROJECTS WITH LEED FOR NEIGHBORHOOD DEVELOPMENT

by

Faith Cable

A Masters Project submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Regional Planning in the Department of City and Regional Planning.

Chapel Hill

April 2007
TABLE OF CONTENTS

I. Executive Summary

II. Overview
   The LEED-ND Program

III. Previous Studies
   Sustainable Development
   An Ecological and Environmental Foundation
   Smart Growth & New Urbanism
      Density
      Diversity
      Design
      Destinations
   Green Building
   Obstacles to LEED-ND

IV. The LEED-ND Rating System
   Overview
   Smart Location & Linkage
   Neighborhood Pattern & Design
   Green Construction & Technology

V. Methodology

VI. Project Evaluations
   Stapleton
   Noisette
   Bloomington Central Station

VII. Project Comparison & Conclusions

VIII. Works Cited

IX. Appendix
I. EXECUTIVE SUMMARY

Sustainable development is seen as a solution that combines economic, environmental and social goals. By addressing environmental challenges, sustainable development can reduce the urgent threat of global warming caused by urban greenhouse gas emissions. During the 1990s, the smart growth movement and the Congress for the New Urbanism began to rethink the way cities are planned.

LEED for Neighborhood Development (LEED-ND) recognizes developments that meet the goals of sustainable development and livable communities. The Congress for the New Urbanism, the U.S. Green Building Council and the Natural Resources Defense Council have partnered to create the new LEED-ND standards – a private certification system that will undergo it’s pilot program in 2007. LEED-ND will certify projects that adhere to both green building standards and smart growth goals.¹

This analysis uses the LEED-ND pilot program standard to measure three different projects: Stapleton, Noisette and Bloomington Central Station. Based on the evaluation of these projects according to the LEED-ND standards, differences among them are noticeable. Their initial site condition heavily affects the ability of each project to earn LEED-ND credits. As all of these projects are infill sites, they benefit from an inherent advantage according to the LEED-ND standards. However, the projects vary based on regional goals and priorities. Stapleton and Bloomington Central Station do a better job with transit service since their regions, Denver and Minneapolis/St. Paul respectively, have invested heavily in transit. Noisette does not have strong transit service; however it does have more attention paid to site design qualities and a master plan that exhibits the most recent thinking on sustainability.

The analysis also shows where the LEED-ND standards do well in assessing different projects but it also highlights credits where the projects meet the intent of the credit yet do not meet the criteria. LEED-ND will be revised throughout the pilot program; however this assessment offers an early view of credits most likely to be problematic and in need of modification.

Measuring sustainable development has been problematic in the past; however the LEED-ND offers the first way to measure developments on a nationwide scale. While LEED-ND is not a perfect or ideal standard, it does provide an achievable goal that developers of new neighborhoods can strive for. By setting high yet reachable goals, LEED-ND can help change standard business practice to a culture that uses sustainability objects as a competitive advantage in the development of new neighborhoods.

II. OVERVIEW

This analysis will highlight projects that meet LEED-ND standards and provide a basis for understanding how livable, sustainable development has been accomplished. This study hopes to provide information about the following questions:

- How do current developments rate on the LEED-ND standard?
- How well do the LEED-ND requirements encapsulate the sustainable features of each project?

Three projects that are applying for the LEED-ND pilot program are analyzed in depth to provide answers to these questions. The projects are Stapleton in Denver, Colorado; Noisette in North Charleston, South Carolina; and Bloomington Central Station in Bloomington, Minnesota. These projects all incorporate many principles of sustainable development although they differ in various respects: location in the country, stage of completion and scale. Stapleton is the largest project and furthest along. It finished its master plan in 1995 and completed the first five years of its twenty year build-out. Noisette is somewhat smaller and includes an area-wide master plan and the new Navy Yard neighborhood that will be located at the former naval base. The master plan was finished in 2004 and the project has only recently begun infrastructure construction at Navy Yard. Bloomington Central Station is the smallest project and also finished its master plan recently in 2004. It has one condominium building completed to date.

This assessment will rate the projects according to the LEED-ND Pilot Project Checklist. It will also address the predevelopment planning efforts, including the development of the master plan, the evolution of the plan as it is built and innovative zoning, financing or infrastructure initiatives. This study will look at the leadership shown by the public and private sectors in crafting these plans and the impact of the planning process on the built project.

LEED-ND came about when some of its authors thought about the impact of a green building located in a remote location. Even if the building had a smaller environmental impact, a remote location meant that all people that went there had to drive a long distance to get there. Any benefits would thus be canceled out by the daily journey of its users.

Greenhouse gases have risen steadily, with a 16% increase from 1990 to 2004. Carbon dioxide (CO₂), accounts for approximately 85% of greenhouse gases emissions that contribute to global warming. Transportation uses accounted for 33% of carbon dioxide emissions from fossil fuel combustion in 2004, with over 60% of that a result of gasoline consumption from automobile use. The residential and commercial sectors accounted for 21% and 17%, respectively, of CO₂ emissions in 2004. Electricity was used to meet the majority of energy demands for lighting, heating, cooling and operating appliances,
totaling 68% for residential and 77% for commercial of total emissions. The remainder was due to natural gas and petroleum consumption for heating and cooking.\(^2\)

The Intergovernmental Panel on Climate Change issued its Fourth Assessment Report findings on climate change in February 2007, stating that warming of the climate system is unequivocal. It also found that continued greenhouse gas emissions at or above current rates would cause further warming and induce global climate system changes in the 21\(^{st}\) century that would very likely be greater than those of the 20\(^{th}\) century.\(^3\)

These pressing environmental issues have gained attention and consumers are demanding solutions to reduce greenhouse gases. LEED provides a tangible way for business to meet this demand by offering verifiable building energy reductions and other environmental goals. One of the key goals of the LEED rating systems is to act as a catalyst for changing business practices. LEED systems are intended to evolve, with the standards increasing over time as they become more common. By creating a high, yet attainable standard, LEED has helped to improve building practices and now will be able to on the neighborhood level.

Given rising market demand, it is an appropriate time to innovate on the frontier of sustainability. LEED-ND does have a stronger focus on the environmental side of sustainability than the social equity side, which this study reflects. While this study does not provide a complete assessment of whether or not LEED-ND fulfills all principles of sustainable development, it does suggest that LEED-ND will provide a new benchmark for assessing sustainability on a larger scale not previously seen before.

III. LITERATURE REVIEW

Sustainable Development
Sustainable development seeks to balance environmental, social and economic goals. The most common definition, written by the Bruntland Commission in its 1987 report *Our Common Future*, refers to sustainable development as “meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.” It implies intergenerational equity that considers the responsibility of the present population to ensure that the unborn have the environmental capability and resources to provide for themselves.

On an international level, sustainable development has taken on different meanings in developed and developing countries. In developed countries, sustainable development has sought to bridge the gap between a healthy environment and economic growth, which are often seen as conflicting goals. Developing concentrate on the social equity part of sustainable development, focusing on better development that reduces the disparities between people within developing countries and with developed countries. This discrepancy between developed and developing countries has resulted in different forms of “sustainable development” in different parts of the world. In the United States, sustainable development is a term that most often associated with the environment aspect and green building initiatives.

Views on sustainability goals: conflicts or complements?
A shift in views of sustainable development has also occurred over time. In a 2004 journal article, Godschalk writes about the contradictions among the goals of sustainable development as identified by a previous article in 1996. These contradictions include the “resource conflict” between economic and ecological utility from claims on natural resources, the “development conflict” between social equity and environmental preservation and the “property conflict” between economic growth and the equitable sharing of opportunities.

However, the resource “conflict” is seen as an opportunity by others to fulfill two goals simultaneously. As explained in *Natural Capitalism*, a high level of design integration creates synergies that both reduce cost and enhance performance. These synergies can “tunnel through the cost barrier,” by utilizing system optimization. Instead of optimizing each unit for peak performance separately, system optimization provides the lowest total cost and highest performance overall. This idea has turned into common practice in green building design: using more expensive windows and insulation to seal the building envelope which allows the heating and cooling systems to be reduced. The cost savings on the heating and cooling may or may not be enough to pay for the improved building

---

envelope; however by taking the operating cost of heating and cooling into account over time, the payback often occurs quickly.

Instead of pitting environmental and economic concerns against each other, a different view of the relationship between the environment and economics recognizes that a healthy environment is essential to a healthy economy. There are no manmade solutions that can replace the vital functions of nature such as the production of oxygen or the purification of water and air. If these functions required capital instead of nature, they would be extremely expensive. Therefore, it makes economic sense to keep these natural functions in place and take into account environmental effects when making economic decisions.

**An Ecological and Environmental Foundation**

In the planning and development of cities, natural systems can be degraded, left alone or restored. However, it is important to understand the underlying ideas that support sustainable construction which are based in ecological and environmental concepts.

Industrial ecology refers to the study of the physical, chemical, and biological interactions among industrial and ecological systems. Its achievements typically involve the reduction of waste generated by traditional manufacturing systems. It also includes construction ecology, which creates a built environment that: (1) has a closed-loop materials system integrated with eco-industrial and natural systems; (2) depends on renewable energy; and (3) preserves natural systems. Following these principles results in buildings that can be deconstructed, have components that can be removed and replaced easily, are built with products that have been recycled before and can be recycled again, are durable and adaptable, and promote the health of the occupants.7

Biomimicry, the conscious imitation of nature’s genius, advocates for creating strong, intelligent materials from naturally occurring materials at ambient temperatures with no waste and using sunlight to power the manufacturing. Design for the Environment or “green design” refers to the integration of environmental considerations in to product and process engineering while considering the entire product life cycle.8 Products are designed so that at the end of their useful life, they may be taken apart and reused, recycled or remanufacturing into something else.

Ecological economics contends that healthy, natural systems – the free goods and services provided by nature – are essential to a successful economy.9 The human economy depends on the larger natural ecosystem for its ability to exchange matter and energy. Ecological economics values both the goods, energy, services and amenities provided by nature as well as human contributions. Valuing nature through assigning a

---

monetary worth to its goods and services is essential to understand the vital worth of natural systems in the human economy.

An ecological footprint refers to the land area required to support a certain population. It can be considered a measure for total resource consumption, thus allowing comparisons among lifestyles. If it would take five planet Earths to support the 6 billion people on earth with a North America lifestyle, resource sharing will need to increase to boost living standards throughout the world and an increased population.10

Eco-efficiency is the delivery of competitively priced goods and services that satisfy human needs while reducing ecological impacts and resource intensity through the products’ life cycles. These goods and services need to be designed so they can be accommodated within the Earth’s carrying capacity.11 It can occur by substituting knowledge for material flows, closing production loops by using biological designs, service extensions, and enhanced product functions with accompanying services.

Life-cycle assessments determine the environmental and resource impacts of a material product or building over its entire life.12 This assessment includes all energy, water and materials used along with the air, water and land over the time from resource extraction to product disposal. Life cycle costing is a cost-benefit analysis over the buildings life that determines the net present value of building components. It can show whether or not certain elements would be able to pay for themselves over time.

These environmental ideas offer a framework for understanding sustainability and city design. To fully optimize the system optimization, just improving the environmental performance of one building is not enough – how it functions within its neighborhood and city contexts also needs to be accounted for.

**Smart Growth & New Urbanism**

Smart Growth and New Urbanism are two parallel, complementary and often overlapping movements in city and neighborhood planning. Smart Growth encourages development that is town centered, transit and pedestrian oriented, mixed-use and environmentally friendly. Smart Growth is based in urban planning and public policy principles; however it does include some urban design principles.13

New Urbanism emphasizes many of the same elements as smart growth but stems primarily from an urban design perspective. It advocates for walkable, pedestrian-friendly communities with compact development that provides a mix of uses and housing types, offering an alternative to conventional low-density suburban development. It has

mixed-use buildings located close to the street so that passer-by may see inside each building, and parking located behind buildings in the center of blocks. The design of the neighborhood creates a pedestrian-oriented place with sidewalks, street trees, on-street parking and buildings placed in close proximity to the street – all elements that contribute to a positive walking environment.

New Urbanism creates places that are mixed-use and walkable which encourages transit use. The correlation between mixed land uses and higher transit use has been found to be significant in several studies. At higher densities, the addition of retail to a neighborhood was associated with greater transit use than areas with similar density. The impact of land use mixing on transit use was found to be greater at employment destinations than at residential origins. High levels of connectivity are typically correlated with smaller grid pattern networks that reduce the distance between two places. These transportation options have a lower environmental impact than traveling by single occupancy vehicles.

Building type and orientation found in New Urbanist developments is integral to walkable neighborhoods and transit-supportive development. Building should be transparent and oriented toward the street: when buildings face the street, they are more accessible to pedestrians and transit riders because there is a direct, well-defined connection.

A range of housing types is called for in New Urbanist projects, including single-family, townhome, condominium and apartment dwellings as well as more creative types such as bungalow courts or live-work units that can accommodate a diverse mix of residents. This creates housing opportunities with a wide range price levels for people with different housing needs and incomes.

The Environmental Benefits of New Urbanism, Smart Growth: Transportation Options & the Preservation of Natural Areas

The main environmental benefits of New Urbanism and Smart Growth stem from their ability to offer alternative transportation modes beyond the automobile and to preserve natural areas from development. Alternative transportation, such as transit, bicycling or walking, produces less pollution than automobiles and requires less paved, impermeable surface. At higher densities of development, people occupy less land per capita which allows for the preservation of greater amounts of uninterrupted natural areas. Reducing the number of car trips, increasing the number of activities within walking distance or transit access and using infrastructure more intensively through building at a higher density can all significantly reduce greenhouse gases.

15 Ewing and Cervero. “Travel and the Built Environment.”
It is important to note that New Urbanism and Smart Growth are not attempting to plan for car-free cities. However, they are trying to expand the systems for mobility to design environments such car travel is not the only reasonable means possible. This approach to whole system design requires more than just transportation planning and also extends to key features of land use: density, diversity, design and destinations.

**New Urbanism and Travel**
Compact, diverse, and pedestrian-oriented neighborhoods are generally found to have lower trip rates and higher rates of use of alternative modes of travel than conventional contemporary neighborhoods. Research on the relationship between land use and public transit has increased in recent years. In 1993, researcher Robert Cervero found that “micro-scale design elements are too ‘micro’ to exert any fundamental influences on travel-behavior; more macro-factors, like density and the comparative cost of transit vs. automobile travel, are the principal determinants of commuting choices.”19 In 2001, a comprehensive assessment of existing studies by Ewing and Cervero found that people in traditional neighborhoods travel more by transit and foot than do people in typical suburban neighborhoods.20 A 2006 study of California light rail lines by Cervero found that residents of transit oriented developments are more likely to use transit than residents in surrounding cities, implying that housing density and urban design do indeed influence transit use.21

Additional research provides evidence that land use characteristics also influence travel behavior. A 2004 study found that the pedestrian environment, accessibility, interaction with other modes of transportation, and competition from other stops are all significant in determining transit ridership.22 A study of neighborhoods in Chapel Hill found that residents were more likely to substitute walking for driving for some trips in a New Urbanist neighborhood than they were in a conventional neighborhood.23 Similarly, urban form is an influential factor in whether or not children walk to school.24 25

While these studies offer more information about the connection between land use and transportation, the variables differed between studies. This makes it difficult to understand which elements are the most significant. Areas were often categorized as urban or suburban for study purposes; however categorization often results in the loss of

---

more nuanced information. Some other limitations in previous studies have included a lack of a strong theoretical base, the omission of travel time, cost and socioeconomic variables. Few have addressed the magnitude of travel changes to understand the extent of transit use.

Density
Density makes alternative transportation options such as walking, bicycling and transit possible. When people are located closer to destinations, they are more likely to walk or bicycle if the distance is shorter. Similarly, if the walk to a transit line is close and accessible to important destinations, then higher density can also help increase transit use.

Density, measured as both residential population density and employment density, is important because it determines the number of people in a particular area who can walk to a transit station. Density has been found to be the most significant factor in predicting the level of transit ridership. Research relating density to ridership has historically been more prevalent than diversity or design, perhaps due to the relative ease of calculating density. Numerous studies have all found that higher densities – both population and employment – lead to higher ridership levels.

Employment Density
Transit use for work trips appears to be more dependent on higher employment densities at destinations than on residential densities at origins. At more than 75 employees per acre, there is a significant shift from driving to transit and walking. Transit-supportive development can reach these density levels through floor to area ratios (FAR) that are close to 1.0 or greater. Development under a 1.0 FAR usually has surface parking, while development over 1.0 typically has structured parking. In a 1991 study of suburban activity centers, the most significant relationship was the number of stories in office buildings, which was highly correlated with the percent of work trips made by mass transit.

Residential Density
A 1977 study by Pushkarev and Zupan found that transit ridership increased sharply at residential densities above 7 dwellings per acre. This standard is still widely cited as a

---

minimum for basic bus service. At 15 dwellings per acre, frequent local bus service becomes viable. Light rail requires a minimum of 9 dwelling units per acre.\textsuperscript{32} The service levels also vary on the density at employment destinations, distribution of employment centers and proximity to the regional core.

Density by itself does not always have a major impact on travel decisions.\textsuperscript{33} Density only has an impact when combined with other elements, such as accessibility of destinations within walking distance and attractive design.

\textit{Reserving Land}

New Urbanist developments accommodate the same number of people in a smaller area than conventional development. An increase in density results in less agricultural land consumed for greenfield development. Gross density affects future land reserves, the allocation of municipal resources. A study in Ontario, Canada found that New Urbanist projects had 76\% higher gross residential density than comparable conventional developments.\textsuperscript{34} In New Urbanist projects, higher density is achieved through some combination of smaller lot sizes, narrower roads, reductions in parking and taller buildings. New Urbanist developments still offer a high level of livability through the provision of public parks, plazas & other usable open space.

More compact development also provides the best solution to protecting valuable natural areas such as wetlands and open space. A smaller development footprint can minimize impervious surface area, which causes erosion and polluted stormwater runoff.

\textit{Diversity}

Land use diversity typically refers to development patterns that include a combination of office, retail, and residential uses in close proximity to one another. There is a high correlation between mixed land uses and higher transit use in many studies.\textsuperscript{35} Research on the effect of land use diversity on transit use is not as clear as density, which may be because land use diversity is more difficult to analyze. Land use diversity also reduces the distance between destinations which can lessen total trip length in any mode of travel. Land use diversity has been measured at several different scales, ranging from the jobs-housing balance on a census tract level to mixed-use development at a site level.

Different studies provide insight into different elements of land use diversity and their effects on transit use. One study measured diversity as the jobs-population balance and found that a balanced mix within the built environment can decrease vehicle miles


traveled.\textsuperscript{36} When land use mix at the census tract level was compared to transit use, the relationship was found to be relatively weak. However, land use mix was found to be more significant at a more detailed level at the origins and destinations, especially for work trips.\textsuperscript{37} The mixing of uses was found to reduce travel demand at employment destinations.\textsuperscript{38} Similar to findings about density, the impact of land use mix on transit use was found to be greater at employment destinations than at residential origins.\textsuperscript{39} Having a mix of uses in close proximity to employment destination is important because many people who use transit to commute may want to walk to lunch or to run errands. At higher densities, the addition of retail to a neighborhood was associated with greater transit use than in areas with similar density.\textsuperscript{40} Local land use mix has been found to be less statistically significant than residential densities\textsuperscript{41} or regional accessibility.\textsuperscript{42}

\textit{Macro vs. Micro Level Land Use Mix}

The highest standard for “mixed-use” is a densely populated neighborhood where jobs and services are within walking distance of residences. Understanding this relationship requires an analysis at a micro level of a \(\frac{1}{4}\) mile radius, which is a five-minute walk for a typical person. One study defined a truly mixed-use area as one in which the majority of residents can fulfill their weekly shopping needs within walking distance.\textsuperscript{43} Another study found a correlation between mixed-use neighborhoods and commuting by foot.\textsuperscript{44}

Transit oriented developments are typically designed at a micro-scale so that they are truly mixed-use. Although some master planned communities do have a mix of uses, they are often separated into individual development zones by major arterial streets and property lines, with pedestrians isolated from the street.\textsuperscript{45} These compare negatively to a transit oriented development, in which the mix of uses occurs within immediate proximity: on the same block, lot, or building. This represents a very fine grain of multiple uses. Housing and offices in transit oriented developments are often located above retail within a five minute walk (\(\frac{1}{4}\) mile) of a transit stop.


\textsuperscript{40} Reid Ewing and Robert Cervero, “Travel and the built environment – A synthesis.” \textit{Land Development and Public Involvement in Transportation} 1780 (2001): 87-114.


\textsuperscript{45} Peter Calthorpe. \textit{The Next American Metropolis}. (New York: Princeton Architectural Press, 1993), 42.
**Clustering**

Clustering is a means of increasing the diversity of land uses in a small area through the deliberate placement of buildings. Instead of different uses or different buildings separated at an even distance, structures are “clustered” together, which creates a common destination and makes them more accessible to pedestrians. Even in areas of low density, common destinations can be clustered together, such as in a village or town. This creates a transportation node in which multiple uses are accessed more quickly, allowing residents to complete multiple errands in one trip.

**Design**

Urban design concerns the arrangement, appearance, and function of cities, focusing on the public space located between buildings. Design of public space depends on a combination of several factors: site design considerations (building and parking lot locations, as well as street design elements), sidewalks, road widths, and crosswalks. Research on urban design is relatively new, with much of it conducted in the past five years. However, most research on design and transit focuses on walkable and accessible streets. Design is important because it shapes the quality of the walking environment and configuration of the street network, which can lengthen or shorten the distance between places. It also affects the functioning of the environmental network and ecological performance.

**Transit**

In studies of urban design, researchers Ewing and Cervero theorize that urban design is likely to have only a marginal impact on transit for primary trips – the trips taken to go to a specific destination (typically work trips). They note that urban design will have a more important impact on secondary trips, i.e. whether people feel compelled to walk or drive after they reach their destination. Robert Cervero has identified statistically significant transit supportive design features in some of his research. They include high numbers of four-way intersections, a limited quantity of on-street parking, and high levels of sidewalk provision. Because individual urban design features do not always prove statistically significant by themselves, effects on travel are likely to occur only with a composite of multiple variables.

Urban design factors also appear to have a greater effect on transit use when analyzed at a more detailed level. In an analysis for the Federal Highway Administration, Parsons Brinckerhoff looked at the impact of micro-scale design elements on travel behavior. The design elements they considered include sidewalks, pedestrian-oriented street systems with protected intersection crossings, buildings located relatively close to sidewalks, parking controls, and locations that foster or support walking and transit use.

---

These elements are typically found in environments built at a smaller, human scale and are associated with individual building sites.\textsuperscript{50} Transit facilities such as benches, shelters, and schedules make a positive contribution to the overall transit experience and add to the pedestrian environment.

\textit{Walkability}

Walkability refers to the quality of the walking environment, including the existence of sidewalks or paths and the degree of walking safety, comfort, and convenience. It also affects transit use since most transit trips begin and end with either a walking or biking trip. To be transit supportive, a place should have an easily accessible bus stop that is supported not just by sidewalks but also by the surrounding roadway, building, and parking designs.

To create transit supportive development, it is important to understand the primary areas likely to be used by transit riders. The area calculated identifies the primary walkable catchment of a transit stop. The primary area is defined as the space within $\frac{1}{4}$ of a mile, while the secondary area is that within $\frac{1}{2}$ of a mile.\textsuperscript{51} To encourage more transit use, it is important to focus on land use changes within half a mile of a transit stop, or conversely, to identify walkable areas that may be good locations for transit expansion. This $\frac{1}{2}$ mile standard is used not only for transit, but may also be applied to schools, parks and other uses where walking or bicycling may be a desirable means of travel.

\textit{Roadway Design}

Roadway design can have a significant impact on the degree to which an area is walking and transit friendly. A road with many lanes and wider lane widths takes longer to cross than one with fewer and narrower lanes. Traffic speed is also critical to walking and safety: at faster speeds a pedestrian is more likely to be seriously harmed if hit by an automobile, and the perception of safety is low.

The presence of trees and on-street parking are important characteristics of walkable streets because they buffer potentially dangerous traffic from the pedestrian realm and provide spatial definition to the public right-of-way.\textsuperscript{52} A study of Colonial Drive in Orlando over a five year period (1999-2003) compared two sections: a walkable section with sidewalks, trees, and on-street parking and a section with a 20-foot clear zone on either side of the road and the wider lane widths typically required by arterial engineering standards. The study found that the walkable street was much safer by every measure than the clear zone street. The walkable street had fewer auto accidents and zero

pedestrian or bicycle injuries. This contrasts with five pedestrian and bicycle injuries on the clear zone street, three of which were fatal.53

Elements such as marked crosswalks, pedestrian crossing signals, and curb bulb-outs at intersections can improve the pedestrian experience by making streets safer. Another form of speed control is the sense of enclosure created by some built environments, a narrowing measure that causes the driver to go more slowly.54 This sense of enclosure can also be created by a tree canopy over the street or by placing taller buildings close to the street.

**Building Design**

Building type and orientation are integral to transit-supportive development. Within a core pedestrian-oriented area, buildings should achieve a minimum transparency of 40 percent (made up of windows, glass doors, etc.) and setbacks of no more than 1 to 10 feet.55 This creates a sense of safety for the pedestrian by providing a set of “eyes on the street” as defined by urban writer and critic Jane Jacobs. Building orientation is also important: when buildings face the street, they are more accessible to pedestrians because there is a direct, well-defined connection to their destination.56

Higher densities are sometimes associated with less attractive building designs. Consequently, proponents of higher density environments argue that attractive building design can reduce opposition to denser residential areas. Higher densities can be provided along with some of the most appealing factors of urban or suburban areas - namely trees and human-scaled buildings. Human scale is defined as building designs that are two to four stories tall, are located close to the street, have a number of windows to create visual interest for the pedestrian, and have multiple entrances.57

Building design also plays an important role in the environmental performance of a development, which is discussed later in this section.

**Parking Design**

Parking design plays an important role in the development of environments that support transit. On-street parking is important for mixed-use areas because it buffers pedestrians from traffic and offers convenient short-term parking for customers. It also reduces the space needed for large parking lots. Parking lots located between the street and buildings create dead space and displace active land uses along the street, making the walking environment less hospitable and connections to buildings much longer. A walk from the

---

street through a large parking lot is often feels uninteresting and uninviting as this ‘dead space’ has little activity or visual interest. Placing buildings behind parking lots also makes the sidewalk environment less inviting to pedestrians because it reduces human interaction, natural surveillance, and shelter from sun and rain.\footnote{Reid Ewing and Robert Cervero, “Travel and the built environment – A synthesis.” \textit{Land Development and Public Involvement in Transportation} 1780 (2001): 87-114.}

Transit-supportive design includes human-scaled buildings located near the street, parking areas located behind buildings, and a clear pedestrian circulation system through any parking lot.\footnote{Carol Swenson and Fred Dock. \textit{Urban Design, Transportation, Environment and Urban Growth: Transit-Supportive Urban Design Impacts on Suburban Land Use and Transportation Planning}, (2003), 14.} The Urban Land Institute, a leading organization of real estate developers, also recognizes the importance of appropriate site design around transit. Their best practice standards note the optimal location for parking is a 5 minute walk from a transit stop with the building located next to the stop. Shared parking, structured parking, and parking behind buildings are all appropriate ways of accommodating automobiles near transit.\footnote{Robert Dunphy, et. al, “Ten Principles for Successful Development Around Transit.” \textit{Urban Land Institute}, (2003), 11.}

Minimizing parking offers many environmental benefits as well. Parking significantly adds to paved surfaces which increases runoff and adds to the urban heat island effect.

\textit{Connectivity}

Connectivity refers to the ease with which destinations may be reached because their locations are linked. This element is important because it can reduce the amount of walking necessary to get from one place to another. High levels of connectivity are typically the result of grid pattern networks that reduce the distance between two places.\footnote{Data Collection and Modeling Requirements for Assessing Transportation Impacts of Micro-Scale Design. \textit{Parsons Brinckerhoff Quade & Douglas, Inc.} (2000), 2-3.} In areas with high accessibility, residents have more options for walking, which may reduce the desire or need to drive for some trips.

Smaller block sizes also help provide connectivity, important to a pedestrian since it shortens the distance between one location and another. Hence, one guideline for suburban transit supportive development defines a maximum block length of 500 feet and maximum block size of seven acres to encourage transit use in a suburban environment.\footnote{Carol Swenson and Fred Dock. \textit{Urban Design, Transportation, Environment and Urban Growth: Transit-Supportive Urban Design Impacts on Suburban Land Use and Transportation Planning}, (2003), 39.} High connectivity increases pedestrian access to potential destinations and provides a choice of different paths to destinations.

The design factor of connectivity (created by the road pattern) and the destination factor of accessibility (referring to travel time to a place many people visit) are closely linked. Depending on how two sites are connected, access can be provided with a direct route or with a long, circuitous route. Naturally, a longer route results in less access.

\begin{thebibliography}{9}
\footnotesize
\end{thebibliography}
Environmental Design

New Urbanist developments often take a more sensitive approach to environmental design than conventional development. In *The Next American Metropolis*, New Urbanist architect Peter Calthorpe states that “major creeks, riparian habitat, slopes and other sensitive environmental features should be conserved as open space amenities and incorporated into the design of new neighborhoods.”63 He describes the opportunity to have natural features serve two roles as key amenities: resource protection and public access.

The environmental consideration shown in New Urbanist projects is evident in research. A study comparing the watershed protection techniques of New Urbanist and conventional developments found that the New Urbanist developments are more likely to protect and restore sensitive areas, reduce impervious cover and incorporate best management practices.64

Destinations

Evaluations of the built environment also show that destinations affect travel choice, in particular, transit choices. It is defined as accessibility to activity concentrations, expressed as the average travel time to all other destinations within the region. For example, a location within the regional core will ordinarily have a higher ‘destinations’ rating than a location on the fringe of the urban area because the central location offers greater accessibility to a higher percentage of the region’s employment.65

Accessibility to a job destination has been found to be a significant predictor of transit use along with good street connectivity at the employment destination.66 Employer incentives also play a role in the decision to use transit or to drive. A study in California found that when employees were offered free parking or subsidized auto commute costs, they were more likely to drive, but those who were offered flexible work hours and subsidized transit commute costs increased their transit use.67 A central destination can also improve the efficiency of transit service and reduce the total travel needed to reach that destination.

Smart Growth, New Urbanism and Equity Concerns

Public Health

Walkable neighborhoods correlate with improvements in public health, such as lower levels of obesity, heart disease and other conditions. In contrast, the more time a person spends in a car, the less healthy they are likely to be. Another added bonus of walkable neighborhoods is that there are typically fewer pedestrian-car accidents and injuries.

---

Affordable Housing

New Urbanism has a complicated relationship with affordable housing. The Charter of the New Urbanism states that “Affordable housing should be distributed throughout the region to match job opportunities and to avoid concentrations of poverty.” However, many New Urbanist developments do not have affordable housing and are often priced higher than homes with comparable square feet.

Smart Growth, despite advocating for housing for a range of incomes, can result in a loss of affordable housing and the poor being priced out of new high-density areas if land supply is limited and regulations do not allow for enough increased density to meet new housing demand. Similarly, New Urbanist developments are more expensive because they have more upfront costs in planning and design as well as higher quality infrastructure and public space, all of which contributes to home prices.

However, people will pay more for a home in a New Urbanist neighborhood. In a study that compared New Urbanist neighborhoods to conventional neighborhoods, homes in a New Urbanist neighborhood commanded a price premium.

Despite the challenge in offering stabilized prices, New Urbanism can provide benefits to affordable housing projects. A study of New Urbanist infill projects in Pittsburgh found that “subsidized New Urbanist projects can also enhance community efforts to promote housing integration and diversity, both unlikely when the market is the alternative to planning.” Quality design of affordable housing can make it more acceptable to neighbors of its proposed locations. New Urbanism is not a solution for community revitalization and affordable housing by itself, but when paired with other strategies, offers design ideas that can further community revitalization goals.

Smart Growth and New Urbanism Implementation Challenges & Opportunities

The two biggest obstacles to smart growth are regulatory and finance barriers. Advocates for smart growth have noted that these obstacles, along with federal policies that subsidize low density development, can prevent development that meets smart growth goals.

Regulatory Obstacles

Municipalities, through their zoning regulations, favor some types of development over others by determining what is allowable ‘by right.’ As Duany and Talen state, “Planning rigidly regulates out good (sustainable) urban form in its implementation devices – the separation and spatial scattering of land uses that is endemic to the vast majority of

---

zoning ordinances and subdivision regulations imposed throughout the U.S. City, county and state government entities can have considerable leverage in road, water, and sewer standards that can have significant impacts on all development projects. A municipality that proactively plans for smart growth may be more likely to have successful development projects than one that does not.

**Form-Based Codes**
Form-based codes offer an alternative to conventional use-based Euclidean zoning. Form codes typically regulate form first and use second. They allow buildings respond to changes in market demand in terms of use; however the codes ensure a higher quality pedestrian realm.

**Financing Challenges**
Financing New Urbanist projects is anticipated to be more difficult than conventional developments considering it uses newer, less proven design strategies. New Urbanist projects are often perceived as riskier than typical real estate development due to their multiple use nature. The high perceived risk requires higher rates of return which means that these projects need to generate cash flow quickly. Financing sources typically favor larger, more experienced developers for New Urbanist projects to reduce risk.

Project costs for New Urbanist projects are often higher since they have more upfront planning expenses. Government and neighborhood support of these projects is key when government agencies need to be a willing partner in changing regulations to allow for innovative design. Government financing may also be important to help cover the cost of more expensive infrastructure or parking decks that the project cannot support. When government support for a project may is uncertain, the risk, and thus the cost of the project are likely to increase.

**New Investments**
However, new investment pools are forming that will support Smart Growth and New Urbanism. In June 2006, three funds announced include Rose Smart Growth Investment Fund ($100 million), Green Living Fund ($100 million) and New Commons Fund ($50 million). The Green Living Fund is planning to use LEED-ND standards as the criteria for its initial location assessment. New Resource Bank has also launched a program to offer financial incentives for green building projects by providing a 1/8 percent discount on loans and higher loan-to-value ratios.

**Green Building**
The U.S. Green Building Council (USGBC) has created LEED – the Leadership in Energy and Environmental Design Green Building Rating System. It is a nationally

---


accepted standard for the design, construction and operation of high performance green buildings. LEED promotes a whole-building approach to sustainability by recognizing performance in five areas: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.76

Numerous other green building standards, such as Energy Star and Built Green, are proliferating throughout the country. Estimates consider there to be over 50 different programs throughout the country and range from national to regional certification programs.

The Costs and Benefits of Green Building
The benefits of green construction, according to a 2005 survey by Turner Construction, included the occupants’ health and well-being, building value, worker productivity, and return on investment. However, the obstacles to widespread use of green building practices are perceived higher costs, lack of awareness regarding the benefits, perceived complexity and cost of LEED documentation, short-term corporate budget horizons, long payback, difficulty quantifying the benefits and the more complex construction.77

There are numerous examples of the proliferation and advancement of green buildings. In the planning stages, One Bryant Park in downtown New York is aiming for zero net carbon emissions. It will be seeking the USGBC Platinum rating, the highest possible award. The costs to green building also appear to be going down. As Peter Smith of the New York State Energy Research and Development Authority notes, “Premium costs are going down as commissions and green products are becoming more standardized. Building green makes sense… it may cost an extra $3 to $5 per square foot to build green, but the total 20-year net benefit could be $50 to $65 per square foot.”78

In a study of 30 green schools, green schools were found to cost just under 2% more than conventional schools or about $3 per square foot but provide benefits that are about 20 times as large. The financial saving is about $70 per square foot which is 20 times the cost of building green. The school would accrue $12/sq ft of that total, attributed to lower energy and water costs, improved teacher retention and lowered health costs.79

Quantifying Sustainability

Triple Bottom Line Accounting
Triple Bottom Line accounting refers to business reporting on the financial, environmental and social returns and impacts of the firm’s investments. This approach reflects the long-term stability of an enterprise in terms of economic vitality, social relationships and environmental compliance and integrity.

However, one of the criticisms of triple bottom line accounting is that environmental and social goals are difficult to measure. LEED-ND can help with the measurability of environmental and social goals.

The LEED-ND Ratings
Despite significant interest in sustainable development, it has been difficult to measure and compare different developments on the same scale. Although the LEED-ND standards do not include all aspects of sustainable development, they offer the first certification standard to be offered on a wide level. LEED-ND is much stronger on the environmental side than the social aspects of sustainability.

The LEED-ND criteria have been formulated for the pilot program, which will be used to revise and refine these standards based on the program results. However, the following description of the criteria and three exemplary projects begin to translate the ideas of sustainability into the built form.
IV. LEED-ND RATING SYSTEM

Overview
The Pilot Version LEED for Neighborhood Development Rating System combines the principles of smart growth, new urbanism and green building. It is guided by the Smart Growth Network’s ten principles of smart growth, the Charter of the New Urbanism and other LEED rating systems.

As the LEED-ND pilot version rating system states, LEED for Neighborhood Development places emphasis on the design and construction elements that bring buildings together into a neighborhood, and relate the neighborhood to its larger region and landscape. The goal of LEED-ND is to have a similar effect as LEED-NC in encouraging developers to increase innovate in revitalizing urban areas, reducing land consumption, reducing automobile dependence, promoting pedestrian activity, improving air quality, decreasing polluted stormwater runoff and building more livable, sustainable communities for people of all income levels.

The LEED rating systems are voluntary, consensus-based, market-driven, grounded in accepted energy and environmental principles and strike a balance between established practices and emerging concepts. The LEED rating systems are developed by committees and maintained by the USGBC. The LEED rating systems usually have a few prerequisites and many credits. A project must meet the prerequisites for certification along with a minimum point total.

The rating system is designed to certify exemplary development projects that achieve smart growth, new urbanism and green building goals. LEED for Neighborhood Development’s aim is to improve land-use patterns, neighborhood design and technology.

A neighborhood development project may include a whole neighborhood, a fraction of a neighborhood or multiple neighborhoods. Small single use infill projects that complement existing uses should be able to earn certification along with larger mixed use developments. For the pilot program, there is not minimum or maximum project size and no strict definition on what comprises a neighborhood.

The LEED-ND pilot program will select up to 120 projects that will be analyzed to ensure that the rating system is practical and effective. Revisions to the program will be based on pilot program.

How the rating system works
Similar to other LEED rating systems, LEED-ND has a few prerequisites and many credits. To obtain certification, a project must meet each prerequisite. The credits add to the project’s score, which determines the level of certification: certified, silver, gold or platinum.

---

Projects may be various sizes, from whole neighborhoods, fractions of neighborhoods or multiple neighborhoods. Smaller infill projects that fit into existing neighborhoods can earn certification along with larger mixed-use developments. The pilot program does not have a minimum or maximum project size; projects must only be able to meet the prerequisites and the minimum number of credits.

**Certification Process**
LEED for Neighborhood Development certifies projects that have a longer completion period than a single building. The certification occurs in a three stage process that includes the following:

- **Stage One: Optional Pre-review.** This stage is available for projects before the entitlement process. For projects that meet receive pre-review approval, USGBC will offer a letter for stating that the project will meet LEED-ND standards if built as proposed. This letter is intended to help the developer in the entitlement process and with financial and occupant commitments.
- **Stage Two: Certification of an Approved Plan.** This stage is available after the project receives its entitlements and any other approvals necessary to build the project. Any changes from stage one would have to be reviewed and approved by USGBC before the issuance of a certificate and USGBC website listing stating that the approved plan is a LEED-ND Certified Plan.
- **Stage Three: Certification of a Completed Neighborhood Development.** This stage occurs when construction is complete or almost complete. Any changes to the approved plan would need to be submitted for review to USGBC before the issuance of a plaque for public display and USGBC website listing stating the completed neighborhood development is achieved.

**Categories**
The LEED-ND rating system includes three main categories:
- Smart Location & Linkage
- Neighborhood Pattern & Design
- Green Construction & Technology

**Smart Location & Linkage**
The Smart Location & Linkage Prerequisites are intended to locate development in or near areas with existing services and not in areas with valuable natural resources. In the prerequisites and credits, greenfield projects have to fulfill more stringent standards than infill projects. Given the specific nature of the measurements for each criterion, the devil is often in the details. Some common measurements include units per acre and FAR (floor area ratio). Street centerline density is a criteria used in several credits as a measure of urbanness.

**Prerequisites**
*(SLL Prerequisites 1-6)*
The first prerequisite, Smart Location, requires development projects to be infill, near transit, by a range of service uses or where people drive less than average. An infill site is defined as a site that has at least 75% of its perimeter bordering land that has been
previously developed and may or may not have been previously developed. The second prerequisite is for projects to be located where water and wastewater infrastructure already exists or is planned. The next three prerequisites are focused on retaining natural resources, including imperiled species and ecological communities; wetlands and water bodies; and agricultural land. The final prerequisite is for development to either avoid floodplain development or meet nationally recognized standards. These prerequisites are more lenient for infill areas as “urbanness” of the surrounding area increases.

Site Location & Brownfields
(SLL Credits 1-3)
LEED-ND encourages the use of infill sites to reduce sprawl. Greater points are awarded for these preferred locations with higher intensities of previous use (infill and previously developed, then infill and not previously developed, then adjacent to other development, then previously developed) and greater street network densities in the surrounding area. The preferred location credit has one of the highest point values, weighted to be one-third of the category Brownfield remediation and reuse can also earn points, with an extra point going toward areas targeted for redevelopment such as Federal Empowerment Zones or eligible for New Markets Tax Credits.

Reaching Destinations: Transportation Choices and Access
(SLL Credits 4-7)
Four credits are based on reducing vehicle travel and offering more transportation options. One is offered for reduced automobile dependence which can include the provision of higher transit service, less auto travel than average or vehicle sharing options. This reduced automobile dependence credit is the second highest credit, offering 8 out of 30 points in the category. Another credit is for bicycle networks in the project and region along with a significant amount of bicycle parking in the project. Housing and jobs proximity is intended to balance housing and employment while encouraging non-vehicle travel. A credit for school proximity near residences is intended to provide the option of walking to school.

Environmental Considerations
(SLL Credits 8-11)
The main environmental considerations in this category are the conservation, restoration and long-term management of habitat and wetlands and water bodies. It can be fulfilled by using native plants and conserving native wildlife, habitat, wetlands and water bodies. Another environmental consideration is the protection of steep slopes with grades over 15 percent.

Neighborhood Pattern & Design
The neighborhood pattern and design category focuses on the walkability of the neighborhood. It addresses not only the street conditions and walking environment but also the ability to reach a destination.

Prerequisites
(NPD Prerequisites 1-2)
There are only two prerequisites for Neighborhood Pattern & Design. The first is to provide an open community that is not gated and physically connected to other areas. The other is compact development, defined as a minimum of seven net units per acre and 0.50 FAR. Seven units per acre are considered to be the minimum density required to support transit, which is supported by previous studies.

**Compact & Walkable Places**  
*(NPD Credits 1, 2, 6-7)*

Creating compact and walkable places is one of the main objectives of this category. Compact development, a heavily weighted credit, offers points based on how high the FAR or dwelling units per acre total. The reduced parking footprint credit requires parking located to the sides or rear of buildings and a maximum percentage of the development footprint for parking.

The walkable streets credit, also heavily weighted, has standards for its base points, including buildings fronting on streets, a minimum 1:3 building height to street width ratio, continuous sidewalks and maximum street speeds. Other components of the credit include small building setbacks, windows fronting on streets, limited blank walls and street trees.

The diversity of uses credit requires a quarter of residents to live within a ½ mile walk of diverse uses, based on a list of 19 uses such as dry cleaner, drug store, restaurant and supermarket.

**Connectivity and Access**  
*(NPD Credits 8, 11-14)*

Providing greater access and connectivity is part of several credits and is closely integrated to other issues in this category. The street network credit is awarded for a high street centerline density in the project area. Access to surrounding vicinity is similar and is awarded for through-streets every 800 feet along the project boundary.

The access to public spaces credit specifies that a park must be located within 1/6 mile of residences and businesses. Different options to fulfill the access to active spaces credit include athletic facilities within a ½ mile or multi-use trails or public recreation centers within a ¼ mile walk of residences and businesses.

The universal accessibility credit encourages going beyond the American Disabilities Act to increase the number of accessible places to include residential homes.

**Diverse & Affordable Housing**  
*(NPD Credits 3-5)*

Diverse and affordable housing are intended to allow citizens from a range of age groups and economic levels to live in the same community. The credit for diversity of housing types can be fulfilled based on the size and type of house calculated according to a diversity index. Affordable housing has two credits, one for rental and another for for-
sale. These credits are based on percentages of housing that are affordable to households at different levels of area median income.

*Transit & Transportation*
*(NPD Credits 9-10)*

A credit for transit facilities can be fulfilled by providing shelters, route signs and schedule information for all stops. The transportation demand management credit offers options including a transportation demand management program, subsidized transit passes or transit service to other transit facilities or major destinations.

*Community Outreach*
*(NPD Credit 15)*

The community outreach and involvement credit encourages community participation through community meetings and establishing ongoing communication between the developer and the community.

*Local Food Production*
*(NPD Credits 16)*

The other unusual credit is local food production, which can be fulfilled by dedicating permanent growing space, purchasing shares in a local community agriculture program or locating the project near a farmer’s market.

*Green Construction & Technology*

The green construction and technology category borrows from the LEED for New Construction and LEED for Existing Buildings criteria. While incorporating the core elements of green building design, these standards also take into account a greater focus on green neighborhood infrastructure.

*Prerequisites*
*(GCT Prerequisite 1)*

The only prerequisite for this credit is construction activity pollution prevention which involves controlling soil erosion, waterway sedimentation and airborne dust. The rest of this category is similar to the LEED for New Construction and LEED for Existing building standards, but with a greater emphasis on the site level conditions.

*Building Efficiency & Reuse*
*(GCT Credits 1-5, 16)*

The credits for high performance buildings include LEED certified buildings, energy efficiency, water efficiency and building reuse. To receive the credit for LEED certified buildings, the project must have at least 20 percent of buildings certified, with more points for greater percentages. The building energy efficiency credit is awarded based on the percentage reduction from conventional performance. Residential homes need to meet the Energy Star guidelines for the energy efficiency credit.

For the reduced water use credit, the building must comply with percentage reductions in water use for commercial buildings or low-flow fixtures for residential buildings. The
outdoor portion of this credit can be achieved by using recycled water for irrigation or landscape that does not need irrigation. These credits are all weighted somewhat higher than the rest of the credits in this category. A similar credit exists for wastewater management that requires the reuse of 50 percent of wastewater.

The reuse of buildings falls into two credits. The first is for the reuse of one or two buildings if at least half of the structure is kept. The second credit is for the reuse of historic buildings that involves renovating a building on the National Register of Historic places or a local preservation ordinance.

**Sustainable Sites**  
*(GCT Credits 6-9)*

Minimizing site disturbance, reducing containments in brownfields and stormwater management are all site issues in this category. The two credits for minimizing site disturbance, one for site design and another for construction, do not apply to infill sites. For greenfield sites, the site design credit requires not developing an additional part of the land beyond the prerequisite level. For the construction credit in greenfields, it can be fulfilled by limiting site disturbance to the area only by the building perimeter or by preserving trees. For brownfield cleanup, an additional credit can be earned by using methods that treat the contaminated material instead of capping or moving the material.

Stormwater management has the heaviest weight of any credit in this category. Generally, the greater amount of stormwater infiltrated or reused on site, the greater the points awarded. Infill sites have less stringent standards than greenfield sites.

**Heat Islands & Solar Orientation**  
*(GCT Credits 10-11)*

Design with respect to solar considerations is also emphasized. The heat island reduction credit can be achieved either by a non-roof strategy that shades half of the impervious surface or a roof strategy of using a roof with a high solar reflective index for 75 percent of the total roof areas or green roofs for 50 percent of the roof area. For the solar orientation credit, either 75 percent of the blocks or 75 percent of the buildings need to have the east-west access as the longer access.

**Energy Generation**  
*(GCT Credits 12-14)*

Energy Generation is the focus of three credits. The first credit focuses on on-site energy generation, offering a point for having an on-site system that provides energy for at least 5 percent of the project. The second credit is for on-site renewable energy sources such as solar or wind that provide energy for 5 percent or more of the project. The third credit is for district heating and cooling that provides energy for at least 80 percent of the project and also is 10 percent more efficient than the standard.

**Infrastructure & Light Pollution**  
*(GCT Credits 15, 17, 20)*
The infrastructure energy efficiency credit can be fulfilled by a 15 percent energy reduction in street lights, water and wastewater pumps and treatment systems, along with the use of LED technology for street lights. The credit for recycled content in infrastructure is aimed at roads and focuses on the amount of recycled material in different types of pavement. The light pollution reduction credit tries to strike a balance between safety and reducing sky-glow, requiring an 80 percent reduction of lighting for exterior areas and a 50 percent reduction for building facades and landscapes.

**Waste Management**
*(GCT Credits 18-19)*
Waste management includes waste produced during construction and waste produced by the users of the project. The construction waste credit requires at least 50 percent of construction and demolition debris to be recycled. The comprehensive waste management credit can be fulfilled through two of three options such as hazardous waste removal; recycling paper, glass, plastics and metals; and including a compost station. This service can be performed for the residents and users of the project either by the local government or the developer.

**Innovation & Design Process**
The innovation and design process category has two credits. The first is for innovation and exemplary performance, which offers points for project elements that go above and beyond the LEED-ND standards. The second is for using a LEED Accredited Professional.

For a more thorough description of the LEED-ND criteria, see Appendix.
V. METHODOLOGY

Pilot Project Checklist Evaluation
This study uses the LEED for Neighborhood Development Pilot Project Checklist to compare the three development projects. The LEED-ND Pilot Project Checklist was developed for Pilot Program applicants. It requires the applicant to enter “Yes,” “No,” or “Maybe” for the prerequisites and the expected number of points earned for each of the credits.

In this analysis, the Pilot Project Checklist is completed for each project. The scores are based primarily on the master plans for each development. As the key guiding document for projects, master plans highlight the important goals and initiatives the project will fulfill and explain each project’s approach to many of the LEED-ND criteria. Additional information will be used to the master plan, including project websites, publications and interviews with city planners, private consultants and/or project developers.

Each project is rated to a likely minimum and maximum numbers of points for each credit. It reflects the ambiguity of some credits where there is high uncertainty over the project’s ability to achieve that credit. A description of each credit’s score is provided in the appendix which discusses the likelihood of points earned on a credit by credit basis. The minimum and maximum points added, then averaged for each category and the project overall.

The Innovation & Design Process category is not included as part of this analysis, primarily because the Innovation and Exemplary Performance category is not defined and does not offer standards for a basis on which to analyze a project.

Project Scores
The project scores are based on as much information that was able to be obtained in a short period of time. Given the change of projects over time and the complex nature of the actual LEED-ND calculations, it is anticipated that the estimated points in this analysis will differ from a final LEED-ND rating. The scores provided by this rating are not intended to be final scores and may differ from each applicant’s pilot project checklist. The scores provided here may not even be close to the final scores of each project.

Differences in scores between this evaluation and each applicant’s pilot project checklist may be due to additional information about the project known by the applicant but not available to be reviewed here. Interpretation of the LEED-ND criteria may also vary, given that explicit instructions on how to calculate each credit have not been developed yet.

The scores in this evaluation are intended more to serve as a basis for discussion. This analysis is intended to show the strengths and weaknesses of each project based on the LEED-ND criteria as well as using three projects to show how the LEED-ND system works in application. The broad level of analysis reflects the level of detail that is
currently occurring in the LEED-ND program with submissions for the Pilot Program due April 6, 2007.

All of the projects analyzed are infill projects and not greenfield projects. Given the preference shown by LEED-ND toward infill, it is anticipated that these projects may score higher than average according to the LEED-ND ratings.
VI. PROJECT EVALUATIONS

STAPLETON

Stapleton is a new neighborhood on a 4,700 acre site that used to be the Stapleton International Airport site. The Stapleton Development Plan is the guiding document for the transformation of the site over 30 to 40 years to a series of mixed-use communities. When complete, Stapleton will have about 30,000 residents and 35,000 workers and include over 12,000 homes, 3 million square feet of regional and town center retail and 10 million square feet of office, research and development and industrial space. It will also have over 1,100 acres of regional parks and open space. The Development Plan is based on the principles of sustainable development, emphasizing the integration of housing and recreation, a regional employment center, walkable communities and reduced consumption of resources.

The Development Plan was created through many participants, including the City and County of Denver, the Stapleton Redevelopment Foundation, professional consultants and the Citizen Advisory Board. The Development Plan has been formally approved by the Denver Planning Board and adopted as an amendment to the Denver Comprehensive Plan by the City Council.

The following analysis according to the LEED-ND standards is done in part based on the Stapleton Development Plan, also known as the “Green Book,” which was published in 1995; the Stapleton Sustainability Master Plan from 2003; and updated information from the project website and interviews.

Figure 6.1 Stapleton Land Use Plan. www.stapletondenver.com

---

81 Stapleton Sustainability Master Plan, page 4.
<table>
<thead>
<tr>
<th></th>
<th>Possible Points</th>
<th>Stapleton</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Smart Location &amp; Linkage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 1: Smart Location Required</td>
<td>Y Y</td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 2: Proximity to Water and Wastewater Infrastructure Required</td>
<td>Y Y</td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 3: Imperiled Species and Ecological Communities Required</td>
<td>Y Y</td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 4: Wetland and Water Body Conservation Required</td>
<td>Y Y</td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 5: Agricultural Land Conservation Required</td>
<td>Y Y</td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 6: Floodplain Avoidance Required</td>
<td>Y Y</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 1: Brownfields Redevelopment</td>
<td>2 2 2</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 2: High Priority Brownfields Redevelopment</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 3: Preferred Locations</td>
<td>10 7 7</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 4: Reduced Automobile Dependence</td>
<td>8 7 8</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 5: Bicycle Network</td>
<td>1 0 1</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 6: Housing and Jobs Proximity</td>
<td>3 0 0</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 7: School Proximity</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 8: Steep Slope Protection</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 9: Site Design for Habitat or Wetland Conservation</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 10: Restoration of Habitat or Wetlands</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 11: Conservation Management of Habitat or Wetlands</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>30 22 24</td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>23</td>
<td></td>
</tr>
<tr>
<td><strong>Neighborhood Pattern &amp; Design</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPD Prerequisite 1: Open Community Required</td>
<td>Y Y</td>
<td></td>
</tr>
<tr>
<td>NPD Prerequisite 2: Compact Development Required</td>
<td>N Y</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 1: Compact Development</td>
<td>7 0 3</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 2: Diversity of Uses</td>
<td>4 3 4</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 3: Diversity of Housing Types</td>
<td>3 3 3</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 4: Affordable Rental Housing</td>
<td>2 0 0</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 5: Affordable For-Sale Housing</td>
<td>2 1 1</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 6: Reduced Parking Footprint</td>
<td>2 0 0</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 7: Walkable Streets</td>
<td>8 0 0</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 8: Street Network</td>
<td>2 1 1</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 9: Transit Facilities</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 10: Transportation Demand Management</td>
<td>2 0 2</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 11: Access to Surrounding Vicinity</td>
<td>1 0 0</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 12: Access to Public Spaces</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 13: Access to Active Spaces</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 14: Universal Accessibility</td>
<td>1 0 0</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 15: Community Outreach and Involvement</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 16: Local Food Production</td>
<td>1 0 0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>39 11 18</td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td><strong>Green Construction &amp; Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GCT Prerequisite 1: Construction Activity Pollution Prevention Required</td>
<td>N Y</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 1: LEED Certified Green Buildings</td>
<td>3 2 3</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 2: Energy Efficiency in Buildings</td>
<td>3 2 3</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 3: Reduced Water Use</td>
<td>3 0 2</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 4: Building Reuse and Adaptive Reuse</td>
<td>2 2 2</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 5: Reuse of Historic Buildings</td>
<td>1 0 1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 6: Minimize Site Disturbance through Site Design</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 7: Minimize Site Disturbance during Construction</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 8: Contaminant Reduction in Brownfields Remediation</td>
<td>1 0 0</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 9: Stormwater Management</td>
<td>5 5 5</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 10: Heat Island Reduction</td>
<td>1 0 0</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 11: Solar Orientation</td>
<td>1 0 0</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 12: On-Site Energy Generation</td>
<td>1 0 0</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 13: On-Site Renewable Energy Sources</td>
<td>1 0 1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 14: District Heating &amp; Cooling</td>
<td>1 0 0</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 15: Infrastructure Energy Efficiency</td>
<td>1 0 1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 16: Wastewater Management</td>
<td>1 0 1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 17: Recycled Content in Infrastructure</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 18: Construction Waste Management</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 19: Comprehensive Waste Management</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 20: Light Pollution Reduction</td>
<td>1 0 1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31 16 25</td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>20.5</td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>100 49 67</td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total Average</strong></td>
<td>58</td>
<td></td>
</tr>
</tbody>
</table>
Smart Location & Linkage
Stapleton performs well in the Smart Location & Linkage category since it is an infill site, a remediated brownfield, offers transportation options including high transit service levels, and restores natural habitat areas. It misses points for the street network density in the surrounding area and for the housing and jobs proximity credit.

Prerequisites
(SLL Prerequisites 1-6)
Stapleton meets many of the prerequisites simply because it is an infill site. As an infill site, it is considered to be a “smart location” and has water and wastewater infrastructure in place. It also does not have significant ecological communities, wetlands and water bodies or prime agricultural land to preserve. There are some floodplains on site; however those areas have been planned as open space so new development does not have to worry about flood standards.

Site Location & Brownfields
(SLL Credits 1-3)
The Stapleton site is considered a preferred location since it is an infill site and is surrounded by a dense urban area. The Preferred Location credit is heavily weighted, with Stapleton receiving most of the credit for being an infill site and a small part for having a moderately high street network density surround the site. The street network grid density is much higher near the southern part of the site where there are existing residential neighborhoods but the industrial uses to the north have fewer streets which hurts the street density total. The former airport site is considered to be an important place to develop according to the LEED-ND standards because it is a remediated brownfield. One credit is achieved for the redevelopment of a brownfield and another credit for a high priority brownfield that has been designated as an area in need of redevelopment. In this case, Stapleton is in a Federal Enterprise Zone so it is considered to be high priority.

Reaching Destinations: Transportation Choices and Access
(SLL Credits 4-7)
Stapleton does relatively well with providing more transportation options. The reduced automobile dependence credit is met with the number of bus rides available from the Stapleton Transit Center. Currently, about 50 percent of the project is located a ¼ mile from the feeder bus line. Future transit plans include the relocation of the Transit Center to the planned rail station and additional feeder bus routes that will provide service within a ¼ mile of the residences and businesses.

The project has a significant amount of bike lanes and trails integrated into the project – enough to meet the first part of the bicycle network credit requiring half the homes to have a 3 mile lane or trail connection to diverse uses. However, there may not be enough bicycle parking spaces, which would have to total 15% of all automobile parking spaces. It seems unlikely that the retail centers that have large amounts of surface parking, Quebec Square and Northfield at Stapleton, would meet this standard.
The housing and jobs proximity credit is not one that Stapleton can meet. In order to fulfill this credit, the project either needs to be within a ½ mile walk distance of pre-project jobs that total half of the project’s residential units or be located near existing rail and have existing dwelling units within a ½ mile walk of half of the new jobs created. Considering the size of Stapleton, it is almost impossible for either half of the residences or half of the new jobs to be within a ½ mile walk of existing jobs and residences. If this credit took into account existing and future jobs and housing, Stapleton may be able to meet this credit since it includes a future employment center in an area with few jobs as well as a future rail station. However, despite the effort of Stapleton to meet the intent of this credit, it does not meet it as written.

It is anticipated that Stapleton will meet the credit for school proximity. The schools have been integrated into the community and are located around a ½ mile from most residences – likely close enough to earn this credit.

Environmental Considerations
(SLL Credits 8-11)
Stapleton is notable for its environmental consideration. Steep slope protection is not much of an issue for the project, since it is on relatively flat land which earns it a credit easily. Stapleton does a lot with conserving, restoring and managing habitat and wetlands. The project has little sensitive habitat and wetlands to conserve, although the little that remained was preserved. However, Stapleton features large areas of natural habitat restored back to its original High Plains landscape. Long-term management is provided by two non-profits, the Bluff Lake Nature Center and the Sand Creek Regional Greenway. The habitat and wetland plans are certainly sufficient to earn LEED-ND credits for them.

Neighborhood Pattern & Design
Stapleton has many walkable neighborhoods, with sidewalks along tree-lined streets, front porches on a wide variety of housing types and parks interspersed throughout the neighborhood. However, the project’s anomalies are its shopping centers, Quebec Square and Northfield Center, which have conventional big box retail that prevents the project from earning as many credits as it might have otherwise been able to.

Prerequisites
(NPD Prerequisites 1-2)
Stapleton certainly meets the
first prerequisite of an open community, since it is not gated. The second prerequisite, compact development, may be met although it is difficult to determine. The required minimum residential density is 7.0 units per acre, which Stapleton exceeds. The required non-residential density is 0.5 FAR. According to the information presented in the Green Book’s master plan, the FAR only totals 0.32 due to a large amount of low density commercial and industrial. However, as the project has evolved throughout time, the density of the commercial areas has grown. An FAR below 0.5 typically results in single story buildings with surface parking, which is not what is currently envisioned for the main office and biotech centers of Stapleton. It seems likely that the project would meet this prerequisite; however a more detailed analysis may be needed.

*Compact & Walkable Places*
*(Credits 1, 2, 6-7)*
Continuing the question of density as mentioned above, Stapleton may be able to earn points for compact development with density above the minimum but that is difficult to determine. Given the weight of this credit, it is one of the areas where Stapleton falls short in this category.

Even though the majority of Stapleton has walkable streets, it doesn’t meet the minimum criteria for the walkable streets credit. One of these criteria is that buildings must front a street, plaza or park. The retail parts of Stapleton, Quebec Square and Northfield at Stapleton, have big-box stores that front parking lots, which disqualifies the project from receiving this credit. Because of these two anomalies in the project, it is unable to earn on of the largest credits. These parking lots also disqualify Stapleton for the reduced parking credit since parking is placed in front of the building.

It is likely that Stapleton would meet the diversity of uses credit. Most of the residences and businesses are located within walking distance of a variety of uses. The East 29th Avenue Town Center has 9 of the 19 diverse uses listed in the LEED-ND standards and is integrated into the neighborhood.

*Connectivity and Access*
*(NPD Credits 8, 11-14)*
Stapleton does relatively well connecting to other areas and increasing access. For the street network credit, the street network density is 25 street miles per square mile, enough to earn the project part of the street network credit. Although Stapleton does connect to the Denver street grid in many areas, there are some connections over the 800 feet. That is the maximum allowed by LEED-ND, so Stapleton may not be able to receive the credit for access to surrounding vicinity.

Stapleton may be able to earn the access to public spaces and access to active spaces credits. Stapleton has numerous parks and active open spaces that have been integrated into the neighborhoods. Whether they would be enough be close enough to 90 percent of the residences and businesses – a 1/6 mile for the public space and a ½ mile for the active space, is difficult to determine given the large size of the project.
The universal accessibility credit is not likely to be achieved by Stapleton. Extra attention to making residences accessible according to ADA standards has not been included in any planning documents for Stapleton or included in any of the design standards provided to the homebuilders.

**Diverse & Affordable Housing**  
*(NPD Credits 3-5)*

Stapleton does offer a wide diversity of housing types and affordable housing. For the diversity of housing types credit, Stapleton has different types and sizes of housing in around 8 to 10 of the 16 possible categories. It is anticipated that the project will earn some points for this credit, but it will take a detailed analysis of what has been built to know the home sizes and types of the 3,000 units sold. Additionally, it is challenging to predict the mix of homes that will be built over the next 10-15 years since the product types will be chosen according to what will do well in the market when completed.

Stapleton also offers affordable rental and for-sale housing. Stapleton has committed to developing at least 15% of its rental housing for households earning 60% of area median income (AMI) or less and 5% earning 50% of AMI or less. However since the LEED-ND standards require either 30% of housing to be for households at 80% of AMI or 15% for households at 50% of AMI, Stapleton’s initiative doesn’t fall in line with either guideline to earn the credit. With for-sale affordable housing, Stapleton is offering 10% of the for-sale housing to be workforce housing for households of 80% of AMI or less. This does fulfill the LEED-ND credit, at least for one point.

**Transit & Transportation**  
*(NPD Credits 9-10)*

Stapleton does some innovation with transit and transportation demand management, but it is open to evaluation as to whether or not the initiatives will fulfill the LEED-ND standards. For the transit facilities credit, the RTD transfer center has the required facilities – benches, schedules and lights. However if other transit stops are counted, they might not all have these facilities which would prevent the project from receiving this credit. The transportation demand management program is on of the project’s initiatives that seem to change over time. Currently there is a shuttle that runs from the RTD transfer center to the Northfield Shopping Center, although it is planned to end. Another program may arise that might take its place to fulfill this credit which makes it difficult to draw firm conclusions.

**Community Outreach**  
*(NPD Credit 15)*

The Stapleton Green Book, the first main planning document for the project, was the result of over 100 community meeting and presentations. Considering the significant amount of public participation in the planning process that has continued through with public hearings and meetings throughout Stapleton’s build-out, it is anticipated that the project will earn this credit.

**Local Food Production**
Stapleton comes close to meeting the local food production credit. Although the project has a community farm, it is not large enough or dedicated to local food production to actually fulfill this credit. Stapleton does have a farmer’s market, another option for this credit. However it is only open for 4 months of the year, one less than the 5 months required by LEED-ND which falls shy of the credit requirements.

Green Construction & Technology
Measuring the amount of green construction is a challenge at Stapleton, considering that the project has evolved over time since the project began about five years ago. The homes started with Colorado’s Built Green standards and then switched to the more stringent Energy Star standards. The commercial buildings also evolved, with the first buildings in Quebec Square having little to no green construction, more green techniques added in with the construction of the 29th Avenue Town Center, and most recently the certification of the Northfield Shopping Center certified to the LEED-NC silver standard.

Since many of the credits require certain percentages of the project to meet different criteria, it is difficult to project the percentages since the number of units at build-out could change over time.

Prerequisites
(GCT Prerequisite 1)
The only prerequisite for the green construction category is construction activity pollution prevention. Considering this is part of the Built Green and Energy Star standards it may have been included in most of the homes. It may or may not have been included in the early commercial phases, which is difficult to determine.

Building Efficiency & Reuse
(GCT Credits 1-5, 16)
LEED-ND considers building standards that include LEED certified buildings, energy efficiency, reduced water use and building reuse. The percentage of LEED certified buildings will depend on future buildings and the feasibility of the LEED for Homes standard. Stapleton has moved toward using LEED for more buildings, with the Northfield Shopping Center recently certified to the LEED-NC silver standard. If Stapleton fulfills their current goal of using LEED for Homes for all new homes, it shouldn’t be a problem to achieve the targeted percentage to earn the LEED certified buildings credit.

The energy efficiency credit is likely to be achieved by Stapleton, which has implemented energy efficiency measure on all of its homes and commercial buildings. According to project estimates, the commercial buildings achieved 25 percent greater
energy efficiency than industry standards and the home have 30-50 percent energy savings.

The reduced water use credit is may also be earned by Stapleton, but it is less clear. The Built Green and Energy Star standards require some reduction of water use for the homes, as does the LEED certified buildings. However, a thorough evaluation of all buildings is needed to determine if the standard has been met. Similarly, if recycled water is all that is used for irrigation, the project may be able to earn the outdoor part of the credit; however that also needs more evaluation. A similar credit exists for wastewater management that requires the reuse of 50 percent of wastewater. Stapleton does not have plans in place for the reuse of that much wastewater, so it seems unlikely that the project will receive that credit.

Building reuse and reuse of historic buildings is much more straightforward. Stapleton has reused several of the former airport buildings and hangers for new businesses. One of the historic hangers, Hanger 61, is being sold to Colorado Preservation Inc., who intends to use historic tax credits to renovate the building. It is anticipated that Stapleton will earn the credits for both building reuse and historic building reuse.

Sustainable Sites
(GCT Credits 6-9)
Stapleton benefits from being an infill site in the credits for site minimizing site disturbance through site design and minimizing site disturbance during construction. As an infill site, it automatically receives both credits. As a brownfield, Stapleton is eligible for the contaminant reduction in brownfields remediation. However, since the project hauled some soils to a disposal facility instead of remediating them on-site, the project does not achieve this credit.

Stapleton makes significant strides with innovative stormwater management. The stormwater is managed through swales, channels, storage facilities and riparian corridors. Considering that all stormwater runs through this system, it is anticipated that the project will receive all points for this credit.

Heat Islands & Solar Orientation
(GCT Credits 10-11)
Solar considerations do not play much of a role in Stapleton. It does not make any provisions for heat island reduction through shading impervious surfaces or using roofing materials with a high solar reflective index. The project also does not take into account solar orientation, which orients buildings along the east-west axis.

Energy Generation
(GCT Credits 12-14)
Energy generation is just beginning to be incorporated into Stapleton. The project does not include regular on-site generation or district heating and cooling but it is increasing its on-site renewable energy sources. Stapleton will include a city-owned urban power
plant and has one homebuilder that is making solar panels standard on all new homes. These efforts have begun over the last year and if they continue, they may be able to fulfill the LEED-ND credit of generating 5 percent of the project’s energy.

Infrastructure & Light Pollution
(GCT Credits 15, 17, 20)
The infrastructure energy efficiency credit is partially fulfilled by Denver’s use of LED technology for all traffic lights. However, Stapleton does not currently have any plans for energy reduction for streetlights and water or wastewater pumps. Stapleton does have a large amount of recycled content in its infrastructure since a lot of the former airport runways were recycled into new streets so it is anticipated that the project will receive this credit.

The light pollution reduction credit tries to strike a balance between safety and reducing sky-glow, requiring an 80 percent reduction of lighting for exterior areas and a 50 percent reduction for building facades and landscapes. Stapleton is experimenting with light pollution reduction, so the project may be able to earn this credit if it continues to reduce light pollution in existing and future areas.

Waste Management
(GCT Credits 18-19)
Stapleton does address both construction waste and waste produced by future users. Its construction waste program recycles over 50% of construction waste, enough to earn the LEED-ND credit. Since the city of Denver provides free recycling service for paper, glass, plastic and cans as well as disposing of hazardous waste, Stapleton is eligible for the comprehensive waste management credit.
NOISETTE
The Noisette Community Master Plan provides a sustainable vision for the 3,000 acre historic center of North Charleston and includes 350 acres of the former Charleston Naval Base that will be redeveloped into a new community

This project arose from conversations about sustainable urban development between a North Charleston city council member, the mayor and the future developers. The developers had completed DeWees Island, an award winning project that has been recognized internationally for sustainable development. The City, Noisette co-founders and the design team worked on the project for three years from 1998 through 2001 when an official partnership between the City and the Noisette Company was formed.

The master plan describes the vision as one based on the triple bottom line – that sustainable cities must be equally responsive to social needs, environmental responsibility and economic vitality. Key foundations of the plan include socially durable communities, sustainable funding of cities, 21st century architecture, measurement and research of outcomes and integrated restoration.

The Noisette area was developed primarily after WWII with a suburban pattern of growth. The community suffers from disinvestment and few employment opportunities. The vision for the site offers to repair its urban fabric while creating new employment and more stable businesses.

The planning efforts de-emphasize the separation of uses, emphasize building form and public space and focus on connections within natural systems. The “transect” has been used as an organizing principle and form-based coding and performance zoning are used to implement the concepts.

---

82 Noisette Master Plan, page 1.2.
The Noisette project has just begun to move beyond the planning stages and will ultimately be developed over a long period of time. This project does well on the LEED-ND standards based on the master plan, but there is higher uncertainty of the project achieving all of the points anticipated since it has not had time to show a successful track record yet.
### Smart Location & Linkage

<table>
<thead>
<tr>
<th>Prerequisite/ Credit</th>
<th>Possible Points</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLL Prerequisite 1: Smart Location</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SLL Prerequisite 2: Proximity to Water and Wastewater Infrastructure</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SLL Prerequisite 3: Imperiled Species and Ecological Communities</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SLL Prerequisite 4: Wetland and Water Body Conservation</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SLL Prerequisite 5: Agricultural Land Conservation</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SLL Prerequisite 6: Floodplain Avoidance</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SLL Credit 1: Brownfields Redevelopment</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>SLL Credit 2: High Priority Brownfields Redevelopment</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SLL Credit 3: Preferred Locations</td>
<td>10</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>SLL Credit 4: Reduced Automobile Dependence</td>
<td>8</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>SLL Credit 5: Bicycle Network</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>SLL Credit 6: Housing and Jobs Proximity</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>SLL Credit 7: School Proximity</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SLL Credit 8: Steep Slope Protection</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SLL Credit 9: Site Design for Habitat or Wetland Conservation</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SLL Credit 10: Restoration of Habitat or Wetlands</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SLL Credit 11: Conservation Management of Habitat or Wetlands</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>30</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>17.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Neighborhood Pattern & Design

<table>
<thead>
<tr>
<th>Prerequisite/ Credit</th>
<th>Possible Points</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPD Prerequisite 1: Open Community</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>NPD Prerequisite 2: Compact Development</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>NPD Credit 1: Compact Development</td>
<td>7</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>NPD Credit 2: Diversity of Uses</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>NPD Credit 3: Diversity of Housing Types</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>NPD Credit 4: Affordable Rental Housing</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NPD Credit 5: Affordable For-Sale Housing</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NPD Credit 6: Reduced Parking Footprint</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>NPD Credit 7: Walkable Streets</td>
<td>8</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>NPD Credit 8: Street Network</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NPD Credit 9: Transit Facilities</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NPD Credit 10: Transportation Demand Management</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NPD Credit 11: Access to Surrounding Vicinity</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>NPD Credit 12: Access to Public Spaces</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NPD Credit 13: Access to Active Spaces</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NPD Credit 14: Universal Accessibility</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NPD Credit 15: Community Outreach and Involvement</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NPD Credit 16: Local Food Production</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>39</td>
<td>17</td>
<td>27</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Green Construction & Technology

<table>
<thead>
<tr>
<th>Prerequisite/ Credit</th>
<th>Possible Points</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCT Prerequisite 1: Construction Activity Pollution Prevention</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>GCT Credit 1: LEED Certified Green Buildings</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>GCT Credit 2: Energy Efficiency in Buildings</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>GCT Credit 3: Reduced Water Use</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>GCT Credit 4: Building Reuse and Adaptive Reuse</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>GCT Credit 5: Reuse of Historic Buildings</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 6: Minimize Site Disturbance though Site Design</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 7: Minimize Site Disturbance during Construction</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 8: Contaminant Reduction in Brownfields Remediation</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 9: Stormwater Management</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>GCT Credit 10: Heat Island Reduction</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 11: Solar Orientation</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 12: On-Site Energy Generation</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 13: On-Site Renewable Energy Sources</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 14: District Heating &amp; Cooling</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GCT Credit 15: Infrastructure Energy Efficiency</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GCT Credit 16: Wastewater Management</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 17: Recycled Content in Infrastructure</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 18: Construction Waste Management</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 19: Comprehensive Waste Management</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 20: Light Pollution Reduction</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31</td>
<td>19</td>
<td>27</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Grand Total

<table>
<thead>
<tr>
<th>Possible Points</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td>52</td>
</tr>
<tr>
<td><strong>Grand Total Average</strong></td>
<td>62.5</td>
<td></td>
</tr>
</tbody>
</table>
Smart Location & Linkage
For Noisette, the Smart Location and Linkage category is the most challenging. While the project does well since it is infill on a remediated brownfield, it does not have the transit and transportation options that the other two projects benefit enjoy.

Prerequisites
(SLL Prerequisites 1-6)
Noisette meets the smart location prerequisites. As an infill site, it is considered to be a smart location; it has water and wastewater infrastructure already in place and does not remove any agricultural land from service. Noisette has performed a comprehensive survey of the ecological setting, likely enough to meet the survey requirement for the imperiled species and ecological communities credit. Additionally, Noisette plans to preserve existing wetlands and water bodies as well as restoring wetland and water body areas and their surrounding buffers. These plans are in line with the wetland and water body conservation prerequisite and enough to fulfill this prerequisite. Some existing development in Noisette is in the floodplain; however any redevelopment in the City of North Charleston would have to follow National Floodplain Insurance Program standards – the same standard as LEED-ND.

Site Location & Brownfields
(SLL Credits 1-3)
Noisette, an infill site, is considered to be a preferred location. The area surrounding Noisette has a street network density of about 28 street miles per square mile for the Noisette planning area. Together as an infill site and with a moderately high street density, Noisette’s location helps it perform well in the preferred locations credit.

The former Naval Base at Noisette is a brownfield that was remediated by the Navy before they sold it to the Noisette Company. As a former brownfield, Noisette qualifies for the brownfields redevelopment credit. The project is also located in a Federal Empowerment Zone so it is also achieves the high priority brownfields credit.

Reaching Destinations: Transportation Choices and Access
(SLL Credits 4-7)
Noisette offers some alternative transportation options, but not many. North Charleston is one of the highest users of the CARTA regional bus system; however the service standards are still low with the average bus frequency of an hour or more. If the two lines serving the Noisette area are within a ¼ mile of half of the dwellings, the project may receive two points for the reduced automobile dependence credit. The master plan offers some options for transit initiatives such as bus system sharing between CARTA and schools; however it is not well developed enough to add to its points for this LEED-ND credit.

Noisette does propose an extensive network of multi-use trails and paths throughout the project that may be able connect to residences in businesses to a variety of uses. It is less
certain whether or not the project will provide enough bicycle parking needed to achieve the bicycle network credit.

The master plan for Noisette calls for a new housing and jobs to revitalize the community. Yet despite this plan for a reasonable balance between the two, the project is unable to earn the housing and jobs proximity credit. A pre-project look at Noisette reveals few jobs – and not enough within a ½ mile walk to total half of the future residences. The project also does not have existing rail transit, required for the other option to fulfill the jobs housing proximity credit. School proximity is a much easier credit to fulfill – it is anticipated that at least 50 percent of the residences are within a ½ mile walk of a school.

The greater success of Noisette with school proximity than in other areas that focus on reaching destinations reflects partially the history of the project area since schools were already in place while transit was not. However, it also highlights some of the more stringent standards of the LEED-ND where most of the intent was met, but the project doesn’t fulfill the standard as written.

Environmental Considerations
(SLL Credits 8-11)
The environmental considerations of Noisette are a strong and compelling part of the project. There has not been much of an emphasis placed on steep slope protection given the flat nature of the land, although the project is likely to earn the steep slope protection credit since it does not built on areas with high slopes. The habitat and wetland conservation and restoration plan is substantial, including the removal of invasive species and the replanting of native grasslands and forest as well as the improving the hydrologic functions of the site and providing appropriate buffers. It is anticipated to go beyond the requirements for both LEED-ND credits. Additionally, Noisette meets the criteria for the conservation management of habitat and wetlands credit through the establishment of a non-profit, the Michaux Conservancy & Land Trust, to oversee the conservation program.

Neighborhood Pattern & Design
Noisette does well with the neighborhood design efforts; however the successful implementation is important to achieve the goals of the planning process. Noisette does not do as well with affordable housing and transportation issues, but exhibits sensitivity with its design.

Prerequisites
(NPD Prerequisites 1-2)
The prerequisites for the neighborhood pattern and design are likely to be met. The project is not gated, thus meeting the open community requirement, and is planned to be sufficiently dense to meet the compact development requirement. The density analyzed is for the Naval Base redevelopment, which will be all new development. The master plan provides a guide for the ranges of density, most of which are above average for the minimum requirements of 7 units per acre and a 0.50 FAR.
**Compact & Walkable Places**  
*(Credits 1, 2, 6-7)*

The master plan for Noisette envisions a place that would be compact and walkable. The density of the transect plan for the Naval Yard is around 40 units per acre and about a 2.0-3.0 FAR, enough to earn part of the compact development credit. The transect plan also includes many of the same criteria as the walkable streets credit, including small setbacks or maximum setbacks, building entries facing the streets, continuous sidewalks and narrowing of streets. From the master plan alone, Noisette would likely meet the walkable streets credit, although it does not provide a lot of detail on how well the project will succeed in doing so over time. The parking placement is only mentioned briefly in the transect, specifying that the densest areas may have parking accesses from alleys, internal lots or parking garages while less dense areas may have parking with alley or frontage access. If frontage access is construed to mean that parking may be placed in front of buildings, then the project would not receive the walkable streets credit or the reduced parking footprint credit. However, if parking is placed to the side or rear of all buildings, the project would be eligible for both credits. To achieve the reduced parking footprint, the project also would have to have a minimal area used for parking along with a high amount of bicycle parking, which may or may not be met.

The plan also discusses the variety of commercial uses for the City Center, Storehouse and River Center North, which will be integrated in to the Navy Yard neighborhoods. It is anticipated that half of the residences will be within walking distance of the diverse uses listed; however the total award for the diversity of uses credit may vary.

**Connectivity and Access**  
*(NPD Credits 8, 11-14)*

The street network density of the plan is about 20 street miles per square mile, enough to achieve the credit. The access includes many small short blocks that provide good connectivity; however some longer blocks above 800 feet are shown in the Navy Yard plan. If the long blocks are bisected by additional streets, the project may be able to achieve the access to surrounding vicinity credit but that is difficult to determine since the plan is still subject to change.

Numerous public spaces and active spaces are provided in Noisette. The master plan makes provisions for public space that will likely be within 1/6 mile walk of most residences and businesses – sufficient for the access to public spaces credit. Similarly, it is likely that over half the buildings will be within a ¼ walk of a trail to earn the access to active spaces credit.

No mention is made of additional provisions to ensure that more of the residences will be ADA compliant, so the project seems unlikely to earn the Universal Accessibility credit.

**Diverse & Affordable Housing**  
*(NPD Credits 3-5)*
Noisette does plan for a many types of housing, but it does not set income restrictions on any of its units. The housing categories include single family, duplexes, rowhouses, apartments and live-work units. If enough of each is provided, it is likely to earn at least part of the diversity of housing types credit. Since the project does not plan to provide income-restricted housing that will be permanently affordable, does not receive either credit for affordable housing.

Transit & Transportation
(NPD Credits 9-10)
Transit and transportation are not the strong suit of the Noisette project. Transit facilities are not mentioned in the master plan and neither is transportation demand management. It is unlikely that the project will receive either credit.

Community Outreach
(NPD Credit 15)
There has been a lot of community outreach, including neighborhood meetings, presentations and community surveys. It is likely that this is enough to meet the community outreach and involvement credit.

Local Food Production
(NPD Credits 16)
The master plan does not mention local food production as part of the plan, so it seems unlikely that the project will achieve this credit.

Green Construction & Technology
Noisette is planning the widespread use of green building standards, by placing covenants and deed restrictions on the land that require any buildings to adhere to LEED standards or the Noisette Quality Home Performance Standards. This will help ensure that the project meets many of the green construction and technology standards.

Prerequisites
(GCT Prerequisite 1)
It is anticipated that Noisette will meet the construction activity pollution prevent prerequisite since it is required for all other LEED standards.

Building Efficiency & Reuse
(GCT Credits 1-5, 16)
The covenants will require that new buildings meet LEED standards, so it is anticipated that Noisette will have no problem earning the credit for LEED certified buildings. Also as a result of that, the project is highly likely to meet the energy efficiency and reduced water use credits for LEED-ND since they are similar to other LEED standards.

Noisette is also planning to reuse many of the historic buildings. Noisette has placed two districts, Charleston Navy Yard Officers’ Housing District and the Charleston Navy Yard Historic District, on the National Register of Historic Places. It is anticipated that the project can earn both the building reuse and reuse of historic building credits.

**Sustainable Sites**  
*(GCT Credits 6-9)*

Noisette does well with sustainable site efforts. Locating the project on an infill site automatically allows the project to meet the credits for minimizing site disturbance both through site design and during construction. It is unclear whether or not the project has fully cleaned the soil in the brownfield remediation process, which would help the project earn the contaminant reduction in brownfields credit.

Noisette plans for significant ecological restoration that will improve its stormwater system, improving the infiltration capacity to reduce flooding. The plan details future stormwater treatment trains – plantings of native vegetation that are adapted to wet and dry periods, and other BMPs such as raingardens, preservation and restoration of wetlands, and daylighting of streams. It is anticipated that the project will achieve most if not all of the stormwater management credit, since the future measures will hold down runoff significantly.

**Heat Islands & Solar Orientation**  
*(GCT Credits 10-11)*

Heat island reduction and solar orientation is not covered in the Noisette master plan. They may be included as the project moves toward more detailed design; however that has not been determined yet.

**Energy Generation**  
*(GCT Credits 12-14)*

Of the energy generation credits, the most likely one that Noisette may fulfill is the credit for on-site renewable energy. Renewable energy is an optional part of the LEED for New Construction standards and the Noisette Quality Home Performance Standards, so it is encouraged, but not required by the project. It may be included in a sufficient amount to fulfill the credit, although that decision is one that has probably not been made yet.

**Infrastructure & Light Pollution**  
*(GCT Credits 15, 17, 20)*

Green initiatives in infrastructure or in light pollution reduction do not seem to be considered in the project. These would include energy efficient street lights or water treatment systems; recycled concrete in roads or reduced outdoor lighting. This may
change over the life of the project, but it does not seem likely that Noisette will earn credits for them at this time.

*Waste Management*

*(GCT Credits 18-19)*

Noisette does have plans in place for construction and comprehensive waste management. The Noisette Company has started a construction waste recycling program for Oak Terrace Preserve, its first neighborhood. The storage and collection of recyclables is a prerequisite for LEED for New Construction and also mentioned in the Noisette Quality Home Performance Standards – the comprehensive waste standard for LEED-ND. It is anticipated that Noisette will meet both waste management credits.
BLOOMINGTON CENTRAL STATION

Bloomington Central Station is a transit-oriented development plan on a 43 acre site along the new Haiwatha light rail line. Located in Bloomington, Minnesota, Bloomington Central Station is the transit stop between the Minneapolis-St. Paul airport and the Mall of America.

This plan includes residential condominium, office and hotel uses with in 20 story towers with ground floor retail surrounding the transit stop. This plan was initiated by the developer, who had recently purchased the 43 acre office property at the request of its tenant, Health Partners. Shortly thereafter, the developer found out the light rail line would bisect their new property and decided the surface parking on site offered a new development opportunity. The Heath Partners office will remain, however all of its parking will be structured over time as the site is redeveloped. The City of Bloomington assisted the development team by writing new zoning provisions to make the project possible and by providing TIF financing to pay for the structured parking. The first phase of the project, the Reflections condominium tower, opened in 2006.

Figure 6.6 Bloomington Central Station master plan
www.bloomingtoncentralstation.com
### Table 6.3: Bloomington Central Station LEED-ND Estimated Score

<table>
<thead>
<tr>
<th>Category</th>
<th>Possible</th>
<th>BCS</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Smart Location &amp; Linkage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 1: Smart Location</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 2: Proximity to Water and Wastewater Infrastructure</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 3: Imperiled Species and Ecological Communities</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 4: Wetland and Water Body Conservation</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 5: Agricultural Land Conservation</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 6: Floodplain Avoidance</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 1: Brownfields Redevelopment</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 2: High Priority Brownfields Redevelopment</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 3: Preferred Locations</td>
<td>10</td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 4: Reduced Automobile Dependence</td>
<td>8</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 5: Bicycle Network</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 6: Housing and Jobs Proximity</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 7: School Proximity</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 8: Steep Slope Protection</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 9: Site Design for Habitat or Wetland Conservation</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 10: Restoration of Habitat or Wetlands</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>SLL Credit 11: Conservation Management of Habitat or Wetlands</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>30</td>
<td>16</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>16.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Neighborhood Pattern &amp; Design</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPD Prerequisite 1: Open Community</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>NPD Prerequisite 2: Compact Development</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 1: Compact Development</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 2: Diversity of Uses</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 3: Diversity of Housing Types</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 4: Affordable Rental Housing</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 5: Affordable For-Sale Housing</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 6: Reduced Parking Footprint</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 7: Walkable Streets</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 8: Street Network</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 9: Transit Facilities</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 10: Transportation Demand Management</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 11: Access to Surrounding Vicinity</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 12: Access to Public Spaces</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 13: Access to Active Spaces</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 14: Universal Accessibility</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 15: Community Outreach and Involvement</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NPD Credit 16: Local Food Production</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>39</td>
<td>17</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Green Construction &amp; Technology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GCT Prerequisite 1: Construction Activity Pollution Prevention</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 1: LEED Certified Green Buildings</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 2: Energy Efficiency in Buildings</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 3: Reduced Water Use</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 4: Building Reuse and Adaptive Reuse</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 5: Reuse of Historic Buildings</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 6: Minimize Site Disturbance though Site Design</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 7: Minimize Site Disturbance during Construction</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 8: Contaminant Reduction in Brownfields Remediation</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 9: Stormwater Management</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 10: Heat Island Reduction</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 11: Solar Orientation</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 12: On-Site Energy Generation</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 13: On-Site Renewable Energy Sources</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 14: District Heating &amp; Cooling</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 15: Infrastructure Energy Efficiency</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 16: Wastewater Management</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 17: Recycled Content in Infrastructure</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 18: Construction Waste Management</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 19: Comprehensive Waste Management</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GCT Credit 20: Light Pollution Reduction</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31</td>
<td>11</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>15.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>100</td>
<td>44</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total Average</strong></td>
<td>54</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Smart Location & Linkage
The best part of the BCS location is its location on the Hiawatha light rail line, providing access to other destinations. The project does offer some environmental benefits, but does not make extraordinary gains.

Prerequisites
(SLL Prerequisites 1-6)
BCS, a fully urbanized infill site, is considered to be a smart location. The project has water and wastewater infrastructure in place and it has no imperiled species, ecological communities, wetlands, water bodies or floodplains on site to protect. The site has not been in agricultural use for the last half a century, but as an infill site the project does not have to consider the loss of prime soil.

Site Location & Brownfields
(SLL Credits 1-3)
As an infill site, BCS meets the first part of the preferred locations credit. For the second part, based on the street network density of the surrounding area is around 12 street miles per square mile, just enough to help the credit total. The project is not located in a brownfield; therefore it cannot receive either of the brownfields credits.

Reaching Destinations: Transportation Choices and Access
(SLL Credits 4-7)
Transportation choice is one of the project’s strong areas. BCS is a transit oriented development centered around a light rail station. The line offers 154 rides per day, enough to earn half of the points for the reduced automobile dependence credit. The bicycle network has a lot of trails but they do not connect to commercial or civic uses which would be needed to earn the bicycle network credit. Additionally, that credit requires the bicycle parking to equal 15 percent of the automobile parking, which is unlikely considering that a significant amount of parking is provided for the office commuters.

BCS fulfills the housing and jobs proximity credit, but not in a way that seems reasonable. The project earns the credit for having jobs within a ½ mile walk that total at least half of the residential units. There are over 1000 residential units planned and the Mall of America, which is about a ½ mile walk from the project, employs over 11,000 people. However, given the poor walking conditions that surround the Mall, there are typically few pedestrians in the area. The project also has a rail station and future office and hotel employment; however the project is not located near any existing residences within walking distance. It is more likely that the jobs and housing balance would actually occur along the light rail line with BCS residents traveling to downtown Minneapolis and BCS employees arriving from the downtown and southeastern neighborhoods along the light rail line.
BCS is not located anywhere near a school although its housing mix of condominiums and townhomes is less likely to attract families with school age children. Nonetheless, the project does not receive a credit for school proximity.

Environmental Considerations
(SLL Credits 8-11)
At BCS, there is some consideration paid to environmental concerns, the project retains its urban character instead of being more restored to a natural state. The project does not have any steep slopes, therefore it receives a credit for not building on any steep slopes. The site does not have any wetlands or water bodies to conserve, so the only way for it to fulfill the site design for habitat or wetland conservation credit would be to use native plantings for 90% of the vegetation. This might be more native planting than the project is actually planning, so the project may or may not achieve this credit. However, the restoration of habitat and wetlands credit is much easier to earn since it only requires that the native plant restoration be greater than 10% of the development footprint. This threshold is relatively obtainable, so it is likely that the project will achieve this credit. So far there are no programs in place to ensure long-term management of the native habitat, although it is rather small and may not be worthwhile. However, that makes it unlikely that the project will receive the credit for conservation management of habitat and wetlands.

Neighborhood Pattern & Design
The BCS neighborhood is patterned more on a European community centered on a rail line than on a traditional American town. The core is very dense and walkable, however BCS does not have surroundings worth integrating into.

Prerequisites
(NPD Prerequisites 1-2)
BCS easily meets the prerequisites of an open community since the project is not gated and of compact development. The project is well over the minimum densities of 7 units per acre for residential and 0.5 FAR for commercial.

Compact & Walkable Places
(Credits 1, 2, 6-7)
The compact, walkable nature of the project itself is one of its successes. It has a residential density of 94 units per acre and a non-residential density of 2.0 FAR, so the project performs well on the compact development credit. Additionally, there is service retail planned for the commercial components of the project, so it is anticipated that the project will earn some points for the diversity of uses credit.

BCS may do well with the walkable streets credit – all buildings have entries that face a street or plaza, the tall height of the towers ensure at least a 1:3 building height to street width ratio, sidewalks are on all streets and the internal streets of the project are designed for low speeds. The project also has other design features of walkable streets - front facades near property lines, glass on non-residential space that are open at night, on street parking, street trees and retail on the ground floor of office. The project may not achieve
the reduced parking footprint though. There are several large parking garages for the project which may be over 20 percent of the total footprint. Additionally, it is not clear if the project would provide enough bicycle and carpool parking either.

Connectivity and Access
(NPD Credits 8, 11-14)
The street network density within the project seems to be just above 20 miles per square mile, enough to earn the street network credit. However if some of the roads shown on the plan are technically driveways, that would drop the street density to low to earn the credit. Through streets are located around the project boundary every 500-600 feet, under the maximum 800 feet allowed by the access to surrounding vicinity credit.

The project provides access to both public spaces and active spaces. The BCS central park, a “public space,” is located within 1/6 mile of all building entrances. The multi-use path runs through the project and connects to the trails along the Minnesota River Valley, an extensive network of trails. These elements fulfill the access to public space and access to active space credits.

Diverse & Affordable Housing
(NPD Credits 3-5)
BCS does not have much diversity in its housing stock, but it does have affordable housing. The types of units are primarily condominiums with some townhomes, most of which will be considered “large” units by LEED-ND – over 750 square feet and 1200 square feet, respectively. The project does not include any rental housing; therefore it does not receive the affordable rental housing credit. However, the project does have affordable for-sale housing, with a goal of 20 percent to be affordable to households at 80 percent of area median income. This is enough to earn the project all of the affordable for-sale housing credit.

Transit & Transportation
(NPD Credits 9-10)
The Haiwatha Light Rail stop is a well lit stop with benches and a partially enclosed shelter as well as a real time information display on the arrival time of the next train. Given the superior facilities, it is anticipated that the project will earn this credit. There are currently no plans for transportation demand management strategies.

Community Outreach
(NPD Credit 15)
As part of the approval process, the project had to go through a series of public hearing and meetings. Since there are no residential neighbors close to this project, there was less feedback than other projects might generate. It is anticipated that BCS could earn this credit.

Local Food Production
(NPD Credits 16)
There are no plans in plans at BCS for any local food production efforts, so it is unlikely that the project will fulfill this credit.

**Green Construction & Technology**

**Prerequisites**

*(GCT Prerequisite 1)*

The project is planning to use green building techniques, certifying buildings to LEED status. Considering that construction pollution prevention is also a prerequisite for LEED, it is anticipated that the project will achieve this prerequisite if it continues to meet LEED standards for all new buildings.

**Building Efficiency & Reuse**

*(GCT Credits 1-5, 16)*

BCS is anticipating LEED for all buildings, so the project’s building performance will hinge on that. It is anticipated that the project will receive points for the LEED certified buildings credit, since it will provide more than required. The project also incorporates energy efficiency in its first phase, the Reflections building, and is likely to continue doing so. Reflections does not reduce water use for the interior of the building due to the late start following LEED standards. If other buildings include water use reduction then the project may still be able to earn the LEED-ND credit for it. Similarly for wastewater management – if the rest of the project includes ways to reuse wastewater, the project may still be eligible for the wastewater management credit although it is not known yet.

There are no existing buildings on site to reuse, so the project is not eligible for the building reuse or reuse of historic buildings credits.

**Sustainable Sites**

*(GCT Credits 6-9)*

The project site heavily influences the project’s ability to achieve credits for sustainable sites. Since BCS is an infill site it does not disturb sensitive site areas, so it receives the credits for minimizing site disturbance through site design and during construction. The project is not located in a brownfield, as stated before, so it is not eligible for the contaminant reduction in brownfields remediation credit.

The project does do well with stormwater management techniques such as rain gardens, storm receptors and pond systems, which filter to the large pond in the southwest corridor.
before traveling into the Mississippi River. Considering the innovative strategies used, it is anticipated that the project will achieve most or all of the points for the stormwater management credit.

*Heat Islands & Solar Orientation*
*(GCT Credits 10-11)*

BCS does not address heat island reduction with highly reflective or green roofs; however these strategies may be included in future phases. Solar orientation is another thing not mentioned. Given that the site plan is already in place, it is not likely to be altered enough to meet the solar orientation credit.

*Energy Generation*
*(GCT Credits 12-14)*

The project is not currently considering any energy generation strategies that provide on-site and/or renewable energy or district heating and cooling. Renewable energy may still be possible to use in future phases; however district heating and cooling seems less viable since it not currently in the works.

*Infrastructure & Light Pollution*
*(GCT Credits 15, 17, 20)*

BCS has not considered greening its infrastructure by providing more energy efficient street lights or using recycled materials in road pavement. It also hasn’t considered light pollution reduction strategies either.

*Waste Management*
*(GCT Credits 18-19)*

Waste management has been incorporated into the project. The first phase Reflections tower recycled 75 percent of construction waste, above and beyond the LEED-ND construction waste management credit. Since comprehensive waste management is also a prerequisite for LEED for New Construction, it is anticipated that the project will meet that credit for LEED-ND.
VII. ANALYSIS AND CONCLUSIONS

Comparing Plans

Of these three developments, there is no development that is completely “greener” than another. Rather they exhibit different strengths and weaknesses. Each of these developments reflects the regional variation in terms of priorities and applicability of different LEED-ND criteria.

Estimated Project Scores

According the estimated scores of this analysis, Noisette has the highest estimated average score of 62.5, enough to earn the LEED-ND gold certification. Stapleton and BCS, with respective scores of 58 and 54 points, would fall in the LEED-ND silver category. It should be noted that Noisette has the most ambitious in its master plan; however it has the fewest of the realized and verifiable on the ground so the score is more subject to variability. Nonetheless, the project takes a very comprehensive approach to sustainable design that should be commended.

Since all of these projects are infill projects, it is anticipated that they can achieve a higher rating than projects on undeveloped sites. It is encouraging that these three projects have done well according to the LEED-ND criteria and can serve as role models to future development.

Stapleton

Stapleton is the largest project analyzed at over five square miles and a build out of over 30 years. Its transit system is one of the project’s highlights, with feeder bus lines that reach the transit center. The transit center will eventually move to the rail station when it is opened; however that is still a few years off. By using feeder bus lines and the transit center, Stapleton’s score is actually higher than BCS for the LEED-ND credit on reduced auto dependence that measures mostly transit.

Stapleton’s weak spot in its LEED-ND scores stems from its big box retail. By placing parking lots in front of buildings, it is disqualified from the walkable street credit which represents 8 potential points. Additionally, it also cannot receive the reduced parking footprint credit either.

The green standards at Stapleton have been an evolution over time. The developer has successfully increased its green building standards from Denver’s Built Green to Energy Star. The project had a lot of innovative stormwater management ideas from the development of the Green Book in 1995. However, the Sustainability Master Plan that came out in 2003 offers more sustainable solutions such as light pollution reduction pilot projects.

Noisette

The Noisette master plan has the most sensitive approach to environmentalism: it takes the restoration of natural habitats to a new level and has the most comprehensive
approach to incorporating green building practices. In some respects, its initiatives are similar to the Stapleton Sustainability Master Plan. In the Noisette plan, significant attention is paid to integrated green infrastructure and more environmentally sensitive buildings through LEED certification or Noisette’s own custom green home standards.

Noisette’s weakness is related to the lack of transit in the region. Typical of many southeastern communities, transit is not well supported or used. The project also relies on more market-based mechanisms for providing affordable housing which may not necessarily result in long-term affordability should the area prove to be overly successful. Noisette takes a more liaise-faire approach to affordable housing, differing from both Stapleton and BCS that have commitments to providing income-qualified affordable housing.

*Bloomington Central Station*

BCS is different than Stapleton or Noisette in that it has the highest density and it is the smallest project at 50 acres. The project is composed primarily of high-rise towers. Because of this higher density, it can be considered the most “compact” of the three projects. BCS, a TOD centered on a rail stop, is rather isolated from its surroundings that are suburban offices, hotels and the Mall of America. BCS has the smallest mix of housing; however it also is the smallest project as well.

The project is anticipating all LEED certified buildings similar to Noisette; however it may be more likely to change since it is not written into deed restrictions. BCS also has sustainable stormwater management and native plantings in the project, however it does not seem to go as far with sustainable stormwater systems as Stapleton or Noisette.
### Table 6.4: Total LEED-ND Estimated Scores

<table>
<thead>
<tr>
<th></th>
<th>Stapleton</th>
<th>Noisette</th>
<th>BCS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Possible Points</strong></td>
<td>Min</td>
<td>Max</td>
<td>Min</td>
</tr>
<tr>
<td><strong>Smart Location &amp; Linkage</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLL Prerequisite 1: Smart Location</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SLL Prerequisite 2: Proximity to Water and Wastewater Infrastructure</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SLL Prerequisite 3: Imperiled Species and Ecological Communities</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SLL Prerequisite 4: Wetland and Water Body Conservation</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SLL Prerequisite 5: Agricultural Land Conservation</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SLL Prerequisite 6: Floodplain Avoidance</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SLL Credit 1: Brownfields Redevelopment</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>SLL Credit 2: High Priority Brownfields Redevelopment</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SLL Credit 3: Preferred Locations</td>
<td>10</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>SLL Credit 4: Reduced Automobile Dependence</td>
<td>8</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>SLL Credit 5: Bicycle Network</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>SLL Credit 6: Housing and Jobs Proximity</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>SLL Credit 7: School Proximity</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SLL Credit 8: Steep Slope Protection</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SLL Credit 9: Site Design for Habitat or Wetland Conservation</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SLL Credit 10: Restoration of Habitat or Wetlands</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SLL Credit 11: Conservation Management of Habitat or Wetlands</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>30</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>23</td>
<td>17.5</td>
<td>16.5</td>
</tr>
<tr>
<td><strong>Neighborhood Pattern &amp; Design</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPD Prerequisite 1: Open Community</td>
<td>Required</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>NPD Prerequisite 2: Compact Development</td>
<td>Required</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>NPD Credit 1: Compact Development</td>
<td>7</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>NPD Credit 2: Diversity of Uses</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>NPD Credit 3: Diversity of Housing Types</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>NPD Credit 4: Affordable Rental Housing</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NPD Credit 5: Affordable For-Sale Housing</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NPD Credit 6: Reduced Parking Footprint</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NPD Credit 7: Walkable Streets</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NPD Credit 8: Street Network</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NPD Credit 9: Transit Facilities</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NPD Credit 10: Transportation Demand Management</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>NPD Credit 11: Access to Surrounding Vicinity</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NPD Credit 12: Access to Public Spaces</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NPD Credit 13: Access to Active Spaces</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NPD Credit 14: Universal Accessibility</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NPD Credit 15: Community Outreach and Involvement</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NPD Credit 16: Local Food Production</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>39</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>14.5</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td><strong>Green Construction &amp; Technology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GCT Prerequisite 1: Construction Activity Pollution Prevention</td>
<td>Required</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>GCT Credit 1: LEED Certified Green Buildings</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>GCT Credit 2: Energy Efficiency in Buildings</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>GCT Credit 3: Reduced Water Use</td>
<td>3</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>GCT Credit 4: Building Reuse and Adaptive Reuse</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>GCT Credit 5: Reuse of Historic Buildings</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 6: Minimize Site Disturbance though Site Design</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 7: Minimize Site Disturbance during Construction</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 8: Contaminant Reduction in Brownfields Remediation</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GCT Credit 9: Stormwater Management</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>GCT Credit 10: Heat Island Reduction</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GCT Credit 11: Solar Orientation</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GCT Credit 12: On-Site Energy Generation</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GCT Credit 13: On-Site Renewable Energy Sources</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 14: District Heating &amp; Cooling</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GCT Credit 15: Infrastructure Energy Efficiency</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 16: Wastewater Management</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 17: Recycled Content in Infrastructure</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 18: Construction Waste Management</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 19: Comprehensive Waste Management</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GCT Credit 20: Light Pollution Reduction</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>20.5</td>
<td>23</td>
<td>15.5</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>100</td>
<td>49</td>
<td>67</td>
</tr>
<tr>
<td><strong>Grand Total Average</strong></td>
<td>58</td>
<td>62.5</td>
<td>54</td>
</tr>
</tbody>
</table>
The Time Dimension

LEED-ND can be particularly hard to measure considering the long time frame of the projects. The projects evolve significantly over time, creating a moving target for measurement. For Stapleton, the implementation of different green building standards and other sustainability initiatives makes it difficult to measure over time. For some of the LEED-ND standards that require 90% of the buildings to meet certain energy reduction levels or other criteria, the compliance level of all buildings over time is a lot to add up over for 10,000 dwelling units over 20 years.

One of the challenges for Bloomington Central Station is that the decision to pursue LEED-NC for the Reflections tower occurred after condominium sales began. Since many of the design decision had already been made, they had to be revisited and green strategies had to be integrated into building partway through the initial design process. While this process goes against the advice of green building experts that recommend early integration of green building techniques, this was the first LEED certified project for all of the project team members. BCS will be able to incorporate more green strategies moving forward; however the learning curve made the first project more difficult.

Noisette is still in the early stages of its development. A comprehensive master plan has been prepared for the project, although it still does not answer all of the questions posed by LEED-ND. The plan may change over time and is subject to market conditions being willing and able to pay for space that meets the LEED-ND criteria.

The criterion for LEED-ND encompasses decisions that must be made over a long period of time during the development process. For projects that are in their very early stages, it will be much easier for them to comply since they will be able to tailor their projects to meet the standards. The fact that projects may develop to the LEED-ND standard makes it important to understand how the standards may influence future projects.

An additional consideration would be whether or not the projects could be broken up into several phases, so that each phase could receive a different LEED-ND rating. This may alleviate some of the measurement problems over time. It may improve the ratings of later phases if environmental criteria improve over time. Additionally, for a project such as Stapleton that has some elements (the shopping centers) that hurt its score, these areas could be dropped from the LEED-ND rated neighborhood. Whether or not that is a reasonable and worthy goal may be subject to future debate.

Measurement Challenges

Ultimately, it is the ability to measure a project to one standard that offers one of the greatest potential contributions of LEED-ND. Its static measures are also its weakness too. Some parts of the projects analyzed met the intention of the standard but not the specific criteria. One example of this is Stapleton’s affordable rental housing, which dedicates 20% of its rental housing as income restricted. But because it falls in between
the options to fulfill the affordable rental housing credit in LEED-ND, it doesn’t achieve either one.

The point systems also do not necessarily relate well to the actual impact of each standard. The site design for habitat or wetland conservation credit requires that 90% of the vegetation be native plants on previously developed sites while the local food production credit can be reached by provided a farmer’s market 5 months per year. Each credit is worth one point; however the net environmental impact per point may vary.

Future academic research is needed to understand the relative importance of the different standards within LEED-ND. As most of the research done to date only shows correlation, not causation, it would be beneficial to further understand causation. As a measurable standard, LEED-ND will be a boon to future planning research since it will offer a metric for comparison.

**Options for Modifications to the LEED-ND Standards**

It is recognized that this evaluation is done according to the LEED-ND Pilot Version Rating System which is intended to be revised. However, based on this initial evaluation, it is clear that some of the standards do not fully measure what they are trying to measure.

*Housing & Jobs Proximity Credit*

The complex wording of the Housing and Jobs Proximity Credit makes it difficult to meet even when the intent is fulfilled. The wording also does not necessarily reflect how places actually function. The low level of pre-project jobs in the area surrounding Stapleton and Noisette bar those projects from receiving the credit, even though both projects plan to add substantial amounts of new employment. In contrast, BCS is surrounded by jobs in place before the project; the project is less than a ½ mile from the Mall of America as well as many suburban offices and hotels. Those jobs are in unwalkable areas with roads over eight lanes wide and high volumes of fast moving traffic. It makes it highly unlikely that BCS residents would actually walk to any of these jobs; however the standards do not take walkability into account.

*Bicycle Parking*

Bicycle parking is included in two different standards. The second part of the Bicycle Network credit requires that bicycle parking spaces equal at least 15% of the automobile parking for all non-residential buildings and multi-family residential buildings. The third part of the Reduced Parking Footprint credit requires bicycle and carpool parking to equal at least 10% of the automobile parking for all non-residential buildings and multi-family residential buildings.

*Local Food Production*

The local food production credit has a farmer’s market option, which should be relatively easy for many projects to fulfill. However, the requirement of it being open for 5 months of the year may not be practical in northern climates where short growing seasons may limit to June through September.
Relating Back to Sustainability

LEED-ND is the first nationwide standard that measures the goals of sustainable development. LEED for Neighborhood Development presents a new bar for future development to achieve. While the standard is by no means perfect, it does provide a solid foundation that can be improved throughout the pilot program and over time. In the process of trying to meet the criteria for LEED-ND, developers and cities will have to ask themselves harder questions about how one project fits into the region. This process can encourage better planning at all levels through the identification of what works and what doesn’t work.

Its orientation primarily toward the environmental side of sustainability may actually be appropriate at this time. Given the current imperative of addressing global warming, LEED-ND can offer a way for carbon dioxide emissions to be reduced and our environmental footprint lessened. By capitalizing on the environmental imperative that is growing every day, LEED-ND is the right solution at the right time.

Although LEED-ND does not cover all criteria for sustainable development, it does provide the best measuring system at the neighborhood level for sustainable development to date. More research is needed to determine the relative impact of different credits and optimal ways to measure project components. Nevertheless, no matter where the exact environmental impact falls, LEED-ND offers an impetus to change behavior and standard practices.

As LEED-ND evolves over time, it will be important to consider the original criteria for sustainable development: achieving economic, environmental and social equity goals. This can be seen as a first step that will hopefully act as a catalyst for future development, development that is more responsible to the planet and the people that live on it.
VIII. WORKS CITED

Works Cited


64. USGBC. “Leadership in Energy and Environmental Design.” USGBC.


IX. APPENDIX

Smart Location & Linkage
The Smart Location & Linkage category addresses issues primarily related to site selection. It considers the context of the project with some points awarded for adjacent conditions. Many categories have less stringent standards for infill sites than greenfield sites, which prioritizes redevelopment over using new sites for development.

SLL Prerequisite 1: Smart Location
This requirement is intended to encourage development within or near existing communities or public transportation to reduce vehicle use and support walking. It can be fulfilled by locating the project on an infill site, or near transit service, by diverse uses or where vehicle miles traveled are lower than the metro area.

SLL Prerequisite 2: Proximity to Water and Wastewater Infrastructure
This requirement is intended to encourage development within or near existing communities to conserve resources required for the construction and maintenance of water and wastewater infrastructure. It can be fulfilled by locating the project in an area with existing or planning water and wastewater infrastructure.

SLL Prerequisite 3: Imperiled Species and Ecological Communities
This requirement is intended to protect imperial species and ecological communities by complying with an approved Habitat Conservation Plan or identifying and protecting the habitat of imperiled species or ecological communities.

SLL Prerequisite 4: Wetland and Water Body Conservation
This requirement is intended to conserve water quality, natural hydrology and habitat and preserve biodiversity through conservation of water bodies or wetlands. This can be achieved by locating in a site with no wetlands, riparian areas or water bodies within 100 feet. For a previously developed site with wetlands or water bodies in an area with high density, impacts may be compensated with on-site or off-site wetland restoration. Other sites may impact 5-15 percent, depending on local density, and compensate with wetland restoration.

SLL Prerequisite 5: Agricultural Land Conservation
This requirement is intended to protect prime and unique farmland and forest lands from development. It can be fulfilled by located the project in an area with a maximum of 25% prime soils or unique soils, or in an area designated for receiving transferred development rights or

SLL Prerequisite 6: Floodplain Avoidance
This requirement is intended to protect life and promote open space and habitat conservation while enhancing water quality. It can be fulfilled by not locating in a floodplain. Infill projects may develop in the floodplain if they follow National Flood Insurance Program, Federal Emergency Management Agency or state or local floodplain management entity standards.
SLL Credit 1: Brownfields Redevelopment
This credit is intended to encourage the reuse of land with environmental contamination to reduce pressure on undeveloped land. It can be fulfilled by locating the project on a site that is documented as contaminated by a Phase II Environmental Site Assessment or by a government agency and remediating the site contamination.

SLL Credit 2: High Priority Brownfields Redevelopment
This credit is intended to encourage the cleanup of contaminated brownfields in areas targeted for redevelopment by the Federal Empowerment Zone, Federal Enterprise Community, Federal Renewal Community, Communities with Official Recognition for Weed and Seed, and Qualified Low-Income Communities as defined by the New Markets Tax Credit program.

SLL Credit 3: Preferred Locations
This credit is intended to encourage development within existing communities to reduce environmental harm associated with sprawl and reduce development pressure beyond the limits of existing development. A range of 2-10 points are awarded, with higher amounts going toward sites with higher intensity of the prior use (classified as infill, previously developed and adjacent) along with higher street network densities in the mile radius around the project boundary.

SLL Credit 4: Reduced Automobile Dependence
This credit is intended to encourage development in areas that provide greater transportation choices or reduce vehicle use. It can be fulfilled by locating the project in areas that have higher transit service, where people drive less than the metro area or in an area with a vehicle sharing area.

SLL Credit 5: Bicycle Network
This credit is intended to promote bicycling and transportation efficiency and can be fulfilled by locating 50% or more of dwelling units and business entrances within 3 miles of diverse uses using a biking network plus providing bicycle parking equivalent to 15% of car parking capacity.

SLL Credit 6: Housing and Jobs Proximity
This credit is intended to encourage balanced communities with a diversity of uses and employment opportunities while reducing vehicle travel. It can be fulfilled with a 25% residential component that is located within a half mile walk of existing jobs that total at least half of the residential unit total. An alternate solution is if 25% of the project is non-residential on an infill site that is within a half mile of a rail stop and a half mile of dwelling units that are at equivalent to 50% of the new jobs created.

SLL Credit 7: School Proximity
This credit is intended to promote public health through physical activity by walking to school and can be completed by locating at least 50% of the project residences within ½ mile walk of a school.
SLL Credit 8: Steep Slope Protection
This credit is intended to minimize erosion to protect habitat and reduce stress on water systems by preserving steep slopes. It can be achieved by not disturbing portions of the site with slopes over 15% or by limiting development according to slope percentage.

SLL Credit 9: Site Design for Habitat or Wetland Conservation
This credit is intended to conserve native wildlife habitat, wetlands and water bodies. It can be fulfilled by protecting all significant habitat, using native plants for 90% of vegetation in infill sites or conserving 100% of water bodies and wetlands on site.

SLL Credit 10: Restoration of Habitat or Wetlands
This credit is intended to restore wildlife habitat and wetlands that have been harmed and can fulfilled by restoring native habitat or predevelopment water bodies and wetlands on-site equal to 10% of the development footprint.

SLL Credit 11: Conservation Management of Habitat or Wetlands
This credit is intended to conserve native wildlife habitat, wetlands and water bodies. It can be fulfilled by creating a 10 year management place for on-site native habitats or wetlands and water bodies.

Neighborhood Pattern & Design
The Neighborhood Pattern & Design category deals primarily with the project master plan. Conditions surrounding the project have a greater impact on projects under seven acres than they do on larger projects.

NPD Prerequisite 1: Open Community
This prerequisite is intended to promote communities that are physically connected to each other and foster communities and connectedness. It can be fulfilled by designating all streets and sidewalks as open for public use and not gated.

NPD Prerequisite 2: Compact Development
This prerequisite is intended to conserve land and promote livability, transportation efficiency and walkability. It is fulfilled by two criteria. The first is to build any residential components of the project to an average density of seven or more dwelling units per acre of buildable land. The second is to build any non-residential components of the project at an average density of 0.50 FAR or greater per acre of buildable land.

NPD Credit 1: Compact Development
This credit is intended to conserve land and promote livability, transportation efficiency and walkability. It can be fulfilled by increasing the density: a point is given for each increase in residential density by 10 dwelling units per acre and in non-residential density by 0.50 FAR.

NPD Credit 2: Diversity of Uses
This credit is intended to promote community livability, transportation efficiency and walkability. It can be fulfilled if at least 25% of the project is residential and at least 50% of those residents are within a ½ mile walk distance of two to ten diverse uses. The diverse uses must be accessed by pedestrian routes that do not include any crossings of streets that have speed limits above 25 miles per hour unless the crossings have vehicle traffic controls such as signals and stop signs with crosswalks. Greater points are given for higher numbers of diverse uses. The 19 diverse uses include the following: bank, child care facility, community/civic center, convenience store, hair care, hardware store, health club or outdoor recreation facility, laundry/dry cleaner, library, medical/dental office, pharmacy, place of worship, police/fire station, post office, restaurant, school, senior care facility, supermarket, and theater.

NPD Credit 3: Diversity of Housing Types
This credit is intended to enable citizens from a wide range of economic levels and age groups to live within a community. It can be fulfilled by including a variety of housing sizes and types in the project so that it scores at least 0.5 or higher on the Simpson Diversity Index. More points are given for higher scores.

NPD Credit 4: Affordable Rental Housing
This credit is intended to enable citizens from a wide range of economic levels and age groups to live within a community. It can be fulfilled by including a proportion of rental units priced for households earning below the area median income (AMI) for at least 15 years. One point is given for providing 15% of the total rental units for households up to 50% AMI or for 30% of total rental units for households up to 80% AMI. Two points are given for providing at least 15% of total rental units for households up to 50% AMI and another 15% for households up to 80% AMI.

NPD Credit 5: Affordable For-Sale Housing
This credit is intended to enable citizens from a wide range of economic levels and age groups to live within a community. One point is given for including at least 10% of for-sale housing priced for households at up to 80% of area median income (AMI) or 20% of for-sale housing priced for households up to 120% of AMI. Two points are given for including at least 10% of for-sale housing priced for households up to 80% AMI and an additional 10% of for-sale housing priced for households up to 120% of AMI.

NPD Credit 6: Reduced Parking Footprint
This credit is intended to increase the pedestrian orientation of projects and to minimize the adverse environmental effects of parking. It can be fulfilled by three criteria. One, all off-street parking must be located at the side or rear of buildings; two, no more than 20% of the total development footprint area shall be used for surface parking; and three, all non-residential buildings or multi-family building must have bicycle and carpool parking equivalent to 10% of total parking.

NPD Credit 7: Walkable Streets
This credit is intended to provide appealing and comfortable pedestrian street environments in order to promote pedestrian activity and public health. The base four
points can be earned by: (1) locating building entries on streets, parks or plazas; (2) designing at 30% of street frontages to a minimum building height to street width of 1:3 and 15% along streets bordering the project; (3) continuous sidewalks along both sides of the street; (4) residential streets designed to a maximum speed of 20 mph; and (5) non-residential streets designed to a maximum speed of 25 mph. Up to 4 additional points can be earned for some combination of the following: placing the front facades closer to the street, including entries every 75 feet, providing at least 33% transparent glass on commercial building facades, limiting blank walls along sidewalks to 50 feet, keeping storefront windows transparent, providing on-street parking on 70% of both sides of new streets, including street trees, placing residential units less than 2 feet from sidewalk level, including ground floor retail on at least 50% of office buildings, or providing shade over the sidewalk.

NPD Credit 8: Street Network
This credit is intended to encourage the design of projects that incorporate high levels of internal connectivity. For projects under 7 acres, it can be fulfilled by locating the project so that the average street network grid density within a ¼ mile from the center of the project is 20-29 (one point) or 30 or greater (2 points). For projects over 7 acres, points are awarded based only on the street grid internal to the project.

NPD Credit 9: Transit Facilities
This credit is intended to encourage transit use and reduce driving by creating safe and comfortable transit facilities. It can be fulfilled by providing covered and partially enclosed shelters for transit stops and providing kiosk or signs with route and schedule information.

NPD Credit 10: Transportation Demand Management
This credit is intended to reduce energy consumption and pollution from motor vehicles by encouraging the use of public transit. It can be fulfilled by three options. One, a transportation demand management program can be created to reduce weekday peak period trips by at least 20%; two, provide subsidized transit passes for a year to project employees and residents for the first three years of the project; or three, provide transit service to other transit facilities or major retail or employment destinations for at least two years.

NPD Credit 11: Access to Surrounding Vicinity
This credit is intended to provide safe and direct connections for pedestrians, bicyclists and drivers to local destinations and neighborhood centers. It can be fulfilled by designing the project so there is at least one through-street at the project boundary every 800 feet unless wetlands, rivers, topography, easements or highways prohibit a connection.

NPD Credit 12: Access to Public Spaces
This credit is intended to provide a variety of open spaces to encourage walking, physical activity and time spent outdoors. It can be fulfilled by locating or designing the project so a park, green plaza or square is within 1/6 mile walk of 90% of the dwelling units and
non-residential building entrances. Projects larger than 7 acres need to have an average park size of at least ½ acre.

NPD Credit 13: Access to Active Spaces
This credit is intended to provide a variety of open spaces close to work and home to encourage walking, physical activity and time spent outdoors. It can be fulfilled by three options: one, by locating or designing the project so an athletic open space facility is within 1/2 mile walk of 90% of the dwelling units and non-residential building entrances; two, by locating or designing at least 50% of buildings are located within 1/4 mile walk of a multi-use or bicycle trail; or three, by locating or designing the project so a public recreation center or gym is within 1/4 mile walk of 90% of the dwelling units and non-residential building entrances.

NPD Credit 14: Universal Accessibility
This credit is intended to increase the proportion of areas that are usable by people of diverse abilities. It can be fulfilled by designing 20% of each type of residential unit to comply with the accessible design provisions of the Fair Housing Amendments Act and Section 504 of the Rehabilitation Act and for common-use or recreation facilities, applying the accessible design provisions of the FHAA and the Rehabilitation Act to residential areas and applying the accessible design provisions of the American Disabilities Act to non-residential areas.

NPD Credit 15: Community Outreach and Involvement
This credit is intended to encourage community participation in the project design and planning. It can be fulfilled by meeting with neighbors and public officials during the pre-conceptual design phase, hosting an open community meeting during the conceptual design phase, modifying the project to reflect community input, working with the community to advertise public meetings, and establish a ongoing means for communication between the developer and the community.

NPD Credit 16: Local Food Production
This credit is intended to promote community-based and local food production to minimize the environmental impact of transporting food long distances and increasing direct access to fresh food. It can by fulfilled by one of three options. One, dedicate permanent growing space according in proportion to residential units. Two, purchase shares in a Community Supported Agriculture program located within 150 miles of the project site for at least 80% of the households for two years. Three, locate the project within ¼ mile of a farmer’s market.

Green Construction & Technology
The Green Construction & Technology category draws from other LEED green building standards to require the best of green building standards.

GCT Prerequisite 1: Construction Activity Pollution Prevention
This prerequisite is intended to reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust. It can be fulfilled by
creating and implementing an Erosion and Sedimentation Control Plan for all construction with the project.

GCT Credit 1: LEED Certified Green Buildings
This credit is intended to design and construct buildings with green building practices. One point is awarded for LEED certification of 20-30% of all new buildings, two points for 30-40% and three points for over 40%.

GCT Credit 2: Energy Efficiency in Buildings
This credit is intended to encourage energy efficient buildings to reduce air, water and land pollution and environmental impacts from energy production and consumption. Non-residential buildings and residential buildings over 3 stories can fulfill this credit by demonstrating 10-20% improvement in the building performance rating according to ASHRAE/IESNA standard; or comply with the ASHRAE Advanced Energy Design Guide for Small Office Building or Small Retail Buildings; or Comply with the Advanced Buildings Benchmark Version 1.1. Residential buildings can fulfill this credit by complying with or exceeding the Energy Star for Homes requirements.

GCT Credit 3: Reduced Water Use
This credit is intended to minimize water use in buildings and for irrigation to reduce the impact to natural water resources. For non-residential buildings and residential buildings over 3 stories, it can be fulfilled by using 20 or 30% less water than required for the Energy Policy Act baseline. For residential buildings, it can be fulfilled by using low-flow fixtures. For outdoor irrigation, a point is awarded for using only rainwater or recycled water for irrigation or using landscaping that does not require permanent irrigation.

GCT Credit 4: Building Reuse and Adaptive Reuse
This credit is intended to extend the life cycle of existing buildings, conserve resources, reduce waste and reduce environmental impacts of new buildings. It can be fulfilled by incorporating at least one or two buildings that maintains at least 50% of the existing building structure and envelope.

GCT Credit 5: Reuse of Historic Buildings
This credit is intended to encourage use of historic buildings and preserve their historic materials and character. It can be fulfilled by incorporating a building on the National Register of Historic Places or a local preservation ordinance and rehabilitating the building according to the Secretary of the Interior’s Standards for Rehabilitation or the local standards.

GCT Credit 6: Minimize Site Disturbance though Site Design
This credit is intended to preserve the existing tree canopy, native vegetation and pervious surfaces while encouraging high density, smart growth communities. It can be fulfilled by locating the development footprint in areas that are 100% previously developed or by not developing a proportion of the land that has not been previously developed beyond the prerequisite level.
GCT Credit 7: Minimize Site Disturbance during Construction
This credit is intended to conserve existing natural areas and protect trees to provide habitat and promote biodiversity. It can be fulfilled by one of the following: (1) locating the development footprint in areas that are 100% previously developed; (2) by limiting the site disturbance to 40 feet beyond the building perimeter, 10 feet for walkways and parking, 15 feet for roads, and 25 feet for permeable additions; or (3) preserving all Heritage or Champion Trees, 75% of 18” caliper trees, and 25% of 12” deciduous and 6” conifer trees.

GCT Credit 8: Contaminant Reduction in Brownfields Remediation
This credit is intended to encourage brownfields cleanup methods that reduce contaminant volume or toxicity. It can be fulfilled by using cleanup methods for 100% remediation that treat, reduce or eliminate the volume or toxicity of contaminated material on site; capping or translocation of contaminated material does not qualify.

GCT Credit 9: Stormwater Management
This credit is intended to reduce pollution and hydrologic instability from stormwater, prevent flooding and promote aquifer recharge. It can be fulfilled by implementing a comprehensive stormwater management plan that infiltrates, reuses or evapotranspirates runoff from 90% of the average annual rainfall or 1” of rainfall from a percentage of the project’s development footprint. More points are given for higher percentages of the development footprint: 15-75% for previously developed site and 20-100% for other sites.

GCT Credit 10: Heat Island Reduction
This credit is intended to reduce heat islands to minimize impact on microclimate and human and wildlife habitat. It can be fulfilled with non-roof or roof strategies. The non-roof option for 50% of impervious surface must include shade, paving materials with a high Solar Reflective Index, an open grid pavement system or covering 50% of parking space. The roof option must have a high Solar Reflective index for 75% of roof area or a green roof for 50% of roof area.

GCT Credit 11: Solar Orientation
This credit is intended to achieve energy efficiency by creating optimum conditions for passive and active solar strategies. Two options are available to fulfill this credit. The first option is to have at least 75% of blocks such that the east/west length of each block is at least as long as the north-south length of the block. The second option is to design and orient 75% or more of the project’s buildings so that the longer axis of the building (1.5 time the other) is along the east-west axis and includes only indoor space for humane occupancy.

GCT Credit 12: On-Site Energy Generation
This credit is intended to reduce air, water and land pollution from energy consumption and production by increasing the efficiency of power delivery. It can be fulfilled by either developing on-site energy generation systems with peak capacity of at least 5% of
the project’s electrical service load or systems with capacity of at least 5% of the project’s annual electrical and thermal energy consumption.

GCT Credit 13: On-Site Renewable Energy Sources
This credit is intended to encourage on-site renewable energy to reduce environmental and economic impacts from fossil fuel use. It can be fulfilled by either including a shared on-site renewable energy source (solar, wind, etc.) with peak generating capacity of at least 5% of the project’s electrical service load or by including a shared on-site renewable energy source with capacity of at least 5% of the project’s annual electrical and thermal energy consumption.

GCT Credit 14: District Heating & Cooling
This credit is intended to reduce air, water and land pollution from building energy consumption through energy efficient district technologies. It can be fulfilled by including a district heating or cooling system for 80% of project square footage or heating and cooling load. It must be 10% more efficient than ASHRAE 90.1 2004 Prescriptive Requirements.

GCT Credit 15: Infrastructure Energy Efficiency
This credit is intended to reduce air, water and land pollution from energy consumption. It can be fulfilled by using street lights, water and wastewater pumps and treatment systems to achieve 15% energy reduction beyond an estimated baseline energy use for this infrastructure. Any traffic lights must use LED technology.

GCT Credit 16: Wastewater Management
This credit is intended to reduce pollution from wastewater and encourage water reuse. It can be fulfilled by diverting at least 50% of the wastewater generated by the project and reusing the wastewater to replace potable water.

GCT Credit 17: Recycled Content in Infrastructure
This credit is intended to use recycled materials to reduce the environmental impact of extraction and processing of virgin materials. For roads, parking lots, sidewalks and curbs, this credit can be fulfilled by using 90% recycled materials for the aggregate base and 15% recycled materials for the asphalt base. Asphalt concrete must have at least 15% recycled asphalt pavement, 75% crumb rubber or 5% roofing shingles. Portland cement must have at least 25% recycled mineral admixtures and 10% reclaimed concrete material aggregate.

GCT Credit 18: Construction Waste Management
This credit is intended to divert construction and demolition debris from landfills, redirect recyclable resources to the manufacturing process and redirect reusable materials. It can be fulfilled by recycling at least 50% of non-hazardous construction and demolition debris and implementing a construction waste management plan.

GCT Credit 19: Comprehensive Waste Management
This credit is intended to reduce the waste disposed of in landfills and to promote proper disposal of office and household waste. It can be fulfilled by meeting two of the three requirements: (1) including a drop-off point for hazardous wastes (paint, oil, batteries, etc.) or locate the project where the local government provides this service; (2) including a recycling or reuse station for recycling paper, cardboard, glass, plastics and metals or locate the project where the local government provides this service; and (3) include a compost station for the collection and composting of food wastes or locate the project where the local government provides this service.

**GCT Credit 20: Light Pollution Reduction**
This credit is intended to minimize light trespass, reduce sky-glow, improve nighttime visibility through glare reduction and reduce development impact on nocturnal environments. It can be fulfilled by lighting only areas as required for safety and comfort and to not exceed 80% of lighting power densities for exterior areas and 50% for building facades and landscape as defined by ASHRAE Standard 90.1-2004 and stipulate continued adherence to these standards in any binding documents.

**Innovation & Design Process**
The fourth category, Innovation & Design Process, offers an opportunity for projects to receive points for creative ideas not in the LEED-ND standards.

**ID Credit 1: Innovation and Exemplary Performance**
The intent of this credit is to provide the opportunity to award points for exceptional performance above the LEED-ND Rating System and/or innovative performance not specifically addressed by LEED-ND. It can fulfilled by identifying the intent of the credit, the proposed requirement for compliance, the proposed submittals and the design approach and strategies used to meet the requirements.

**ID Credit 2: LEED Accredited Professional**
This credit is intended to support and encourage the planning and design integration and to streamline the application process. It can be fulfilled by including at least one principle design team member who is either a LEED Accredited Professional or credentialed with regard to smart growth or new urbanism.

**STAPLETON**

**Smart Location & Linkage**

**SLL Prerequisite 1: Smart Location**
Stapleton is a new neighborhood that is replacing the former Stapleton Airport. The surrounding area is fully developed; therefore Stapleton qualifies as an infill site.

**SLL Prerequisite 2: Proximity to Water and Wastewater Infrastructure**
As a previously developed site, the site would have some water and wastewater infrastructure in place or nearby. As a redevelopment priority for the City of Denver, the Stapleton Green Book lists the short and long term wastewater management strategy as a priority for additional study.\textsuperscript{83} It is anticipated that Stapleton would meet this prerequisite.

SLL Prerequisite 3: Imperiled Species and Ecological Communities
The likelihood of imperiled species or significant ecological communities at a former airport is low, therefore this prerequisite is achieved.

SLL Prerequisite 4: Wetland and Water Body Conservation
There are two main water bodies in Stapleton, Sand Creek and Westerly Creek. According to the Green Book, these creeks have been under concrete during the operation of the airport and will be returned to their natural state with redevelopment. Each of these will provide natural water quality enhancements such as ponds and wetlands for surface water drainage.\textsuperscript{84} Considering the amount of open space planned for the area surrounding the creeks, it is anticipated that Stapleton will fulfill this prerequisite.

SLL Prerequisite 5: Agricultural Land Conservation
There is no agricultural land within Stapleton. The project does fulfill option one of the Smart Location Prerequisite as an infill site, therefore it fulfills this prerequisite.

SLL Prerequisite 6: Floodplain Avoidance
The Green Book specifies that the open space system is designed to accommodate all of the site’s 100 year flood control requirements.\textsuperscript{85} According the City of Denver floodplain map, the only floodplain areas appear to correspond with the undeveloped areas along the greenway corridors in the plan.

SLL Credit 1: Brownfields Redevelopment
Stapleton is considered a brownfield since it is a former airport site. The City and County of Denver did the investigation and clean up of known contamination before selling the property for development. The primary types of contaminates include petroleum products, solvents, methane, nitrate and asbestos. The City contracted with companies that specialize in environmental clean up to investigate, clean up and test soil and groundwater so that the property may be suitable for residential development. Soil that does not meet cleanup standards has been removed, hauled to an offsite disposal facility and replaced with different soil.

SLL Credit 2: High Priority Brownfields Redevelopment
While not mentioned in the Green Book, other information on the City of Denver website reveals that Stapleton is also located in a Federal Enterprise Zone. Therefore it qualifies as a High Priority Brownfield Redevelopment.

\textsuperscript{83} Stapleton Green Book, Page 1-8
\textsuperscript{84} Stapleton Green Book, page 5-15.
\textsuperscript{85} Stapleton Green Book, page 5-11.
SLL Credit 3: Preferred Locations
The site would be considered to be the most preferable type of location: an infill site that is also a previously developed site. The second component of this credit is based on the street network grid density within a mile radius from the perimeter of the site boundary. This density is estimated to be around 15 street miles/square mile, which is enough to earn one point.

SLL Credit 4: Reduced Automobile Dependence
The Green Book calls for all portions of the site to be within five minutes walking distance (a quarter mile) of public transportation. Fixed rail service along the Smith Road corridor is planned as part of the FasTracks rail expansion.86

Currently, the Stapleton site has 820 weekday bus transit rides that occur within the project site or adjacent to the project boundary. While it appears that 50% of the dwellings and business entrances could be within ¼ mile of these transit rides, it is difficult to determine if that is the case without a very detailed plan and density analysis. Stapleton is planning on expanding feeder bus service when the Transit Center is relocated upon completion of the rail stop. It seems highly likely that at least 50% of the residents will be within the feeder lines that will connect to the transit center; therefore Stapleton is anticipated to receive 7 points for this credit.

A vehicle sharing program is mentioned in the master plan, but no record of a current program can be found on the Stapleton website that highlights similar initiatives in progress so it seems unlikely the project will receive this credit.

SLL Credit 5: Bicycle Network
The Green Book plan for the bicycle network in Stapleton calls for a comprehensive bicycle network, including off-street bikeways and on-street bike routes. It is anticipated that the plan requires enough bike lanes and trails and enough integration between uses so that 50% of dwelling units and business entrances are within 3 miles of the diverse use list using the biking network. The plan does mention bicycle parking, but does not specify the anticipated amount to be provided.87 Given the high amount of automobile parking in the retail areas of Stapleton, it may not provide enough bicycle parking (equal to 15% of car parking spaces) to satisfy this requirement. Stapleton may or may not fulfill this requirement; however if it falls short, more bike racks could be easily installed.

SLL Credit 6: Housing and Jobs Proximity
The Green Book master plan includes a mix of residential and commercial uses, with 935 acres for residential, 1,189 acres for commercial and 161 acres for institutional uses. It is expected to accommodate 25,468 residents and 31,138 employees. Due to the size of the project, it may be difficult for it to fulfill the LEED-ND criteria as written. The first option to fulfill this credit requires that the project must be within a ½ mile walk distance of pre-project jobs equal or greater than 50% of the project dwelling units. Considering Stapleton is planning to add over 10,000 dwelling units and the surrounding area is not

87 Stapleton Green Book, pages 5-31 and 5-25.
currently a major job center, it seems unlikely to fulfill this option. The second option requires existing fixed rail, which is not expected to be built in Stapleton until halfway through project completion. It also requires existing dwelling units to be within a half mile of 50% of jobs created by the project; however considering many of those jobs will be surrounded by new dwelling units, Stapleton can’t meet this part of the second option. While Stapleton fulfills the intent of the credit, the size of the project makes it difficult to fulfill the credit criteria as written.88

SLL Credit 7: School Proximity
The master plan recommends a strategic task force to develop an education and job training delivery model for Stapleton.89 The Stapleton Education Master Plan was created in 2001-2002 which identified future schools. These schools include Westerly Creek Elementary (K-5), Odyssey Charter School (K-8), William R. Roberts School (4-8), Denver School of Science and Technology (charter high school), and a new Stapleton High School. The current schools are located a ½ mile from most residences, so it is anticipated that the project will earn this credit.

SLL Credit 8: Steep Slope Protection
Stapleton is located in a relatively flat area and as a former airport site, had most slopes removed prior to that use. Steep slopes were not included in the Green Book, however given the topography of the site it is a relatively moot point.

SLL Credit 9: Site Design for Habitat or Wetland Conservation
Although Stapleton had water bodies and wetlands on the site after being used as an airport most of the historic vegetation has been eliminated.90 However, given the comprehensive plan for the restoration of water bodies, wetlands and surrounding areas, it is anticipated that it would meet the third option for this credit. The credit requires an assessment of how water bodies and wetlands on the site perform water quality maintenance, wildlife habitat protection and hydrologic function maintenance. These functions are going to be dramatically improved as a part of the redevelopment. In the master plan, long term management and funding is anticipated to be by city revenues generated by the development, potentially in partnership with other agencies and jurisdictions.91

SLL Credit 10: Restoration of Habitat or Wetlands
The open space system in Stapleton, comprising approximately 35% of the site, includes more than 1,600 acres of parks, trails, recreation facilities and natural areas. Prairie and riparian corridor restoration will increase the wildlife habitat, especially the 365 acre Prairie Park in the northern portion of the site. The open space system will also address stormwater management, water quality improvement, irrigation and other development

88 Stapleton Green Book, page 5-34.
89 Stapleton Green Book, page 5-72.
90 Stapleton Green Book, page 5-16.
91 Stapleton Green Book, page 5-12.
requirements. The reintroduction of original High Plains landscape will include indigenous vegetation and will provide a viable scale for wildlife.  

SLL Credit 11: Conservation Management of Habitat or Wetlands
The long-term management of the habitat, wetlands, and water bodies appears to have been taken into account over the course of this project’s development. Although a 10-year management plan may not have been included in the Green Book, long-term management is being provided by two non-profits that act as stewards over significant natural resources. These non-profits include the Bluff Lake Nature Center and the Sand Creek Regional Greenway.

Neighborhood Pattern & Design

NPD Prerequisite 1: Open Community
Stapleton is not a gated community and all streets and sidewalks are available for public use, therefore it meets the open community requirement.

NPD Prerequisite 2: Compact Development
According to the Green Book, Stapleton meets the first part of this standard: it has an average residential density of 11.4 dwelling units per acre, well above the 7.0 minimum. However, using a weighted average FAR of all non-residential development, the FAR is 0.32 which is below the required minimum of 0.5. This is likely due to substantial amounts of space set aside for low density business/office/retail/light manufacturing space (717 acres) and warehouse/light manufacturing space (387 acres), each of which has a FAR of 0.3. If only the medium and high density business areas were included in the LEED-ND application and the low density business, warehouse and cultural/institutional categories were omitted, the FAR would rise to 0.68.

As Stapleton has progressed, the vision for the office uses is of a higher intensity than originally proposed. Danno, a project manager at Calthorpe Associates which is one of Forest City’s planning consultants, described Stapleton’s current vision as a new “downtown” that is a real employment center. He thought the office development would likely be around 4-10 stories with structure parking – far above the single story office with surface parking that produces a 0.3 FAR. Danno also thought the Green Book may have included a lower FAR to reduce the number of proposed jobs and alleviate the community’s concern over traffic problems. Given this assessment of Stapleton’s future, it is likely that the project will have a density high enough to reach LEED-ND’s 0.5 FAR minimum.

NPD Credit 1: Compact Development
Based on the Green Book, Stapleton would not receive any points since the non-residential development has an FAR too low to qualify. However, if the non-residential density increases, the project may achieve this credit. Since the average residential

---

92 Stapleton Green Book, pages 5-6 and 5-12.
93 Stapleton website. www.stapletondenver.com
94 Stapleton Green Book, page 5-34.
density is 11.4 units per acre (also consistent with the project’s average 4,000 square foot lot size),\textsuperscript{95} and the retail areas are low density, Stapleton may be able to receive a few points for this credit; however it is difficult to predict.

NPD Credit 2: Diversity of Uses
The diverse uses at the East 29\textsuperscript{th} Avenue Town Center include banks, a convenience store, hair care, a health club, a dry cleaner, dentists, a pharmacy, restaurants and a supermarket, totaling 9 of the 19 listed. Considering the school is also located nearby, that brings the total up to ten. The 29\textsuperscript{th} Avenue Town Center serves the current residential neighborhood that radiates out approximately a mile. This is the first neighborhood completed; future neighborhoods will also have similar town center areas. Non-residential streets with speed limits above 25 miles an hour have traffic controls – typically stop signs internal to the project and stoplights along project boundary streets. If the East 29\textsuperscript{th} Avenue Town Center is typical of all project town centers, Stapleton may be able to earn 4 points for diversity of uses.

NPD Credit 3: Diversity of Housing Types
The master plan for Stapleton describes a land use plan that is flexible so that it may respond to the market conditions over the build out of the project. It anticipates 23% to be high density, 48% to be medium density and 28% to be low density housing. There is substantial variety to the housing built at Stapleton to date, with a wide range of styles, sizes and prices. Seven town home, condominium, loft and single-family products in Stapleton begin with less than 1,200 square feet while 19 products begin above 1,200 square feet. Two of the nine multi-family buildings have elevator access and one project has live-work units. While there is insufficient information to analyze the project with the Simpson Diversity index, it is anticipated that the project will earn anywhere from 1-3 points for this credit since it has housing in about 8-10 categories.

NPD Credit 4: Affordable Rental Housing
The Stapleton master plan mentions affordable housing, but does not specify precise quantities. In a 2001 agreement, Forest City committed to developing at least 20% of the rental housing in Stapleton as affordable rental housing. Affordable rental units are to be leased to households earning 60% or less of MFI. Of the affordable units, 25% are to be available to buyers earning 50% of MFI or less (5% of total rental units). As part of this agreement, the 4,000 housing units are to remain affordable for at least 30 years. Despite providing affordable rental housing, this does not qualify for the LEED-ND credit that requires 30% of rental housing for renters at 80% AMI or less or 15% for renters at 50% AMI or less.

NPD Credit 5: Affordable For-Sale Housing
Forest City committed to developing at least 10% of the for-sale housing in Stapleton as affordable workforce housing according to the 2001 agreement. Affordable workforce housing is considered to be for households earning 80% MFI or less. These 8,000 homes are enough to qualify for one point.

\textsuperscript{95} John Wolfe Interview.
NPD Credit 6: Reduced Parking Footprint
The master plan does not show much detail of site plans and parking placement. A few sketches suggest that surface parking will be present; however they appear to place most of the parking behind buildings. In the actual development of the project, surface parking has been placed between the street and the building.

Stapleton has big box retail in its regional retail center, Quebec Square and its lifestyle center, Northfield at Stapleton. Both of these have parking facilities in front of the building, thereby disqualifying Stapleton from this credit.

NPD Credit 7: Walkable Streets
In the master plan, there is significant amount attention paid to describing the walkable nature of the future development. While large portions of the development meet the criteria for LEED-ND, some of the big box retail buildings have their entrances facing on parking lots, therefore they don’t meet the first requirement that: “a principle function entry of each building has a front façade that faces a public space such as a street, square, park, paseo or plaza.” Therefore, no points can be earned for this credit.

NPD Credit 8: Street Network
The street network shown in the master plan continues the existing street grid in Denver throughout the site, interrupted for parks and open space surrounding the nature waterways.

The street centerline density of the project is about 25 street miles per square mile, based on the plan for the portion of the site south of Smith Road. This is enough to earn one of two points for street network grid density.

NPD Credit 9: Transit Facilities
The Stapleton master plan does not specify the types of transit facilities that will be included in the project. The current transit center is located at the old parking structure of the former airport, however there an improved transit center planned for the future. The current transit shelter has shelters with bus schedules, benches, lights and bike racks. If this is the only facility, it gets a point. If there are other facilities with fewer features it may not.

NPD Credit 10: Transportation Demand Management
Ideas for the transportation demand management system in Stapleton are highlighted in the master plan. These strategies include neighborhood and employer transit subsidies known as the Eco-Pass program, subsidies for transit and taxis for retail customers, shuttles to/from DIA and the transit station, and rideshare matching, among others.

Stapleton currently has its own Transportation Management Association website. It features a shuttle from the RTD Stapleton Transfer Center to Northfield Shopping Center that runs every 30 minutes until March 31, 2007. It also offers free carpool assistance, traffic, transit, bike maps and traffic forecasts. Stapleton may fulfill this credit if it continues the shuttle and offers transit passes or completes a TDM program.
NPD Credit 11: Access to Surrounding Vicinity
The location of Stapleton in an urban infill site, thus it enables the project to connect regularly to the street grid. The master plan shows the street grid of Denver extending into Stapleton where the project abuts existing neighborhoods. However, there are some connections that are greater than 800 feet so it is not anticipated to receive this credit.

NPD Credit 12: Access to Public Spaces
As described in the Green Book, there is a significant amount of public space within Stapleton. Of the areas that have been developed, park space has been integrated into most neighborhoods to complement the overall open space network. Whether or not this reaches the 90% total within a 1/6 mile would depend on a more complex calculation that takes into account the amount of space completed along with the exact locations of dwelling units, business entrances and public spaces. It is likely that Stapleton would fulfill this credit, but not guaranteed.

NPD Credit 13: Access to Active Spaces
Active open space facilities in the Stapleton Green Book include numerous acres of facilities that have an outdoor sports complex, golf courses and the agricultural center. Due to the integration of the active spaces into the neighborhood, it seems highly likely that Stapleton would fulfill this credit by providing active open space facilities within a ½ mile walk distance of 90% of the dwelling units and non-residential business entrances.

NPD Credit 14: Universal Accessibility
The Stapleton master plan does not cover universal accessibility and it is not certain it any extra accessible design provisions were incorporated into the project.

NPD Credit 15: Community Outreach and Involvement
The creation of the Stapleton Green Book was a result of a significant amount of community participation. During the preparation of the plan, more than 100 community presentation and meetings were held. Additional input was gained by four public workshops, collection of feedback on interim projects and additional presentations and hearings as part of the adoption process.

NPD Credit 16: Local Food Production
Stapleton has its own 23 acre community farm, “The Urban Farm,” that is dedicated to teach agricultural and environmental education. With a density of 11.4 units/acre, Stapleton needs to have 200 square feet per unit or 48.9 acres dedicated to local food production. It seems that the intent of the Urban Farm is not local food production and that it is not large enough to fulfill the credit.

Stapleton also has a Farmer’s Market once a week from mid-June through mid-October. Since it is only open 4 months of the year, it does not meet the LEED-ND requirement of 5 months. If the Farmer’s Market season were expanded by one month, the project would qualify for this credit.
Green Construction & Technology

GCT Prerequisite 1: Construction Activity Pollution Prevention
Construction activity pollution prevention is not mentioned in the Green Book and may or may not have been included as part of the project. The Built Green standards, used until 2006, include construction activity pollution prevention as an optional credit so it may have been done on the residential buildings. Given the increasing importance of green building at Stapleton, it is likely that this standard is being implemented frequently. Since this objective is for all buildings, it is difficult to determine if it was used for the early commercial phases necessary to comply with this prerequisite.

GCT Credit 1: LEED Certified Green Buildings
Certified green buildings were not mentioned in the Green Book; however the Built Green home standard used by Stapleton was introduced in 1995 – the same year as the master plan was written. LEED was not introduced until 2000, so it could not have been considered in the Green Book. LEED is mentioned in the 2003 Stapleton Sustainability Master Plan, as a future standard for residential and commercial construction.96

Northfield Stapleton, a lifestyle center, has just been certified as a Silver LEED-NC certification. When LEED for Homes is complete, Stapleton anticipates using it as to certify new construction. Stapleton may be able to build 40% of its total project to LEED certification considering the project is only about a quarter complete, however it hasn’t to date. It is anticipated that Stapleton will be able to achieve some points for this credit; however the total number is unclear.

GCT Credit 2: Energy Efficiency in Buildings
The Green Book calls for maximizing conservation and establishing energy performance standards.97 The Stapleton Sustainability Master Plan also specifies energy efficiency goals.

The energy efficiency of the commercial buildings can only be measured for Northfield Stapleton since it is a LEED certified project. The energy efficiency of previously constructed commercial buildings is unknown. However, according to the Sustainability Master Plan, in 2003 the commercial buildings achieved 25% greater energy efficiency that industry standards.98

The homes have been built to the Colorado Built Green standards and beginning in 2006, to Energy Star standards. Considering that the Built Green standards have a HERS score of 85 close to the Energy Star HERS score of 86, it is anticipated that the many of the homes certified as Colorado Built Green will be meet Energy Star Standards. Through these standards, Stapleton homes are estimated to provide 30-50% energy saving.99

---

96 Stapleton Sustainability Master Plan, pages 26 and 32.
98 Stapleton Sustainability Master Plan, page 49.
Considering Stapleton is less than half completed, the project is on track to meet this requirement if it continues to construct LEED certified space that totals 90% of the buildings.

GCT Credit 3: Reduced Water Use
The Green Book promotes the reduction of potable water use and the reuse of non-potable water and stormwater for irrigation, industrial and other non-human consumption needs.\textsuperscript{100} This considers the options for indoor and outdoor reductions in water use. The Built Green standards require some form of reduced water usage, however it is difficult to determine the extent that is was fulfilled. Additionally, the commercial buildings may or may not have reduced their water usage, so it is difficult to determine if 90% of the buildings would be able to meet water reduction criteria. While the trends toward water reduction look promising, it is still unclear if Stapleton would receive points.

The Sustainability Master Plan highlights the landscape guidelines that were created to use native materials and to also use recycled water for irrigation. If these are implemented on a broad scale as stated, Stapleton could receive a point for the Outdoor Option of this credit.

GCT Credit 4: Building Reuse and Adaptive Reuse
While the reuse of buildings is not covered in the Green Book, the Sustainability Master Plan highlights the reuse of the former airport buildings and hangers. They are currently used for Colorado Studios, the Bladium Sports Club of Denver, the Denver Police Training Academy and R.K. Mechanical, Inc.\textsuperscript{101} It is anticipated that Stapleton would likely earn two points for reuse of these buildings.

GCT Credit 5: Reuse of Historic Buildings
The Green Book calls for the reuse of the historic hangers located on site.\textsuperscript{102} One of the historic hangers, Hanger 61 is currently being sold to Colorado Preservation Inc., who intends to use historic tax credits in the renovation of the building.

GCT Credit 6: Minimize Site Disturbance though Site Design
This project is located in a previously developed site; therefore it receives a point for this credit.

GCT Credit 7: Minimize Site Disturbance during Construction
This project is located in a previously developed site; therefore it receives a point for this credit.

GCT Credit 8: Contaminant Reduction in Brownfields Remediation

\textsuperscript{100} Stapleton Green Book, page 5-31.  
\textsuperscript{101} Stapleton Sustainability Master Plan, page 37.  
\textsuperscript{102} Stapleton Green Book, page 5-46.
Although Stapleton did cleanup its brownfield site, it hauled soil away to a disposal facility and replaced it with different soil. Therefore it will not qualify for this credit that requires all soil be remediated and left in place instead of removed.

GCT Credit 9: Stormwater Management
The Green Book describes the comprehensive flood control and stormwater management system for Stapleton that will avoid piped collection systems and rely mostly on storage and management of water on site through swales, channels, storage facilities and a new riparian corridor north of I-70. Stormwater management will occur in the public realm to ensure ongoing maintenance, assist in natural irrigation of public spaces and provide greater development flexibility.\(^\text{103}\)

The stormwater system is one of Stapleton’s more prominent accomplishments. Low-lying areas are left as open space with swales, rain gardens and other natural landscapes that can remain dry for long periods of time yet still accommodate and filter rain water during a storm event. It is anticipated that Stapleton would receive all five points for this credit.

GCT Credit 10: Heat Island Reduction
Heat Island Reduction is not mentioned in the Green Book. Additionally, it is not included in the Built Green standards so it is unlikely that roofing materials have a high Solar Reflective Index or that 50% of the non-roof impervious surfaces with have shade or paving materials with a high Solar Reflective Index. Therefore, it is unlikely that the project would achieve this credit.

GCT Credit 11: Solar Orientation
The Stapleton site plan shows lots and buildings, a large proportion of which do not have a primary east-west orientation. Therefore, it is unlikely that the project could fulfill this credit.

GCT Credit 12: On-Site Energy Generation
In the Green Book, on-site energy generation is only mentioned in terms of renewable energy demonstration projects (as mentioned below). It seems unlikely that the project is including enough on-site energy generation initiatives that would fulfill this credit.

GCT Credit 13: On-Site Renewable Energy Sources
The Green Book lists renewable energy demonstration projects as one of the major recommendations.\(^\text{104}\) While it has not been included in the early years of the project, two recent developments may make Stapleton eligible for this credit. One is a city-owned urban solar power plant that was announced in February 2006 that will power 1,000 homes.\(^\text{105}\) The second is a March 2007 announcement by Harvard Communities, one of

\(^{103}\) Stapleton Green Book, pages 5-16 and 5-27.
\(^{104}\) Stapleton Green Book, page 5-30.
\(^{105}\) Denver Unveils RFP for 2 MW Solar Project. [www.renewableenergyaccess.com](http://www.renewableenergyaccess.com)
the homebuilders in Stapleton, stating it will make solar panels standard on all new homes. These solar panels will provide about 30% of homeowners’ electricity.106

These recent efforts may or may not be enough to fulfill this credit since it is difficult to determine if solar will increase enough to generate 5% of total project capacity and if the solar energy initiatives will ever be incorporated in to binding documents.

GCT Credit 14: District Heating & Cooling
The Green Book lists village-scale energy systems that support energy management goals as another recommendation.107 However, no evidence of district heating and cooling has been found with regards to Stapleton, so it seems unlikely to meet this credit.

GCT Credit 15: Infrastructure Energy Efficiency
Infrastructure Energy Efficiency is not mentioned in either the Green Book or the Sustainability Master Plan. It is unlikely that Stapleton would achieve this credit since not much has been done to reduce the energy of street lights, water or wastewater pumps. However, all traffic lights in Denver use LED technology which would contribute to this credit.

GCT Credit 16: Wastewater Management
The master plan considers reusing water from wastewater treatment facilities and contributing to water quality improvement.108 There is no information as to whether or not this moved forward, so it seems somewhat unlikely that Stapleton will receive this credit at this time.

GCT Credit 17: Recycled Content in Infrastructure
According to the Sustainability Master Plan, Stapleton has used a large amount of recycled concrete from the former airport runways for the project’s infrastructure.109 It is anticipated that the large quantity available to recycle would result in the project achieving this credit.

GCT Credit 18: Construction Waste Management
The Sustainability Master Plan states that a construction waste recycling program is in development that includes presorting waste and grinding “like” waste to reuse.110 If this program is successfully able to recycle over 50% of construction waste – enough to account for the waste prior to the implementation of the program – then it will fulfill this credit.

GCT Credit 19: Comprehensive Waste Management

109 Stapleton Sustainability Master Plan, page 37.
110 Stapleton Sustainability Master Plan, page 38.
The City of Denver provides free recycling services for paper, glass, plastic, and cans and also will pickup and dispose of hazardous waste. Given this initiative, Stapleton is eligible for this credit.

GCT Credit 20: Light Pollution Reduction
The Sustainability Master Plan addresses strategies to combat light pollution that maintains safety while eliminating light trespass. The first projects completed in 2003 reduced light at Quebec Square by 5-10%, King Scoopers by 50%, and East 29th Town Center by 30%. If Stapleton continues to reduce light pollution throughout the development, it is anticipated that it could receive this credit.

---

NOISETTE

Smart Location & Linkage

SLL Prerequisite 1: Smart Location
Noisette is located on an infill site; the master plan calls for infill and redevelopment throughout the site including a mixed-use urban center where the Naval Base used to be located. The project meets the first option of this prerequisite.

SLL Prerequisite 2: Proximity to Water and Wastewater Infrastructure
Noisette, as an already existing community, has wastewater and wastewater infrastructure in place, thereby meeting this prerequisite.

SLL Prerequisite 3: Imperiled Species and Ecological Communities
The master plan describes the early ecological conditions of the area and cites field surveys of the Noisette area. These surveys showed mostly degraded ecological settings that have been lost through agricultural use and development. The habitat survey by Noisette is the most comprehensive one completed thus far, which will likely fulfill this prerequisite.

SLL Prerequisite 4: Wetland and Water Body Conservation
The wetlands, riparian areas and water bodies in Noisette have been greatly degraded. However, the master plan does include significant amounts of ecological restoration. It appears that 100 foot buffers of these areas exist in most places. One example of the restoration work is a of 44 acres of tidal marsh that ill have a 300 foot riparian buffer along 2,200 feet of stream. It appears that Noisette is taking adequate steps to fulfill this prerequisite.

SLL Prerequisite 5: Agricultural Land Conservation
There is no significant agricultural land to preserve at Noisette. Because the project meets the first option of the Smart Location Prerequisite, this prerequisite is fulfilled.

SLL Prerequisite 6: Floodplain Avoidance
Since some of Noisette site is in the 100 year floodplain, as an infill site it can be developed if it follows the National Flood Insurance Program requirements and still meet this prerequisite. The Noisette land use plan shows floodplain areas as locations of developed property. National Floodplain Insurance Program standards are followed for any floodplain development in North Charleston, so it is anticipated that the project would fulfill this prerequisite.

SLL Credit 1: Brownfields Redevelopment
The master plan does not mention that the Naval Base was considered a brownfield. The former Naval Base was a brownfield, however the Navy remediated the site before conveying it the Noisette Company. The Navy conveyed the property with a warranty in the deed that if problems arise later, the Navy will still be responsible for those problems

112 Noisette Master Plan, page 3.6.
and take care of them as needed. Considering the site condition, it does qualify as a brownfield.\textsuperscript{113}

SLL Credit 2: High Priority Brownfields Redevelopment
Also not mentioned in the master plan, Noisette is located in a Federal Empowerment Zone, therefore it also qualifies as a high priority brownfield redevelopment.\textsuperscript{114}

SLL Credit 3: Preferred Locations
Noisette is located in an infill site that is also a previously developed site, thus receiving the first 6 points for this credit. The street centerline density in the mile surrounding the project is around 28 street miles per square mile for the Noisette planning area, enough to earn the project two additional points.

SLL Credit 4: Reduced Automobile Dependence
The master plan suggests adding passenger rail stations along Spruill Avenue if light rail becomes a reality for the region. It also acknowledges the challenges of transit service in the region. While the one of the North Charleston buses is the busiest in the CARTA system, the performance of the system is relatively low: the average frequency is one hour or more.\textsuperscript{115}

There are two lines that go further through or close to most of the site and four that end near the southern boundary of the site. If the two lines are considered, there are 30 transit rides per weekday. Whether or not these lines are enough to be within a ¼ mile of 50% of the dwellings and businesses is difficult to tell. The project may get two points for credit, but it would depend on a more detailed analysis of the project.

The second option for this credit, a comparison of VMT, may yield more points since North Charleston has an average lower income than the region and may be less likely to drive on average. However, if the neighborhood gains more affluence without significant improvements to the regional transit service, the VMT may increase.

SLL Credit 5: Bicycle Network
The Noisette master plan proposes extensive multi-use trails and paths throughout the community.\textsuperscript{116} Given the diverse mix of uses in the area, it is likely that half of the dwelling units or businesses are within 3 or more miles of four or more diverse uses. However, the plan does not specify the amount of bicycle parking on site and may not be able to fulfill that part of the credit.

SLL Credit 6: Housing and Jobs Proximity
Noisette plans for a reasonable housing-jobs balance, however it is relatively unlike to fulfill this credit. The master plan calls for both new housing and jobs to revitalize the community. However, given the characterization of the area as one with few

\textsuperscript{113} Andy Gowder interview.
\textsuperscript{114} Andy Gowder interview.
\textsuperscript{115} Noisette Master Plan, pages 4.15-4.19.
\textsuperscript{116} Noisette Master Plan, page 4.21.
employment opportunities, it seems it would be unlikely that the project would be within a ½ mile walk distance of pre-project jobs, considering it would require those jobs to total half of the new dwelling units. Therefore, Noisette couldn’t fulfill the first option for this credit and would not be able to meet the second option since it does not have rail transit in place.

SLL Credit 7: School Proximity
The master plan promotes schools as centers of the community. It envisions multiple ways that schools could enhance community life, such as adult education, employment training, movie screenings or local theater. While the facilities are in need of maintenance, the locations are disbursed within the community. Considering the school locations, more than 50% of the residences are located within a quarter mile radius of a school, so it is very likely that at least 50% of the residences are within a ½ mile walking distance of a school. Thus this project should meet this credit.

SLL Credit 8: Steep Slope Protection
The master plan recommends the use of green infrastructure as a way to protect heavily sloped areas from soil erosion. However, the land is relatively flat, so steep slopes are likely to be a minor issue for this project and allow it to fulfill this credit.

SLL Credit 9: Site Design for Habitat or Wetland Conservation
Noisette fulfills the criteria for site with wetlands and water bodies, by designing the site to conserve all of the water bodies and wetlands on site. The master plan includes a site assessment that details the poor water quality, the lack of wildlife habitat and challenges to the hydrologic functions of the site. The plan identifies opportunities for restoring much of the original native landscape with appropriate buffers. It also highlights plans for permanent conservation through the creation of the Noisette Preserve, an ecological preserve and eco-tourism area that is subject to a conservation easement. This more than fulfills the criteria for this credit.

SLL Credit 10: Restoration of Habitat or Wetlands
Along with the water and wetland restoration as mentioned above, Noisette is removing exotic species from the forests and salt marshes and replanting native grasslands and reforestation. The criteria for this credit are anticipated to be fulfilled through the planned restoration work.

SLL Credit 11: Conservation Management of Habitat or Wetlands
The master plan for managing and restoring the Noisette Preserve will be developed that considers long-term strategies for the preserve. The Noisette Company has initiated a non-profit, the Michaux Conservancy & Land Trust, to oversee the conservation program including endowment funds, conservation easements, deed restrictions, restrictive

---

117 Noisette Master Plan, page 5.32.
118 Noisette Master Plan, page 4.3.
119 Noisette Master Plan, pages 3.3-3.6.
120 Noisette Master Plan, page 3.5.
covenants, drainage easements and buffer easements.\textsuperscript{121} It is anticipated that the establishment of this non-profit will fulfill this credit.

**Neighborhood Pattern & Design**

NPD Prerequisite 1: Open Community
Noisette is an infill community that is available for general public use and is not gated, thereby meeting this prerequisite.

NPD Prerequisite 2: Compact Development
Noisette uses transect zoning for the redevelopment of the Naval Base area. The base density can be increased if the Noisette Quality Home Performance Standard is used. Only the T4A is below 7 units per gross acre (it is 4 units/acre). Considering the density by right is at or above 7 units per gross acre for the majority of the plan, net density is likely to be substantially higher.

For non-residential density, the lot coverage permissible ranges from 50\% to 100\%, therefore an average FAR of 0.5 or higher is possible.\textsuperscript{122} Given the flexible zoning requirements, it is anticipated that Noisette meets this prerequisite.

NPD Credit 1: Compact Development
While the master plan provides permissible densities according to the transect, the actual density built will depend on the definition of “units per acre gross,” the exact percentage allowable in each transect zone and if future development maximizes the density allowed with the Noisette Quality Home Performance Standard.\textsuperscript{123} Considering only the Navy Yard redevelopment, if gross density is about 85\% of net density (typical if gross density includes roads but not open space) and if each transect occupies about a quarter of the development, with the performance standard the highest average density could reach about 43 units per net acre.

For non-residential development, development will be limited by the maximum building envelope and theoretically could reach up to around 6.0 FAR. However given that T6 development is unlikely to all be built to the maximum of 18 stories and 100\% lot coverage, it is more likely that FAR will be closer to 2.0 or 3.0 FAR.

Considering its maximum residential density allowed per acre in the Navy Yard redevelopment, it is anticipated that Noisette could receive 4 points for the 43 units per acre estimate. Actual density may vary but a range of 3-5 would be reasonable.

NPD Credit 2: Diversity of Uses
The master plan identifies many options for mixed-use development including a variety of retail and business uses throughout the plan.\textsuperscript{124} Specific businesses are not identified.

\textsuperscript{121} Noisette Master Plan, page 3.9.
\textsuperscript{122} Noisette Master Plan, page 2.13.
\textsuperscript{123} Noisette Master Plan, page 2.13.
\textsuperscript{124} Noisette Master Plan, page 2.15.
in the overall master plan and are left up to the digression of individual property owners. In the Navy Yard redevelopment site, mixed-use development with a variety of commercial uses is planned for the new City Center, Storehouse and River Center North areas. While the types of diverse uses listed in this credit aren’t listed in the plan, it is anticipated that at least 50% of the dwelling units will be in walking distance of at least some diverse uses, likely earning the project anywhere from 2 to 4 points.

NPD Credit 3: Diversity of Housing Types
The master plan shows different examples of housing types that could be included in different transect zones. These types include the edge yard single house, side yard single house, side yard duplex, rear yard rowhouse and court yard apartment block. Additionally, the Housing for All initiative also calls for a diverse mix of housing.125

At Navy Yard, there are currently two residential buildings that will have 1 and 2 bedroom and live-work units available for lease in 2008.

NPD Credit 4: Affordable Rental Housing
Affordable housing is mentioned as an objective of Noisette’s performance zoning strategy and also as a component of green development.126 Noisette is also adopting a housing solution call Housing for All, which includes a wide mix of housing types that will permit higher density and the opportunity to provide a more diverse mix of home sizes and price ranges in each block. Affordable housing, usually defined as housing receives public subsidy, is considered to be an unsustainable model in the master plan.127

However, since the master plan and other documents do not specify a minimum amount of rental affordable housing based on area median income, Noisette does not qualify for this credit.

NPD Credit 5: Affordable For-Sale Housing
Affordable for-sale options considered by the Noisette master plan include ground rents (of land, with the homeowner purchasing only the home), green mortgages, energy efficient mortgages and transportation efficient mortgages.128 The master plan and other documents do not specify a minimum amount of for-sale affordable housing based on area median income, so Noisette does not qualify for this credit.

NPD Credit 6: Reduced Parking Footprint
The master plan specifies parking location by transect. T6 and T5 may have parking accessed from alleys, internal lots, parking garages and on-street parking. T4A and T4B may have parking with alley or frontage access.129 However, the plan does not specify if more than 20% of the project will be used for parking facilities or the number of bicycle

125 Noisette Master Plan, page 8.5.
126 Noisette Master Plan, pages 2.7 and 4.5.
127 Noisette Master Plan, page 8.5.
128 Noisette Master Plan, page 8.5.
129 Noisette Master Plan, page 2.13.
parking spaces available. It is possible that Noisette may receive this credit, but not guaranteed.

NPD Credit 7: Walkable Streets
The master plan calls for new and existing streets to meet the criteria for the walkable streets credit. The plan shows entries faces streets, the buildings to street ratio seems to be around 1:3, continuous sidewalks are called for, and streets are shown as being narrow or narrowed from existing widths.

The transect code also calls for minimum setbacks of 0 ft min/5 ft max in T6, 0 ft min/10 ft max in T5, 0 ft min/20 ft max in T4B and 15 ft min/25 ft max in T4A. Given the relative mix, it is anticipated that Noisette would be able to meet two of the additional four points. There are other options that Noisette may be able to meet, such as 33% transparent glass along the ground level façade of non-residential uses or storefront windows visible per binding agreements or on-street parking or street trees. However, it is difficult to determine at this stage whether or not Noisette will meet all of the required criteria for this standard.

NPD Credit 8: Street Network
The street network grid density shown in the master plan is about 20 street miles per square mile, enough to achieve one of two points for the credit. This is based on the Noisette master plan area.

NPD Credit 9: Transit Facilities
The transit facilities in the Noisette area are not mentioned in the master plan. They are more likely to be determined when the master plan turns into reality, so this credit may or may not be achieved.

NPD Credit 10: Transportation Demand Management
The master plan does specify the transportation demand strategies outlined for this credit. The most similar strategy is to combine transit fleets between CARTA, school districts and local churches and community organizations to reduce the number of vehicles while expanding service options. However, due to the lack of TDM strategies outlined, it seems unlikely that Noisette is currently planning options that would fulfill this credit.

NPD Credit 11: Access to Surrounding Vicinity
As an infill site in an urban area, the Noisette area is composed of a semi-regular grid-block structure. The Noisette area is bounded by I-526 to the north, I-26 to the west and the Cooper River to the east and integrates with the small neighborhood on the southern border. Noisette includes through-streets every 800 feet on average due to the location’s existing street grid. The new Navy Yard neighborhood will provide more integration with the rest of Noisette, having short blocks typically far less than 800 feet. However there a few blocks shown that are longer than 800 feet. If additional streets are added to these blocks they will meet the credit, but if they remain as shown they will not.

130 Noisette Master Plan, page 2.13.
NPD Credit 12: Access to Public Spaces
Given the amount of open green space that will be added as part of the ecological restoration process, it is anticipated that 90% of the dwellings and non-residential uses will be within 1/6 mile of parks, plazas or square, however that number is somewhat difficult to ascertain from the master plan. Based on the transect plan, Navy Yard will have parks, plazas or squares fully integrated into its neighborhoods, including a series of small squares throughout the blocks. It is likely that Noisette will fulfill this credit, but perhaps not guaranteed given its infill condition.

NPD Credit 13: Access to Active Spaces
The Noisette master plan includes a significant amount of trails throughout the neighborhood. It is highly likely that well over 50% of all buildings will be with ¼ walk of a trail, thereby earning this credit.

NPD Credit 14: Universal Accessibility
There is no mention made of special provisions for universal accessibility in the master plan. Therefore, it is unlikely that any special provisions are in place that would enable Noisette to receive this credit.

NPD Credit 15: Community Outreach and Involvement
Throughout the creation of the Noisette master plan, the community was significantly involved. Neighborhood planning meetings, master plan presentations, breakout discussions and community surveys were all part of the planning process.

It is anticipated that the master planning process has been and will continue to be sufficient to achieve this credit.

NPD Credit 16: Local Food Production
The master plan does not mention local food production as part of the plan, nor does the Noisette website, so it seems unlikely that the project will earn this credit.

Green Construction & Technology
The master plan discusses benchmarks for buildings in Noisette – the Noisette Quality Home Performance Standards and LEED standards. The Noisette Quality Home Performance Standards were developed to specifically address the South Carolina low-country conditions to which buildings must respond. In the master plan, LEED standards are recommended as a requirement for commercial and high-rise residential construction.

GCT Prerequisite 1: Construction Activity Pollution Prevention

---

131 Noisette Master Plan, page 6.5.
133 Noisette Master Plan, page 1.4.
Considering that construction pollution prevention is a pre-requisite in LEED for building systems, and common among residential standards that the Noisette Home standard is based on, it is highly likely that Noisette will meet this pre-requisite.

GCT Credit 1: LEED Certified Green Buildings
Though only suggested in the master plan as a requirement, LEED certified buildings have been added as covenants to lots and building before they are sold by Noisette Company to vertical developers. This guarantees to be an extremely effective way to ensure green buildings in Noisette.

GCT Credit 2: Energy Efficiency in Buildings
Given the requirement for LEED certified buildings in the master plan which will be implemented through title restrictions, it is anticipated that the energy efficiency required by LEED-ND will be achieved. Similarly, the Energy Star HERS rating is anticipated to be met by the requirements in the Noisette Quality Home Performance Standard. Given the emphasis that green building guidelines place on energy efficiency, it is anticipated that the project will earn at least 2 or 3 points.

GCT Credit 3: Reduced Water Use
Considering the requirement for LEED certified buildings in the master plan that will be implemented through title restrictions, it is anticipated that the reduction in water use required by LEED-ND will be achieved. Similarly, the low flow fixture requirement in LEED-ND is anticipated to be met by the requirements in the Noisette Quality Home Performance Standard. Given that reduced water use is also one of the most common green building techniques, it is anticipated that the project will earn at least 2 or 3 points.

GCT Credit 4: Building Reuse and Adaptive Reuse
The proposed historic district designations will result in the opportunity to reuse numerous buildings. Since the restrictions on the renovation and reuse of historic buildings are more stringent than the guidelines for this credit, it is anticipated that Noisette will meet this credit.

GCT Credit 5: Reuse of Historic Buildings
The master plan considers options for historic district designation in Noisette, including the Liberty Hill neighborhood, the Officers’ Housing District the Naval Hospital District, and the Shipyard District. To date, the Charleston Navy Yard Officers’ Housing District and the Charleston Navy Yard Historic District have been granted listings on the National Register of Historic Places.

GCT Credit 6: Minimize Site Disturbance though Site Design
This project is located in a previously developed site; therefore it receives a point for this credit.

---

134 Noisette Master Plan, pages 9.3-9.5.
135 Noisette Master Plan, pages 9.3-9.5.
136 Noisette Master Plan, page 8.5.
137 Noisette Master Plan, page 8.5.
GCT Credit 7: Minimize Site Disturbance during Construction
This project is located in a previously developed site; therefore it receives a point for this credit.

GCT Credit 8: Contaminant Reduction in Brownfields Remediation
The master plan does not specify whether or not soil was moved in the process of remediation. Therefore, Noisette may or may not receive points for this credit.

GCT Credit 9: Stormwater Management
The ecological restoration described in the master plan will rebuild stormwater and infiltration capacity to reduce flooding. The landscape will include “Stormwater (management) Treatment Trains,” which are specialized plantings of native vegetation adapted to moist and dry periods that can stabilize drainageways and filter water. Drainage easements for surface drainage will also be included to ensure ongoing vegetation and sediment management and maintenance access.\(^{138}\) The green infrastructure plan includes other BMPs such as raingardens, preservation and restoration of wetlands, and daylighting of streams.\(^{139}\)

Given the extensive planning for green infrastructure in Noisette, it would be reasonable to expect that the project would infiltrate 90% of average rainfall for at least 60-75% of the development footprint, if not more. Therefore, Noisette would probably be able to achieve 4-5 points for this credit.

GCT Credit 10: Heat Island Reduction
As described in the master plan, heat island reduction is one of the credits for LEED New Construction certification.\(^{140}\) It is not listed as one of the Noisette Quality Home Performance Standards. The master plan does not include non-roof heat island reduction strategies and the roof strategies may or may not be used for 75% of the buildings. It is difficult to determine whether or not Noisette will complete this credit over time.

GCT Credit 11: Solar Orientation
Solar orientation – the placement of buildings on an east-west access – is not identified per se in the LEED for New Construction or Noisette Quality Home Performance Standards. Passive heating and cooling, which can be achieved through solar orientation, is included in the Noisette home standards.\(^{141}\) Given the information in the master plan, it seems unlikely that the project will achieve this credit.

GCT Credit 12: On-Site Energy Generation
On-site energy generation is considered as part of renewable energy sources below. It is difficult to determine whether or not the project will meet this credit by the guidance given in the master plan.

\(^{138}\) Noisette Master Plan, pages 3.5 & 3.8.
\(^{139}\) Noisette Master Plan, page 4.3.
\(^{140}\) Noisette Master Plan, page 9.4.
\(^{141}\) Noisette Master Plan, page 9.3.
GCT Credit 13: On-Site Renewable Energy Sources
Renewable energy is mentioned in both the LEED for New Construction standards and the Noisette Quality Home Performance Standards in the master plan.\textsuperscript{142} Considering renewable energy is one of the optional criteria for fulfilling these standards, it is difficult to determine whether this LEED-ND credit will be achieved.

GCT Credit 14: District Heating & Cooling
District heating and cooling is not mentioned in the master plan. Given no information is included in the master plan, it seems unlikely that the project will achieve this credit.

GCT Credit 15: Infrastructure Energy Efficiency
Infrastructure energy efficiency is not mentioned in the master plan. Given no information is included in the master plan, it seems unlikely that the project will achieve this credit.

GCT Credit 16: Wastewater Management
Water solutions include wastewater as a part of building design, using features such as rainwater recycling to reduce the wastewater discharged.\textsuperscript{143} Given the information in the master plan and the detailed attention paid to water flow throughout the plan, Noisette may be able to fulfill this credit although it is difficult to say for certain at this time.

GCT Credit 17: Recycled Content in Infrastructure
Since there is no information about recycled content in infrastructure included in the master plan, it seems unlikely that the project will achieve this credit at this time.

GCT Credit 18: Construction Waste Management
In the master plan, minimizing construction waste management is included in the LEED for New Construction standards as a credit and in the Noisette Quality Home Performance Standards. Oak Terrace Preserve, the first neighborhood under construction, is currently recycling its construction waste so it seems highly likely that Noisette will receive a point for this credit if it continues this program throughout the completion of the project.

GCT Credit 19: Comprehensive Waste Management
The storage and collection of recyclables is a prerequisite for LEED for New Construction and also mentioned in the Noisette Quality Home Performance Standards.\textsuperscript{144} Considering this initiative will probably include the basic hazardous waste and paper/plastic/metal recycling, Noisette will very likely fulfill this credit.

GCT Credit 20: Light Pollution Reduction

\textsuperscript{142} Noisette Master Plan, pages 9.3-9.4.
\textsuperscript{143} Noisette Master Plan, page 3.13.
\textsuperscript{144} Noisette Master Plan, pages 9.3-9.5.
Light pollution reduction is not mentioned in the master plan. While it could be included at a later date, provisions have not been considered that would qualify the project for this credit.
BLOOMINGTON CENTRAL STATION

Smart Location & Linkage

SLL Prerequisite 1: Smart Location
Bloomington Central Station (BCS) is considered to be an infill site, therefore it would meet the first option for the Smart Location Prerequisite. Additionally, this site is also located near existing transit service (planned and under construction during the time of this project planning) that is located in the center of this project.

SLL Prerequisite 2: Proximity to Water and Wastewater Infrastructure
As an infill site, the project is served by existing water and wastewater infrastructure, therefore it meets this prerequisite.

SLL Prerequisite 3: Imperiled Species and Ecological Communities
Considering that the site has been an office building and parking lot for several decades, it is unlikely that there are imperiled species present that would require protection so no further action is required for this prerequisite.

SLL Prerequisite 4: Wetland and Water Body Conservation
There are no wetlands, riparian areas or water bodies located on site or within 100 feet of the site, so this prerequisite is fulfilled.

SLL Prerequisite 5: Agricultural Land Conservation
BCS meets both option 1 and 2 of the Smart Location Prerequisite, therefore it meets this prerequisite.

SLL Prerequisite 6: Floodplain Avoidance
The site is not located in a floodplain, therefore it meets this prerequisite.

SLL Credit 1: Brownfields Redevelopment
BCS is not located in a brownfield. Prior to the office space that currently occupies the site, the land used to be agricultural use. Therefore, BCS cannot receive this credit.

SLL Credit 2: High Priority Brownfields Redevelopment
As BCS is not located in a brownfield, it is ineligible for this credit.

SLL Credit 3: Preferred Locations
BCS is located in an infill site; therefore it meets the first component of this credit and earns 6 points. The street center line density is of the surrounding area is around 12 street miles per square mile, which earns the project an additional point.

SLL Credit 4: Reduced Automobile Dependence
The project is located centrally around a new light rail station, as shown in the master plan. According to the Metro Transit website, the operator of the light rail, 154 rides are currently provided per day. That earns BCS 4 points for this credit.
SLL Credit 5: Bicycle Network
According to the master plan, there is an 8 foot sidewalk/multi-use path along side the train line. Adjacent to the site on the east, the natural wildlife refuge has trails that connect to the site. Considering the trails provided, it is likely that BCS has an adequate trail distance, however they are unlikely to connect to any commercial or civic uses. Additionally, given the large number of automobile parking spaces on site, it is unlikely that there will be bicycle parking spaces equivalent to 15% of those automobile spaces. The bicycle network is in place primarily for recreation use, whereas a large percentage of the parking serves commuters that would be unable to reach the site by bicycle. Therefore, it is unlikely that the project will meet this credit.

SLL Credit 6: Housing and Jobs Proximity
The residential component of the project will have over 1000 dwelling units, which is at least 25% of the project’s square footage. Within a half mile walk distance of BCS includes numerous hotels, offices and the Mall of America. Given the Mall employs 11,000 people alone, it is anticipated that those jobs would be enough to equal 50% or more of the dwelling units. While points can be awarded for meeting the criteria of this credit, given the wide suburban design of the roads between BCS, other businesses and the Mall, it is unlikely that people would actually make that half mile walk in reality.

SLL Credit 7: School Proximity
There are no schools located in close proximity to this project; therefore it is ineligible for this credit.

SLL Credit 8: Steep Slope Protection
This 50 acre site is relatively flat and therefore does not disturb any slopes of 15% or greater. Given the location of the site, it is anticipated that it would receive a point for this credit.

SLL Credit 9: Site Design for Habitat or Wetland Conservation
BCS is located on a previously developed site, but it does not have wetlands or water bodies. The project is planning to include native plants for vegetation; however it may or may not be for 90% of vegetation. Since the extent of native planting is difficult to know at this point, the project may or may not achieve this credit.

SLL Credit 10: Restoration of Habitat or Wetlands
The master plan for BCS describes the native plant restoration that will be included as part of the project. It is anticipated that this area would be greater than 10% of the development footprint, thus sufficient to fulfill this credit.

SLL Credit 11: Conservation Management of Habitat or Wetlands
Considering that this site does not have native habitats or wetlands and water bodies, it is unlikely that there would be enough in place to necessitate a 10 year management plan. Therefore, it seems unlikely that BCS would achieve this credit.
Neighborhood Pattern & Design

NPD Prerequisite 1: Open Community
BCS is not a gated community; therefore it meets this open community prerequisite.

NPD Prerequisite 2: Compact Development
BCS has an average density of over seven dwelling units per acre and non-residential space with an FAR over 0.5, thus meeting this prerequisite.

NPD Credit 1: Compact Development
The residential component is estimated to be currently 94.4 units per acre and the non-residential component is about 2.01 FAR.\textsuperscript{145} Given that the residential square footage is about a third of the project, the weighted average of each component is 5 points.

NPD Credit 2: Diversity of Uses
There is service retail that will be included as part of this project, however it won’t be built until later phases. Totaling 45,000 square feet, it is anticipated to include a mix of the diverse uses that will likely earn the project anywhere from 2-4 points.

NPD Credit 3: Diversity of Housing Types
BCS is unlikely to receive much credit for diversity of housing types. It is high-rise condominiums and townhomes, with most units above 750 square feet. The project is located in a commercial district and there is no other housing within a quarter mile of the project to take into account.

NPD Credit 4: Affordable Rental Housing
This project does not include rental housing, only for-sale housing, so it is unlikely to meet this credit.

NPD Credit 5: Affordable For-Sale Housing
The project’s goal is for 20% of the for-sale housing to be affordable to households at 80% AMI. This is sufficient to achieve 2 points for this credit.

NPD Credit 6: Reduced Parking Footprint
The buildings are located facing the internal streets of the projects and the parking facilities are located behind them facing American Boulevard and West Road. Whether the placement of the parking structures along these roads would go against the interpretation of the credit is difficult to determine. For the second part of this credit, it is hard to determine if the parking structures appear to comprise at least 20% of the development footprint and perhaps more. The project narrative does not include any information about bicycle parking, so it is currently unlikely to fulfill the requirement that bicycle parking be equivalent to 10% of automobile parking for this part of the credit.

NPD Credit 7: Walkable Streets

BCS meets the first requirements of this credit. All functional entries face a street, square or plaza; the tall heights of the towers ensure a building to street ratio of at least 1:3; sidewalks and woonerfs are included throughout the project; and all streets internal to the project are designed for low speeds. The project may meet additional requirements, including front facades near property lines, glass on non-residential space that are open at night, on street parking, street trees and retail on the ground floor of office. It is anticipated that BCS will earn anywhere from 4 to 8 points for this credit.

NPD Credit 8: Street Network
The street centerline density within the project is around 21-22, based on measurements of the current site plan. It is anticipated that the project may be able to earn one of two points for the street network.

NPD Credit 9: Transit Facilities
The Haiwatha Light Rail stop is a well lit stop with benches and a partially enclosed shelter. It also has a real time information display on the arrival time of the next train. Given the superior facilities, it is anticipated that the project will earn this credit.

NPD Credit 10: Transportation Demand Management
The master plan doesn’t mention a specific TDM program. However there is a transit pass program available through Metro Transit that offers subsidized transit passes to employees for an employer tax break that the project may be able to promote as a way to satisfy this requirement.

NPD Credit 11: Access to Surrounding Vicinity
The through streets along the project boundary are located about 500-600 feet apart on average, therefore it is anticipated that BCS would meet this prerequisite.

NPD Credit 12: Access to Public Spaces
The BCS Central Park is centrally located in the project, within 1/6 of a mile of the condominium and office entrances. This should fulfill the project’s requirements.

NPD Credit 13: Access to Active Spaces
The trail system includes a multi-use path through the site and connects to the Minnesota River Valley trails. Since all buildings are within a ¼ mile of the path, it is anticipated that it will fulfill this credit.

NPD Credit 14: Universal Accessibility
The master plan does not include additional provisions for universal accessibility, therefore it seems unlikely that the project would meet this credit.

NPD Credit 15: Community Outreach and Involvement
As part of the approval process, the project had to go through a series of public hearing and meetings. Since there are no residential neighbors close to this project, there was less feedback than other projects might generate. It is anticipated that BCS could earn this credit.
NPD Credit 16: Local Food Production
Local food production is not included as part of this project, so the project would not be eligible for this credit.

Green Construction & Technology

GCT Prerequisite 1: Construction Activity Pollution Prevention
The project is planning to use green building techniques, certifying buildings to LEED status. Considering that construction pollution prevention is also a prerequisite for LEED, it is anticipated that the project will achieve this prerequisite.

GCT Credit 1: LEED Certified Green Buildings
LEED certification is considered for all buildings in BCS. It is anticipated that the project may receive points for this credit.

GCT Credit 2: Energy Efficiency in Buildings
In the LEED for New Construction certification for the Reflections condominium tower, BCS reached the energy efficiency target by reducing energy use by 23%. With this level of performance throughout the project, it is anticipated that BCS could earn at least 2 if not all 3 points.

GCT Credit 3: Reduced Water Use
The Reflections tower, the only part of the project complete, did not include any reductions to water use for the project except for a 50% reduction in irrigation which is insufficient for LEED-ND. Considering that Reflections is less than 10% of the total project square footage, it would be possible to achieve the indoor water reduction needed if it is completed on all other buildings.

GCT Credit 4: Building Reuse and Adaptive Reuse
There were no buildings on site available for reuse.

GCT Credit 5: Reuse of Historic Buildings
No historic buildings were located on the BCS site.

GCT Credit 6: Minimize Site Disturbance through Site Design
This project is located in a previously developed site; therefore it receives a point for this credit.

GCT Credit 7: Minimize Site Disturbance during Construction
This project is located in a previously developed site; therefore it receives a point for this credit.

GCT Credit 8: Contaminant Reduction in Brownfields Remediation
This site is not a brownfield so the project is ineligible for this credit.
GCT Credit 9: Stormwater Management
BCS is planning a series of innovative stormwater management techniques including rain gardens, storm receptors and NURP pond systems, all of which filter to the pond in the southwest corridor before traveling into the Mississippi River. It is anticipated that this will earn somewhere between 3-5 points.

GCT Credit 10: Heat Island Reduction
Solar reduction was not mentioned as an initiative in any project documentation or in any conversations, so it is unlikely that the project will achieve this credit.

GCT Credit 11: Solar Orientation
The buildings are not located on an east-west access; therefore the project would not be eligible for this credit.

GCT Credit 12: On-Site Energy Generation
On-site energy generation is not mentioned in the development plan and is currently not planned to be implemented.

GCT Credit 13: On-Site Renewable Energy Sources
Renewable energy is not mentioned in the development plan and is currently not planned to be implemented.

GCT Credit 14: District Heating & Cooling
District heating and cooling is not mentioned in the development plan and is currently not planned to be implemented.

GCT Credit 15: Infrastructure Energy Efficiency
Infrastructure energy efficiency for street lights is not mentioned in the development plan and is currently not planned to be implemented.

GCT Credit 16: Wastewater Management
The Reflections tower, the only part of the project complete, did not include any wastewater management initiatives. Considering that Reflections is less than 10% of the total project square footage, it would be possible to achieve the wastewater management requirements needed if it is completed on all other buildings. It has not been determined whether or not this will be pursued.

GCT Credit 17: Recycled Content in Infrastructure
District heating and cooling is not mentioned in the development plan and is currently not planned to be implemented.

GCT Credit 18: Construction Waste Management
Due to the LEED for New Construction certification, it is anticipated that BCS will reach the construction waste targets sufficient for this credit. The Reflections project recycled 75% of construction waste, so if other buildings do the same then this credit should be easily obtained.
GCT Credit 19: Comprehensive Waste Management
The storage and collection of recyclables is a prerequisite for LEED for New Construction, therefore is anticipated that BCS will achieve this credit.

GCT Credit 20: Light Pollution Reduction
Light Pollution Reduction is not mentioned in the development plan and is currently not planned to be implemented.