Green Infrastructure Case Study

Stapleton, Denver Colorado USA

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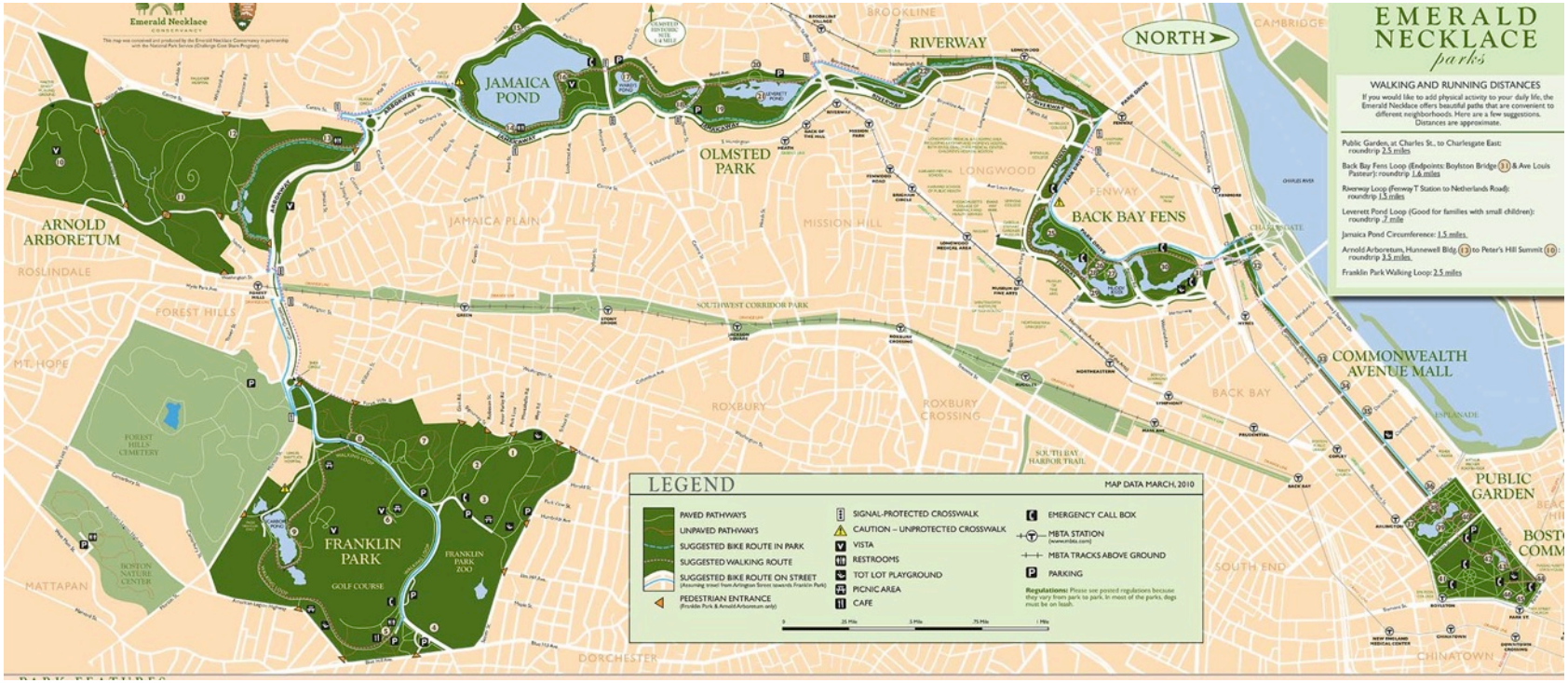
Outline

- Peter Wilder and Ian Mell Foundation
- GI definition and theory
- Stapleton context and overview
- Planning process
- Ecological network of green corridors and spaces
- Environmental restoration and biodiversity
- Stormwater management infrastructure
- Urban Framework
- Recreation and community agriculture
- Conclusion - Assessment

Linking Presentations

Ian Mell & Peter Wilder

- Ian – Historical basis, philosophy, application according to scale, trajectory
- Fredrick Law Olmsted – Emerald Necklace in Boston, USA. system of landscape spaces, corridors and urban spaces



Ian Mell

- Ebenezer Howard – Garden Cities, Welwyn, Letchworth.
- Kevin Lynch – Urban planning and spatial social ecology-districts, edges, paths, nodes, landmarks.

Welwyn, England, Garden City, Photo: Austin, 2011

Linking Presentations

Peter – Site scale landscape regeneration and support of energy and water system strategies for sustainable buildings and landscapes. Attention to green infrastructure physical and psychological health.

Limuru Development Kenya – Reponses to site conditions forms the urban development framework

Wilder Associates

Linking Presentations

Site scale landscape energy and water system

Passive heating and cooling technologies -

Wilder Associates

Linking Presentations

Peter – Site scale landscape regeneration and support of energy and water system strategies for sustainable buildings and landscapes. Attention to green infrastructure physical and psychological health.

Vanke Green Building Park, Beijing China and the wetlands interpretation center

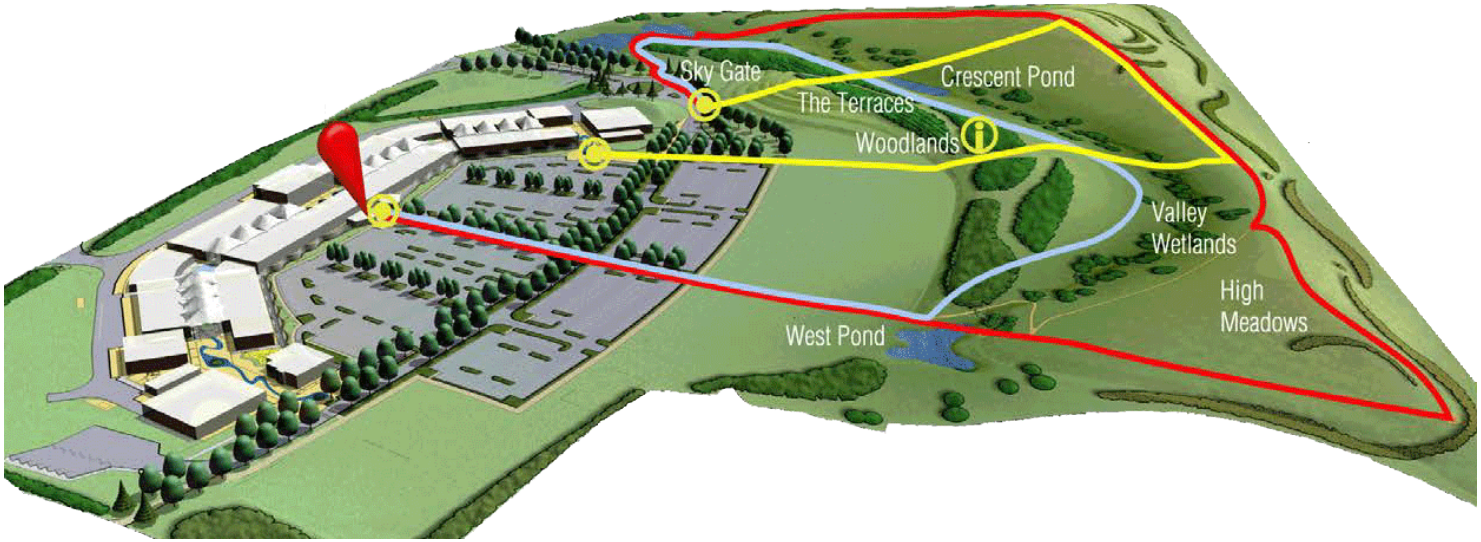
Meixi Lake Ecocity - branding rather than performance

Wilder Associates

Linking Presentations

Peter – Site scale landscape regeneration and support of energy and water system strategies for sustainable buildings and landscapes. Attention to green infrastructure physical and psychological health.

Brownfield Restoration in Britain



Wilder Associates

Stapleton, Denver Colorado USA

Definition and Theory

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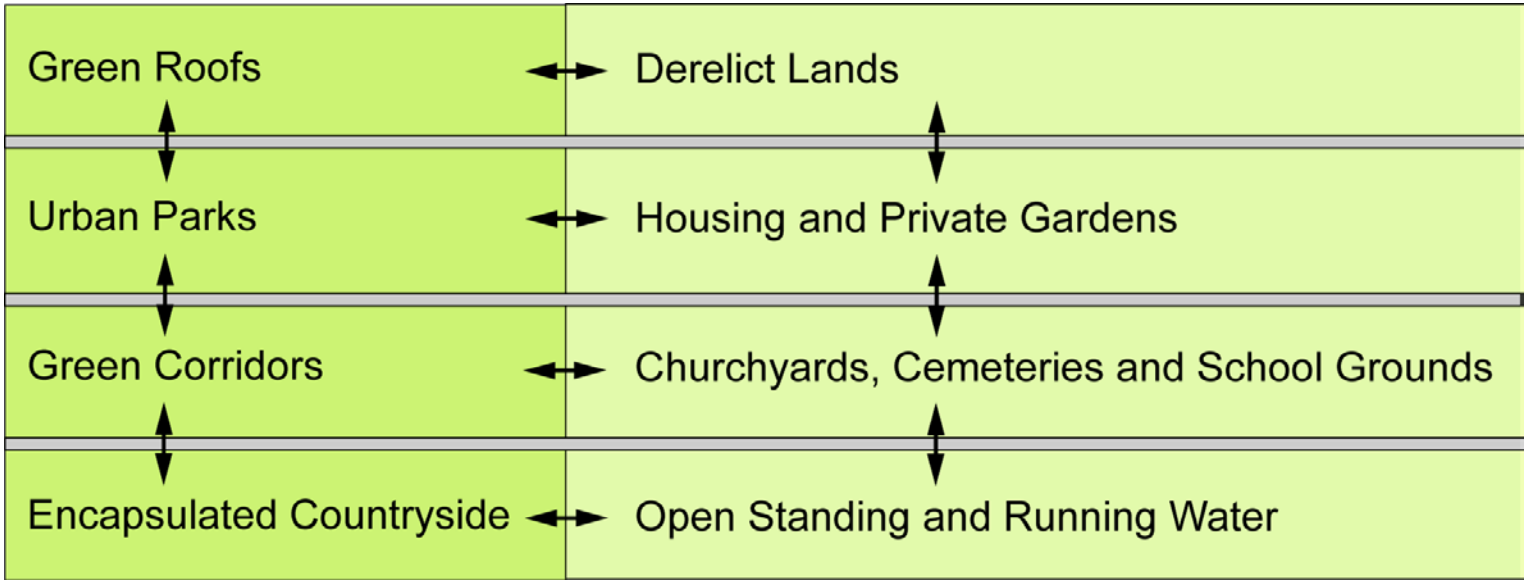
Green Infrastructure Definition

- Continuous network of landscape corridors and spaces serving multiple ecosystem and human functions.
  - Green infrastructure requires comprehensive participatory planning and master planning and physical design for multiple uses.

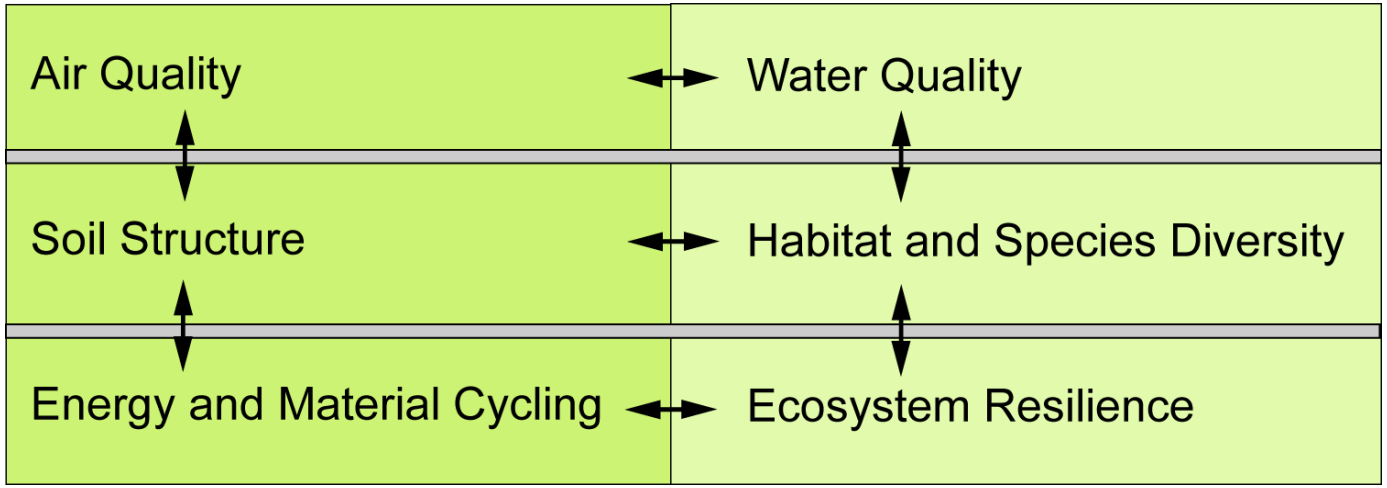
Green Infrastructure Model

- Infrastructure Elements



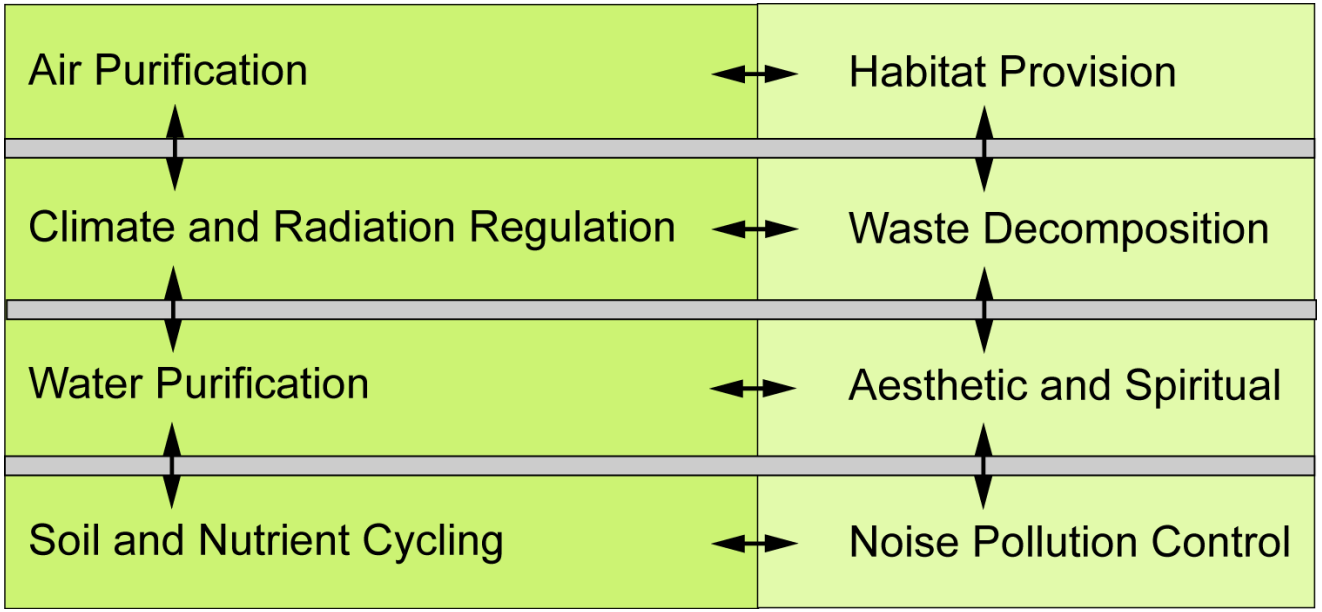
Graphic: G. Austin adapted from K. Tzoula, 2007.

Ecosystem Functions



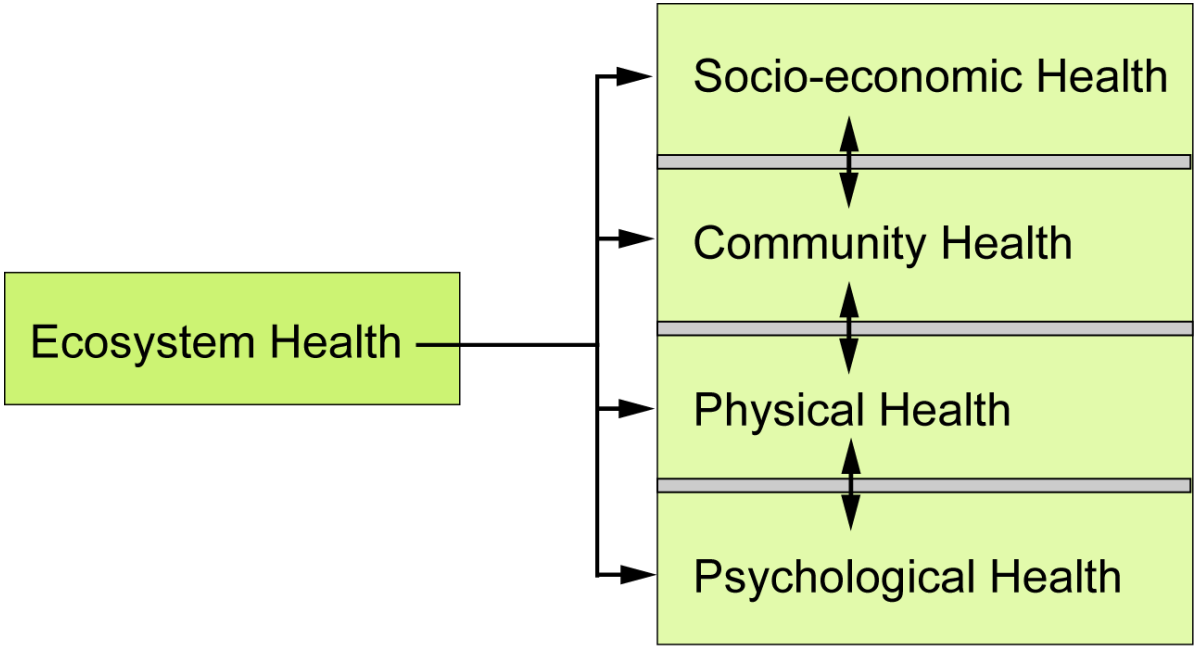
Graphic: G. Austin adapted from K. Tzoula, 2007.

Ecosystem Services to Humans



Graphic: G. Austin adapted from K. Tzoula, 2007.

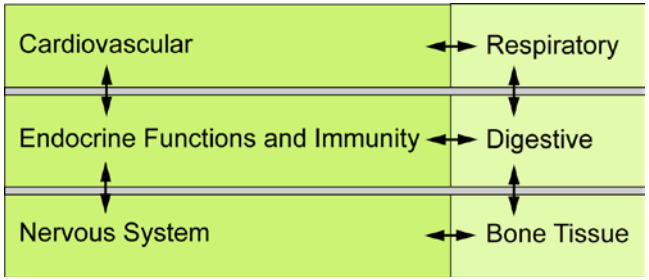
Ecosystem – Human Relationship



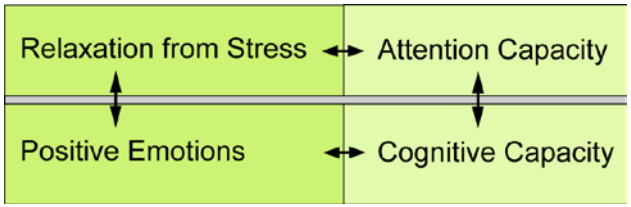
Graphic: G. Austin adapted from K. Tzoula, 2007.

Human and Community Health

- Physical

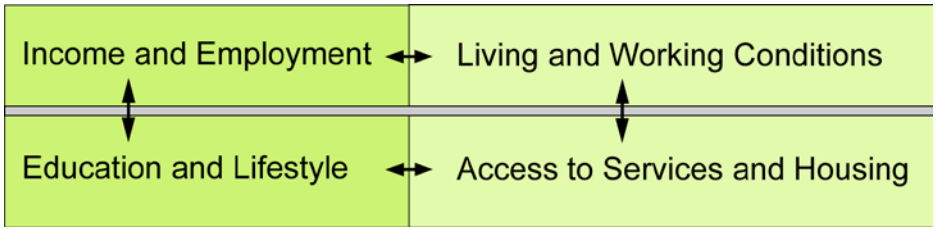


- Psychological



- Community

- Social



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Stapleton, Denver Colorado USA

Context

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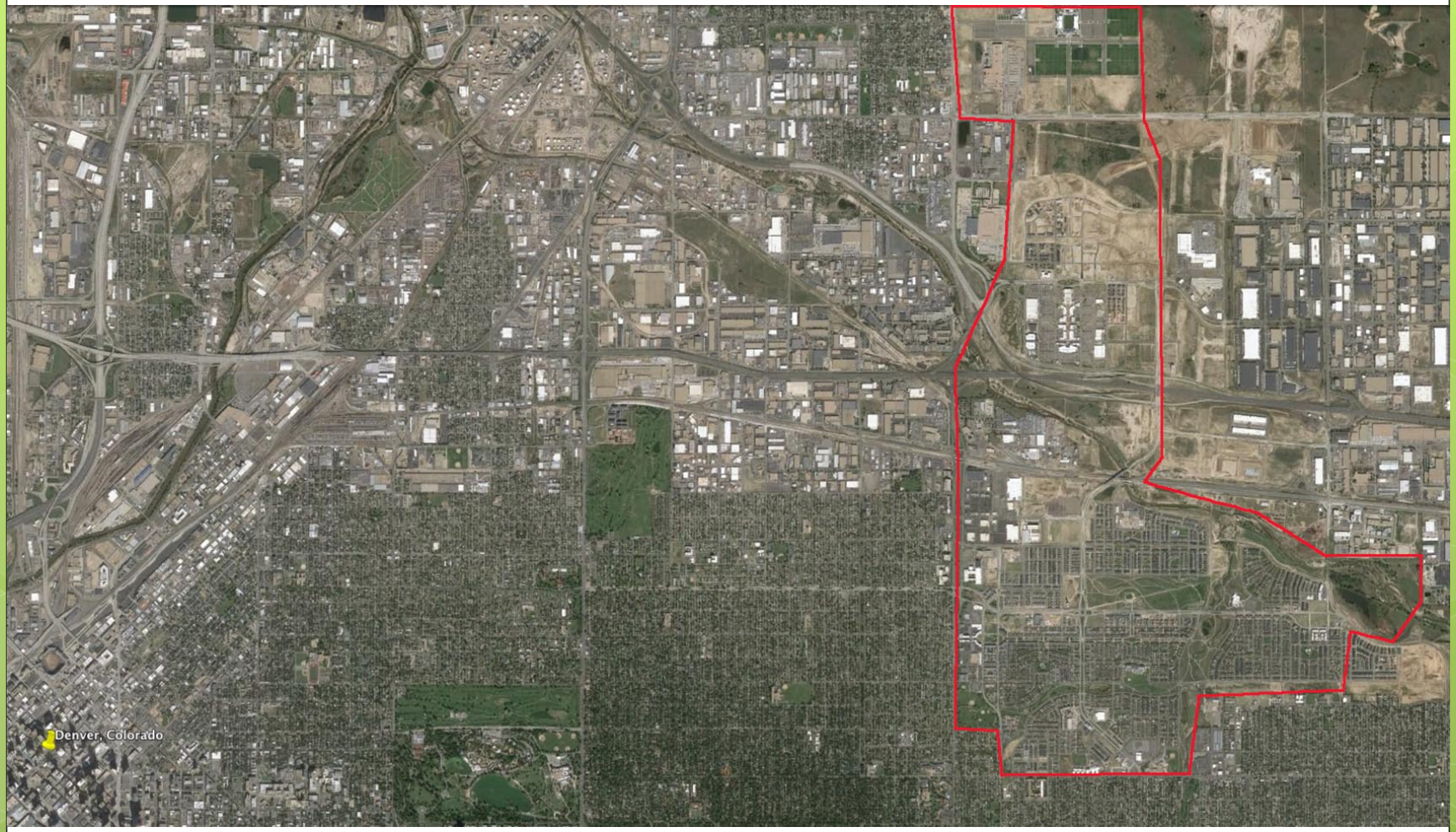
Context

Denver, Colorado is on the east slope of the Rocky Mountain Range. The climate is cold and dry. 35°34'48.66" N 103°34'38.39" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Context



Denver and Stapleton. 39°46'11.73" N 104°55'27.44" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Located five miles east of downtown Denver, Stapleton is the largest brownfield infill project in the United States. It is the site of a former airport but design problems, traffic, limited expansion opportunities and noise complaints caused the city to seek a new location for the airport. In 1989, other land was annexed for construction of a new international airport and the 4,700 acres (1,902-hectares) at Stapleton were available for redevelopment.

Context

Aerial view of Stapleton and downtown Denver. Photo: Forest City Enterprises Inc.

Context

Stapleton is near the junction of Interstate Highway 70 and Interstate 270 and Quebec Street. Regional transportation through the site complicate its development. The high-speed and high-volume traffic on the freeway and Quebec pose sometime insurmountable problems for the pedestrian and wildlife. The depressed railroad track increase this problem.

Sand Creek is a rare perennial stream and recreation corridor linking the site to all of Denver.

Freeway and rail corridor through parcel. 39°46'28.79" N 104°53'52.42" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Stapleton Overview

Photo: Forest City Enterprises Inc.

Although some phases are yet to be implemented, the community will house more than 30,000 residents and 35,000 workers.

It will provide 8,000 homes, 4,000 rental apartments, and contribute a huge amount of office (10 million ft^2, 929,000 m^2) and retail space (4.2 million ft^2, 390,000 m^2).

Photo: Austin, 2013

National retailers at Northfield . Photo: Forest City Enterprises Inc.

Photo:
Austin, 2013

Of particular interest is the 1,116 acres of open space system of urban plazas, formal parkland and restored habitat.

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Planning Process

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Planning

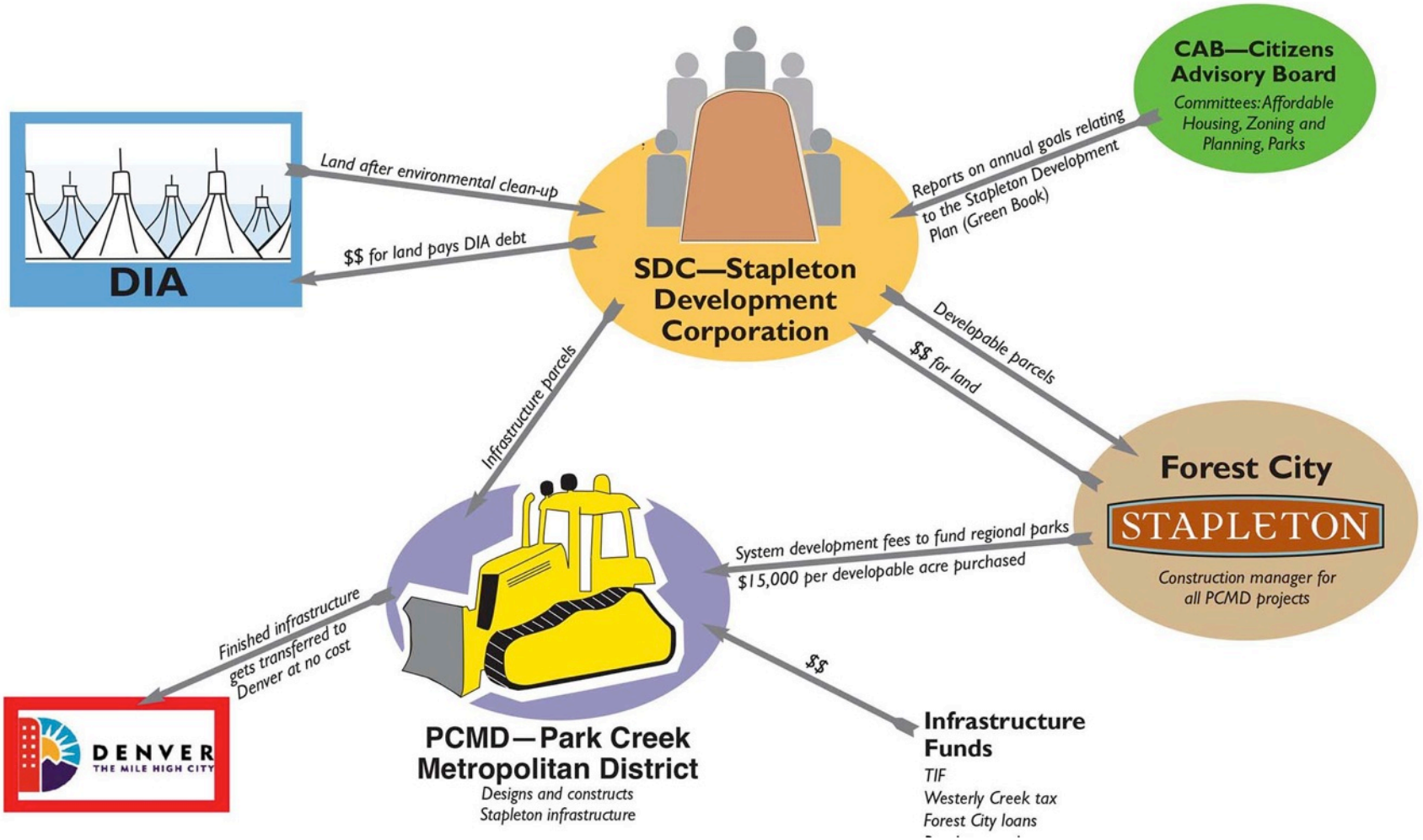

Image: http://frontporchstapleton.com/article/stapleton-runways-residences

Planning

- Participatory planning
  - 35-person, citizen group managed a two-year long community planning process called Stapleton Tomorrow beginning in 1989
  - In June 1991, they completed a concept plan for the redevelopment of Stapleton, which was incorporated into Denver's Comprehensive Plan
- New entities were created
  - Stapleton Redevelopment Foundation, 1993
  - Citizens Advisory Board, 1993
    - More that 100 public events
- *"Green Book" (The Stapleton Redevelopment Plan*), with of technical consultants including engineers, planners, architects and landscape architects, 1995.
- Stapleton Development Corporation.

Photo: http://frontporchstapleton.com/wp-content/uploads/2014/09/eastbridge-473B3088.jpg

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Photo: The Stapleton Foundation for Sustainable Urban Communities

The habitat plan formulated by the citizen planners and assisting consultants.
Image: The Sustainable Redevelopment Plan (Green Book), 1995.
http://www.scribd.com/doc/23067998/GreenBook-2of4-Section-Vpages138

Planning

- The *Green Book* allocated over 1,600 acres to parks, trails, recreation facilities and natural areas, including the restoration of Westerly Creek and a 365-acre Prairie Park in the northern portion of the site.
- Commercial and industrial use was allocated 1,200 acres of developable land.
- The residential density was specified to meet 12 units per acre in order to support public transportation systems.
- Neighborhood centers were planned with higher residential density to provide the population needed for neighborhood commercial and transit centers .

A concentration of Single Family Residential Houses keeps density low but much higher that typical in the USA. Photo: Austin, 2013

Planning

- The Stapleton Development Corporation is responsible for receiving parcels from the Denver International Airport (the public owner) after demolition and remediation of any toxic substances.
- The development-ready parcels are sold to the developer, Forest City, after covenants are added to the deeds. The covenants are measures that assure that the land is developed according to the *Green Book* master plan.

Photo: Stapleton Sustainability Master Plan, 2004

- Other reviews by the Stapleton Development Corporation during detailed planning and construction also align the outcome with the master plan.

Photo: United States Geologic Service 1993 aerial photo. www.airfields-freeman.com/CO/Airfields_CO_Denver_NE.htm

Planning

- Not all of the goals of the *Green Book* have been realized.
- For example, the development is less diverse in terms of economic strata of residents than the *Green Book* envisioned, and the 1,660-acre open space was reduced to 1,116 acres.
- The community is also overwhelmingly auto-oriented rather than transit oriented. However, there is a municipal bus station on the site and bus routes through the community and a light rail station is underdevelopment.

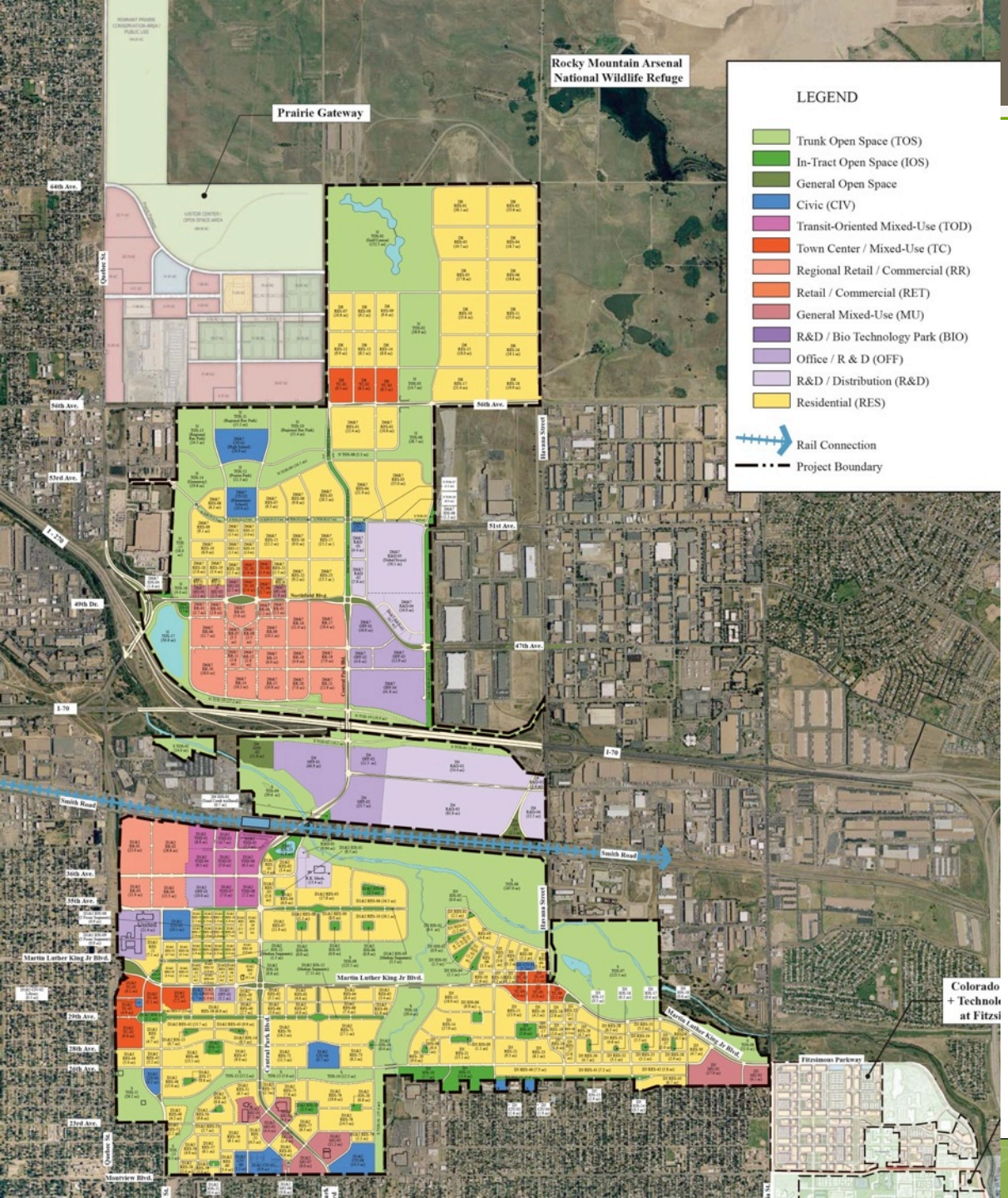
Quebec Square Regional Shopping. Photo: Forest City Enterprises Inc.

Planning

- The green infrastructure network at Stapleton is a structural element of the master plan.
- It features multiple purposes ranging from separating and focusing the highest density development, to the restoration of habitat and connecting it to regional preserves and corridors.
- This orientation was the result of proactive planning by citizens, the city, economic development, environmental, and social interest groups.

An urban open space in a small mixed-use development. Photo: Austin, 2013

Development Plan



Planning

- The activist character of the Stapleton planning process is unusual in the USA
  - Stapleton property was publically owned and contained areas where toxic substances, such as solvents and hydrocarbons, required removal or remediation.
  - The second factor was the need to replace habitat completely destroyed by the previous land-use
  - Elsewhere, piecemeal development of smaller privately owned parcels and the absence of a regional vision (and physical master plan) result in reactionary planning processes, unintended cumulative impacts and poor quality built environments.
- The ability of the city of Denver to prepare parcels for development, attach development requirements and transfer the property to a developer guaranteed that the green infrastructure was implemented

29th Street Center. There are more than 100 stores and shops in the community. Photo: Forest City Enterprises Inc.

Planning

- Lessons for the urban planners in the USA are
  - Prioritize and then purchase the key parcels and then
  - Transfer these to the private sector with development covenants where commercial and residential development frames open space at densities higher than 20 dwelling units per acre.
  - This strategy limits the land area consumed by the built environment, supports public transportation, and rewards residents, developers and business owners willing to occupy higher density areas
  - Citywide open space networks. high quality urban environments
  - These places perform well economically, environmentally, and socially

Auto-oriented retail, building J at Northfield . Photo: Forest City Enterprises Inc.

Planning

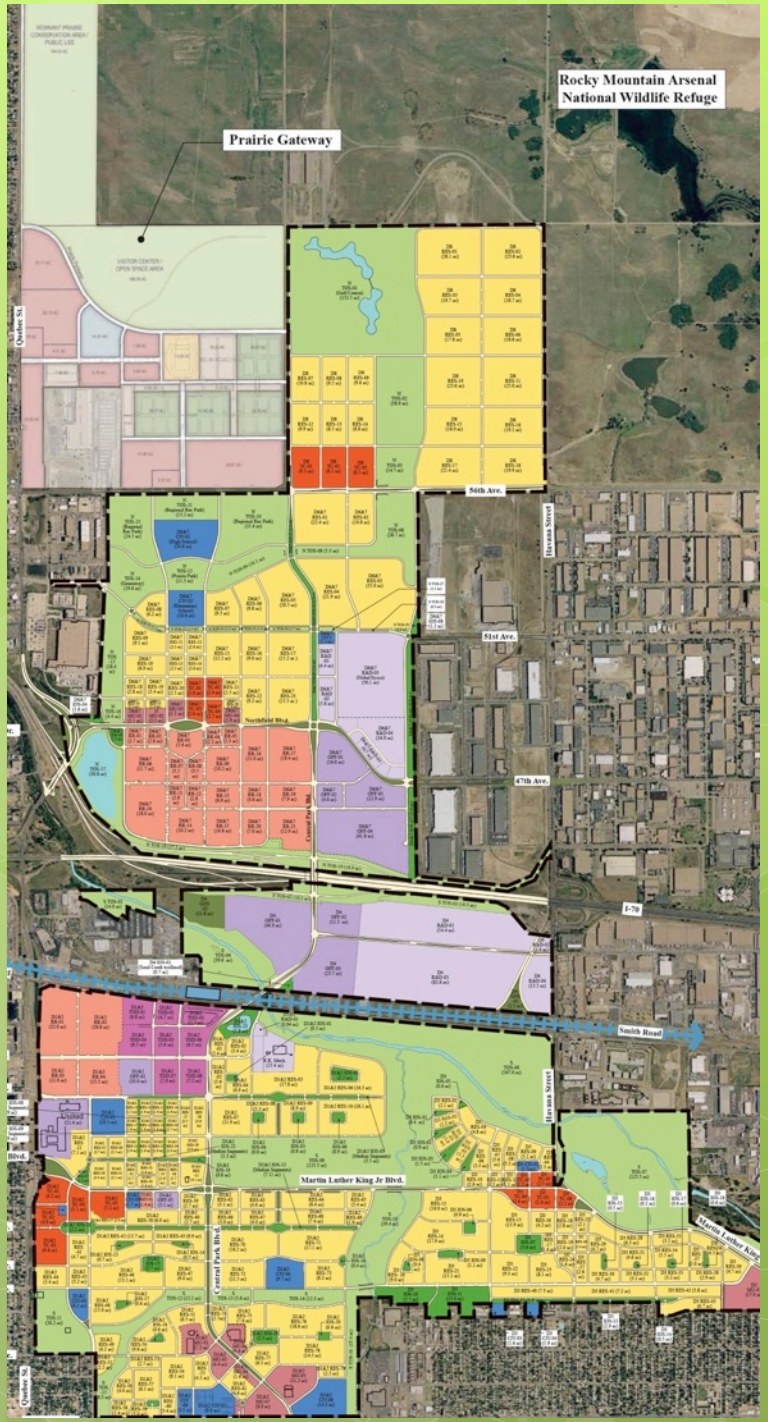
The initial development undertaken by the city and Forest City Enterprises was a betrayal of the participatory planning process and philosophy articulated in the *Green* Book. The 75-acre Quebec Square is an auto-oriented regional shopping center dependent on the nearby freeway. Although stormwater basins were created to manage the runoff this is an example of what Stapleton would not be. The city and the developer defended the project by saying that the huge profits and tax revenue generated would fund future green infrastructure and higher quality residential neighborhoods and mixed-use centers.

Quebec Square. Photo: Forest City Enterprises Inc.

Planning

The developer claims that the extension of the street grid into Quebec Square will allow the project to be retrofitted in the future to increase the mixture of uses, including residential.

Québec Square. 39°46'55.03" N 104°53'30.13" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014



Stapleton, Denver Colorado USA

Ecological Network

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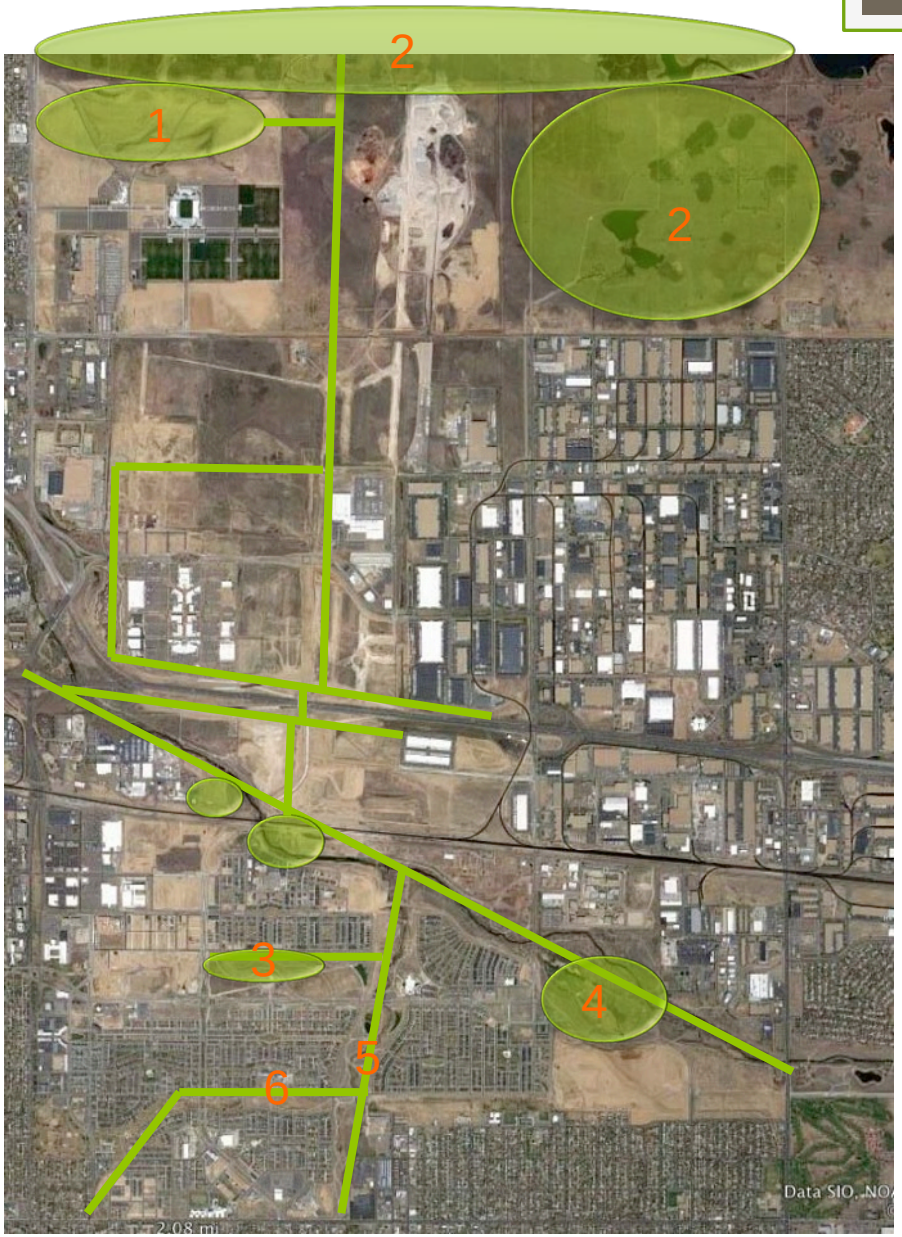
Development Plan. Forest City

Ecological Network

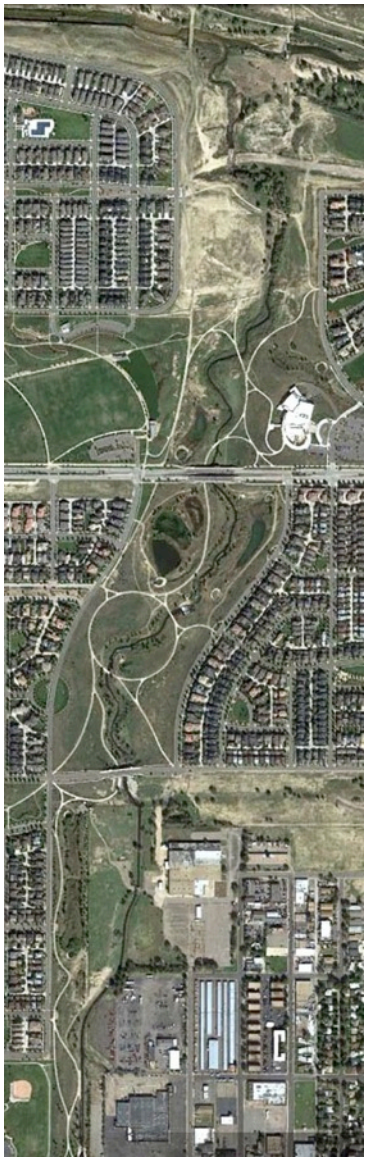


Habitat and Ecological Corridors at Stapleton

1 - Prairie Reserve
2 - National Wildlife Refuge
3 - Central Park
4 - Bluff Lake Nature Center
5 - Westerly Creek
6 – Greenway

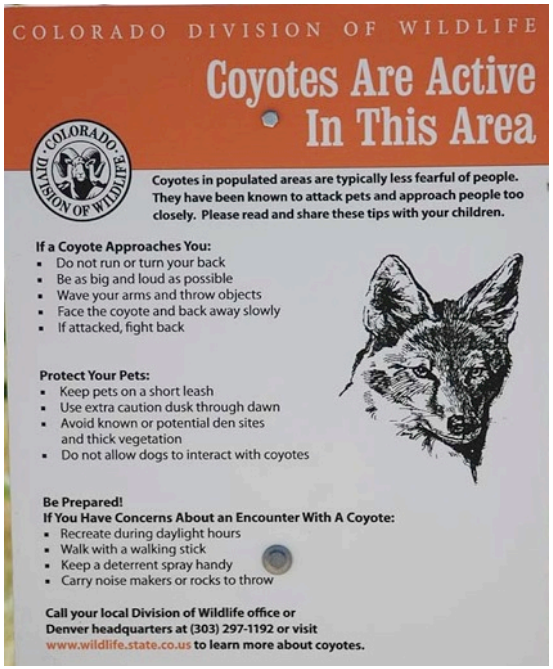
The northern sections of the ecological network are still being restored.

Westerly Creek - Ecological Network



- Ecologically Stapleton is an exemplary example of ecosystem restoration and the creation of habitat areas connected by corridors.
- Westerly Creek was once buried below the runways of the airport
- 75 acres, 4.5 miles of trail, riparian and prairie habitat
- Connections to the Greenway Park and Sand Creek

Gopher snake. Photo: Austin, 2013



Living with wildlife. The riparian and prairie ecosystem is developing quickly along Westerly Creek through a food chain: native vegetation > prairie dogs > hawks > snakes > coyote. Photo: Austin, 2013

Westerly Creek. 39°45'29.34" N 104°52'33.02" W, Oct. 6, 2013
Google Earth accessed Oct. 30, 2014

Ecological Network

The Westerly Creek corridor is at least 600’ (200 meters) wide and provides a permanent water supply.

Westerly Creek riparian corridor a few years after restoration. Photo: Austin, 2013

Sand Creek - Ecological Network

Westerly Creek connects to the larger Sand Creek to the north. This is the conduit that populated the newly established habitat.

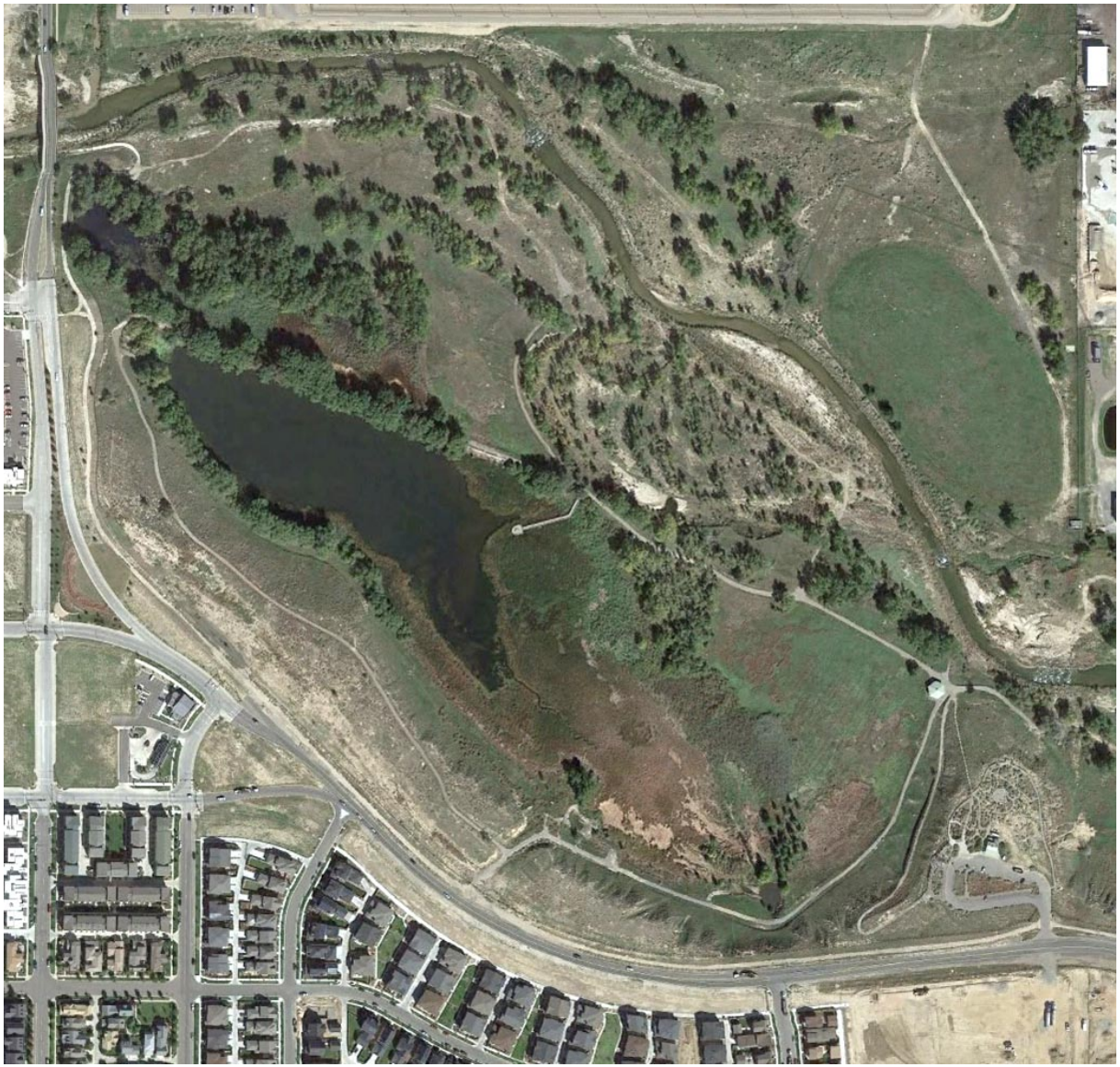
Sand Creek flows through Denver and connects to the new Waverly Creek corridor. Photo: Austin, 2013

Sand Creek - Ecological Network

The Sand Creek Provides riparian and upland habitat. Photo: Austin, 2013

Bluff Lake Habitat Fragment

- Small habitat remnants can provide high quality habitat if connected to other habitat fragments
- 123 acres of open water, wetland and upland habitat
- Hawks, ducks, woodpeckers, geese, kingfishers, song birds
- Large and small herbivores
- Large carnivores



The Bluff Lake Nature Center is adjacent to the confluence of Westerly and Sand Creek. Photo: Austin, 2013

Bluff Lake Habitat Fragment

Coyote, deer and bear captured with an automatic trail camera in the Bluff Lake Nature Reserve. Photo: www.blufflake.org/wordpress/wp-content/uploads/

Prairie Dog. www.blufflake.org/wordpress/wp-content/uploads/Black-tailed_Prairie_Dog.jpg

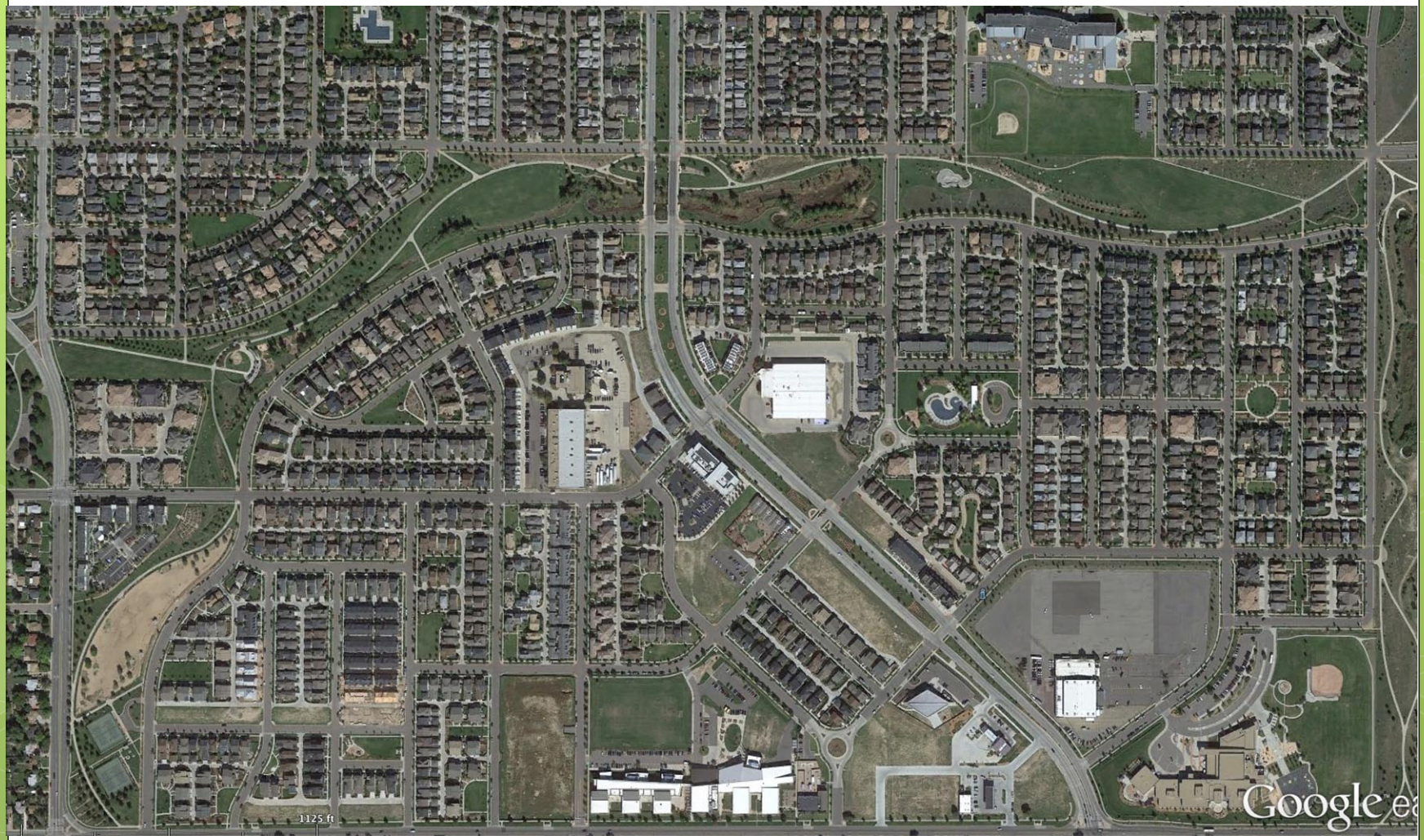
Bluff Lake - Ecological Network

- Preservation of native species sensitive to the presence of humans requires large habitat area that provides Interior or special resources. Bluff lake is rather small to act as a complete territory for large animals or raptors. However, its connection to other large habitat areas increases its value.
- The minimum fragment size and maximum spacing varies depending on the target species. However, in a rural context habitat areas of 50 hectares (124 acres) spaced 2,000 m (6,335') apart maximum is a good estimate supported by ecological research.

Sand Creek in the Bluff Lake nature area. Photo: www.stapletondenver.com/sites/default/files/imagecache/page/BluffLakeRiver.jpg

Greenway - Ecological Network

The Stapleton Greenway is an east-west 100 m (300') wide multi-use corridor that connects to Westerly Creek (right). Because of the connection, the habitat value is increased.



Greenway. 39°45'06.28" N 104°53'21.99" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Greenway - Ecological Network

- Recreation and stormwater treatment are the primary functions of the greenway, but since native vegetation is planted in the stormwater swales and basins valuable is created. However, species well adapted to living among humans rather than sensitive native species are likely. Nevertheless, this urban biodiversity is important to the ecosystem and the residents.

- A minimum corridor width of 20 meters is necessary to create useful habitat. Visual buffers between wildlife and people also supports greater variety of species.

Greenway - Ecological Network

The planners at Stapleton made good decisions in locating schools adjacent to the Greenway and other habitat areas. The green area of the schools expands the corridor width, provides a more compatible matrix condition and encourages environmental education activities.

School and Skate Park on Greenway. 39°45'18.35" N 104°53'06.15" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

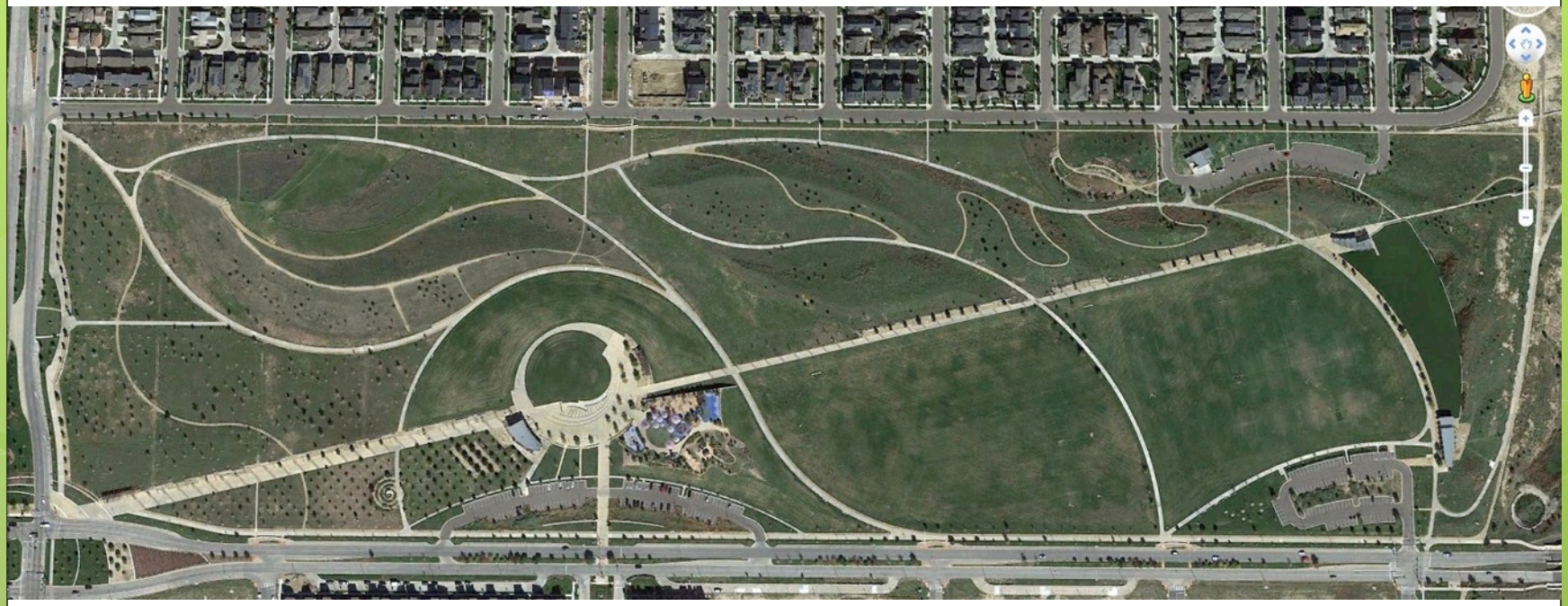
Central Park- Ecological Network

This image illustrates that the Westerly Creek corridor (foreground) connects to the 80 acre Central Park. Since there is no break in the corridor, larger wildlife can move daily to forage while small species can create home territories in the prairie grass and tree groves.

Photo: www.stapletondenver.com/sites/default/files/resources/Stapleton_Parks.jpg

Central Park- Ecological Network

Unfortunately, like the Greenway, the Central Park habitat ends on the west without an ecological connection another habitat area. This reduces its capacity to fully participate in a natural network.



Central Park. 39°45'39.95" N 104°53'02.50" W Oct. 6,2013 Google Earth accessed Oct. 30, 2014

Central Park- Ecological Network

About half of park contains a newly planted habitat section. Eventually, this zone will more fully support biological diversity. However, even today many more species (such as the threatened meadowlark) are present in the natural vegetation than in the manicured recreation areas. To date, there have been 27,000 trees planted in Stapleton.

Central Park looking southeast. Photo: Austin, 2013

Flooding
Channel erosion
Sedimentation
Eutrophication
Toxicity
Base flow
Groundwater recharge

Stapleton, Denver Colorado USA

Stormwater Management

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Stormwater Management

There are two components to stormwater management. First is the control of flooding and the channelization of streams and rivers. The second is the treatment of non-point source pollution.

There are two typical alternatives for managing stormwater. One is called Low Impact Development, where water is captured and treated on the individual parcels. The other method is to collect the water from the parcels for storage and treatment at the neighborhood or municipal scale. Stapleton adopted the second approach because this is a semi-arid environment and the water was needed to support the restoration of habitat in the Westerly Creek corridor and elsewhere.

Stormwater outlets and pools in the Westerly Creek Corridor. 39°45'30.80" N 104°52'35.95" W. Oct. 6,2013 Google Earth accessed Oct. 30, 2014

Stormwater Management

A principle tenet of green infrastructure is that it is multi-functional. We concentrated only on the ecological functions in the previous section. However, there are many secondary benefits. In this section, we will emphasize stormwater but acknowledge that other critical functions are delivered simultaneously. Perennial steams and permanent pools dramatically increase biological diversity.

Stormwater outlets and sedimentation area. Note the use of the recycled runway paving. Photo: Austin, 2013.

Stormwater Management

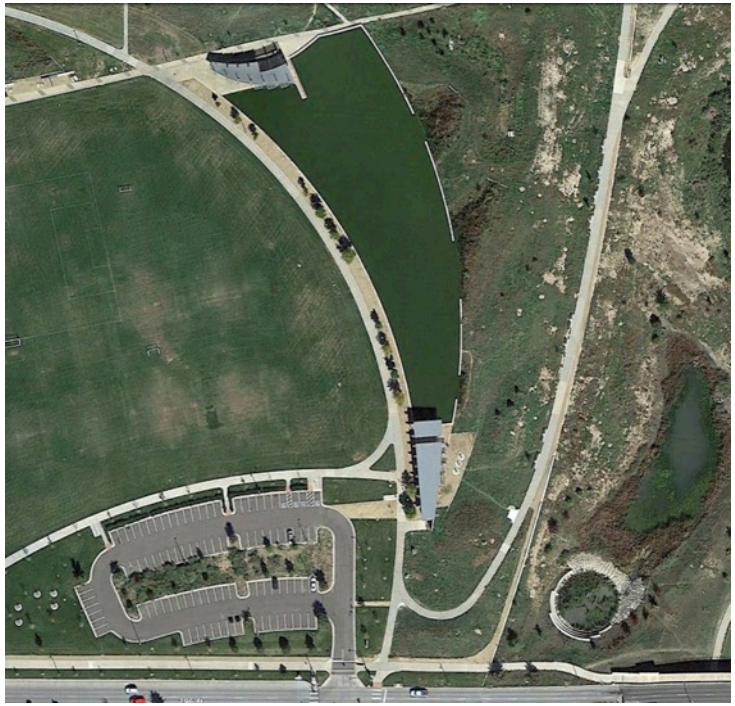
In the Greenway stormwater management, vegetated swales and pools sometimes dominate the corridor. Nitrogen, phosphorus, as well as street pollutants, such as hydrocarbons and heavy metals, are reduced as the water flows slowly through the vegetation. Flood waters are stored and infiltrated.

Walking and bicycling on dedicated paths and other recreation pursuits are associated with the stormwater system.

Greenway Detail - Stormwater Area. 39°45'14.99" N 104°53'22.92" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Stormwater Management

In this view of the east end of the Central Park the stormwater runoff from the athletic fields is captured in a more urban style before flowing into the Westerly Creek basins and pools.



Central Park at Westerly Creek. 39°45'40.22" N 104°52'40.57" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Central Park shade pavilion and stormwater basin. Photo: Austin, 2013

Stapleton, Denver Colorado USA

Recreation and Community Agriculture

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Recreation

Green infrastructure must serve people and their need for physical activity, stress reduction, social interaction, and civic celebrations. Compromising other functions, such as wildlife habitat can be minimized through careful planning and design

Central Park play. Photo: Austin, 2013

Recreation

Several social and recreation functions are concentrated in Central Park. A community building, playground, event space, shade pavilions and sports fields are visible in this image.

Central Park Detail. 39°45'39.65" N 104°53'05.66" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Recreation

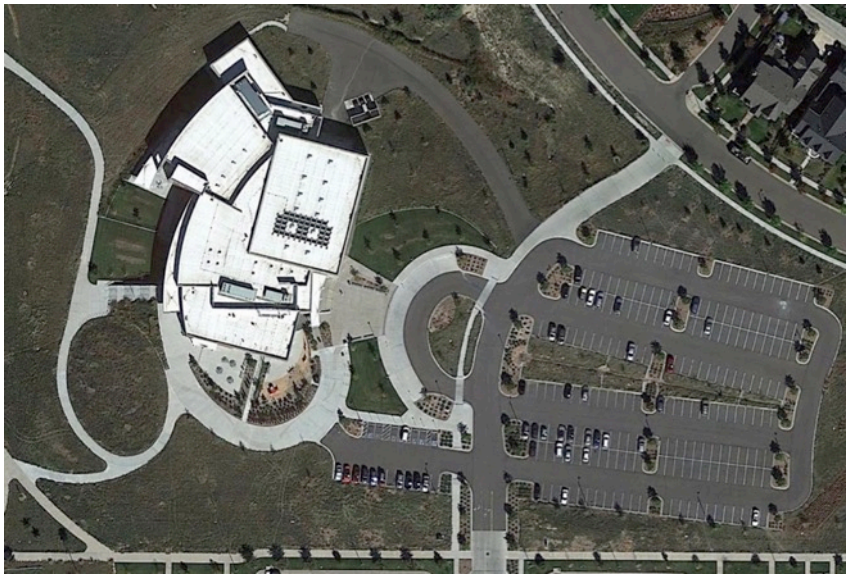
This sport field is located at the west end of the Greenway. It could have been designed better to serve multiple purposes including stormwater and biodiversity.

39°45'31.32" N 104°52'35.95" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Recreation

Even formal recreation venues should be linked to the green infrastructure network to provide safe and pleasant pedestrian and bicycle access. There are six public swimming pools at Stapleton. There is a new 50,000 square foot recreation center adjacent to Westerly Creek.

Aviator Pool. Photo: Forest City Enterprises Inc.



Recreation Center adjacent to the Westerly Creek corridor. 39°45'39.01" N 104°52'26.95" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Recreation Center. Photo: Austin 2013

Recreation

This image illustrates an artful integration of several green infrastructure functions.

Greenway recreation node. 39°45'07.86" N 104°53'44.53" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Recreation

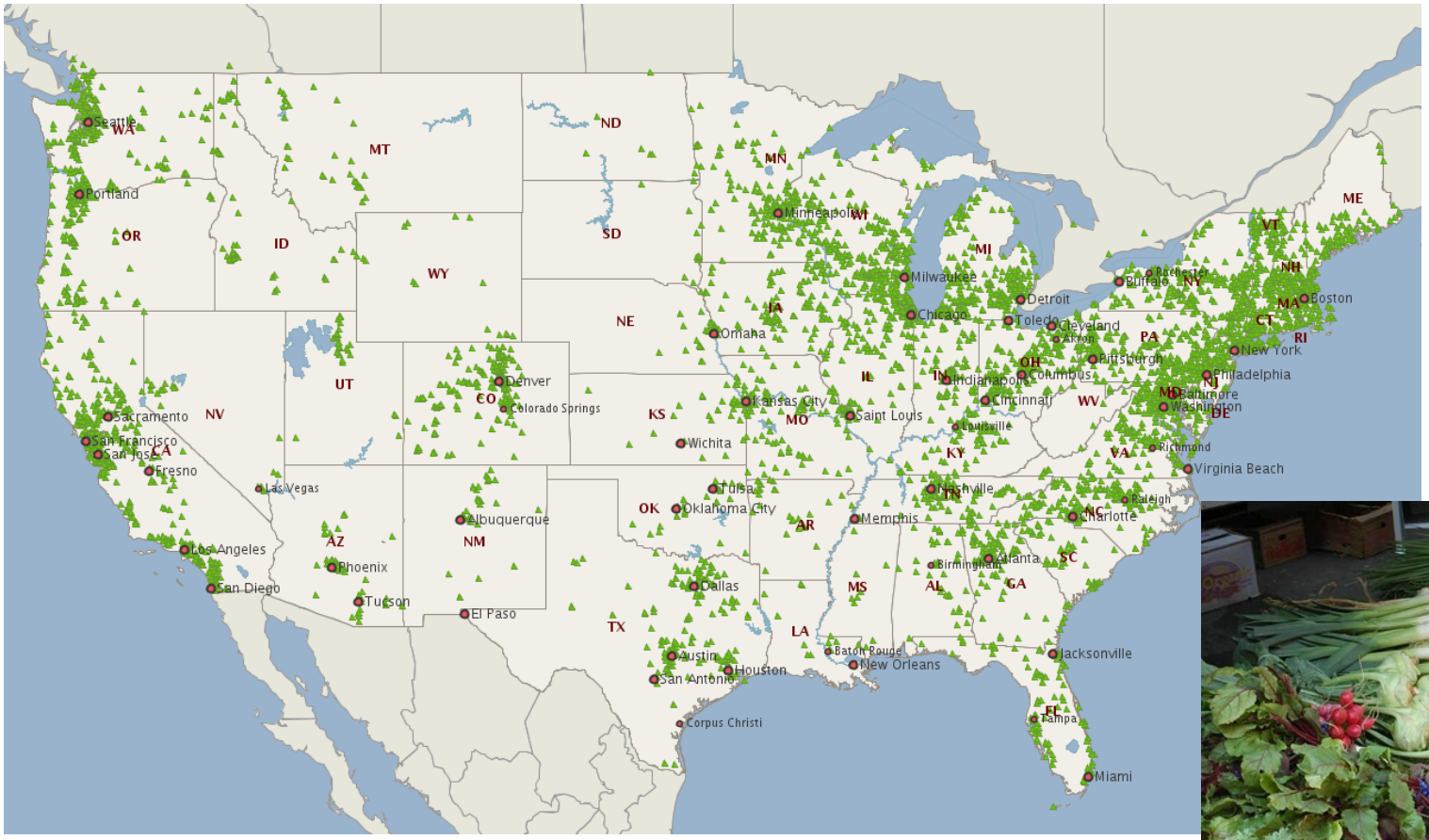
Photo: Forest City Enterprises Inc.

Photo: Forest City Enterprises Inc.

Regional sports fields and stadium. 39°48'14.72" N 104°53'21.48" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Greenway Skate Park. Photo: Forest City Enterprises Inc.

Community Agriculture



Community agriculture is a commercial enterprise conducted by a professional farmer. These programs sell, generally organic, products directly to customers. This community supported agriculture model is growing rapidly in the USA as are community gardens (allotments)

Photo: Austin, 2011

Community Agriculture

Community Agriculture. 39°46'04.24" N 104°52'14.01" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Photo: Austin 2013.

Community Agriculture

There is a hoop house at the community garden in Stapleton where salad greens are grown hydroponically. In addition, the irrigation water is cycled through a tank where Talpia fish are grown for food. Active education programs teach children about natural systems and farming.

Photos: Austin, 2013

Community Agriculture

The community agriculture center at Stapleton has a broad range of programs and ample space but lacks the aesthetic character that would draw visitors to the beauty and educational programs that could be offered. These image from the Food Garden illustrate the use of architecture and plants used to unify the often messy character of community agriculture or allotment.

University of British Columbia Community Garden Demonstration Photos: Lindsay Clement

Stapleton, Denver Colorado USA

Urban Framework

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Urban Framework

Town Center. Photo: Forest City Enterprises Inc.

Urban Framework

Green infrastructure is a system-wide planning tool that organizes and preserves natural areas and open space but it is equally important for establishing the setting for urban life in a community. This idea was mentioned by Ian in your last presentation when introduced the concepts presented by Kevin Lynch an *Image of the City.* Lynch defined urban zones as districts, edges, nodes, paths and landmarks (we might add thresholds to his list). These zones can be sized, characterized and distributed by the planner to create accessible and legible urban areas. They depend on both architectural elements and green infrastructure. The architecture forms the edge of spaces that green infrastructure completes for retail, office, residential and civic activities.

Play at Northfield. Photo: Forest City Enterprises Inc.

Founders Green, 29th Street. Photo: Austin, 2013.

Fountain at Northfield . Photo: Forest City Enterprises Inc.

29th Avenue Median from Westerly Creek (right) to Founders Green (left). 39°45'31.88" N 104°53'22.03" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Urban Framework

Green infrastructure principle – Provide direct access to public open space for those living at the highest residential density.

29th Street promenade. Photo: Austin, 2013.

Urban Framework

A variety of urban open spaces are created along the 29th Street spine.

39°45'29.33" N 104°53'56.97" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Urban Framework

1,000 to 2,000 new residential units within a 10-15 minute walk can support new retail areas.
Sources: Byrne McKinney & Associates and Goody Clancy Architecture, Planning and Preservation

Founders Green – community celebration space. Photo: Austin, 2013.

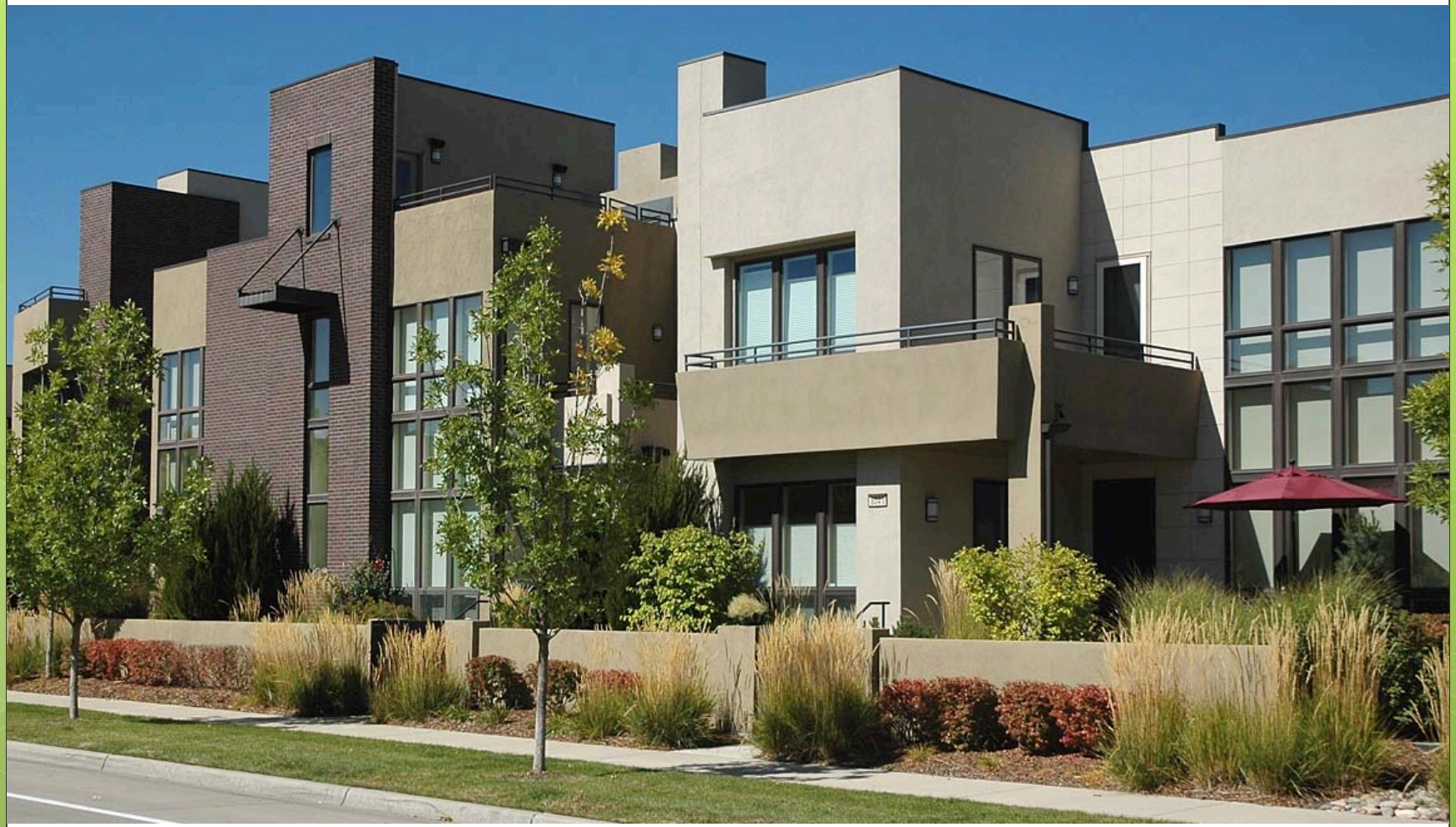
Urban Framework

The civic park adjacent to Founder's Green is the entrance to a retail section of 29th Street. Photo: Austin, 2013.

Winter celebration at the civic park on 29th Street. Photo: www.stapletondenver.com/community/whats-happening/2014-stapleton-winter-welcom

Urban Framework

Nationally, the U.S. can save over $100 billion in infrastructure costs over 25 years by growing compactly (Urban Land Institute; Brookings Institution).



. Photo: Austin, 2013.

Transportation & Access

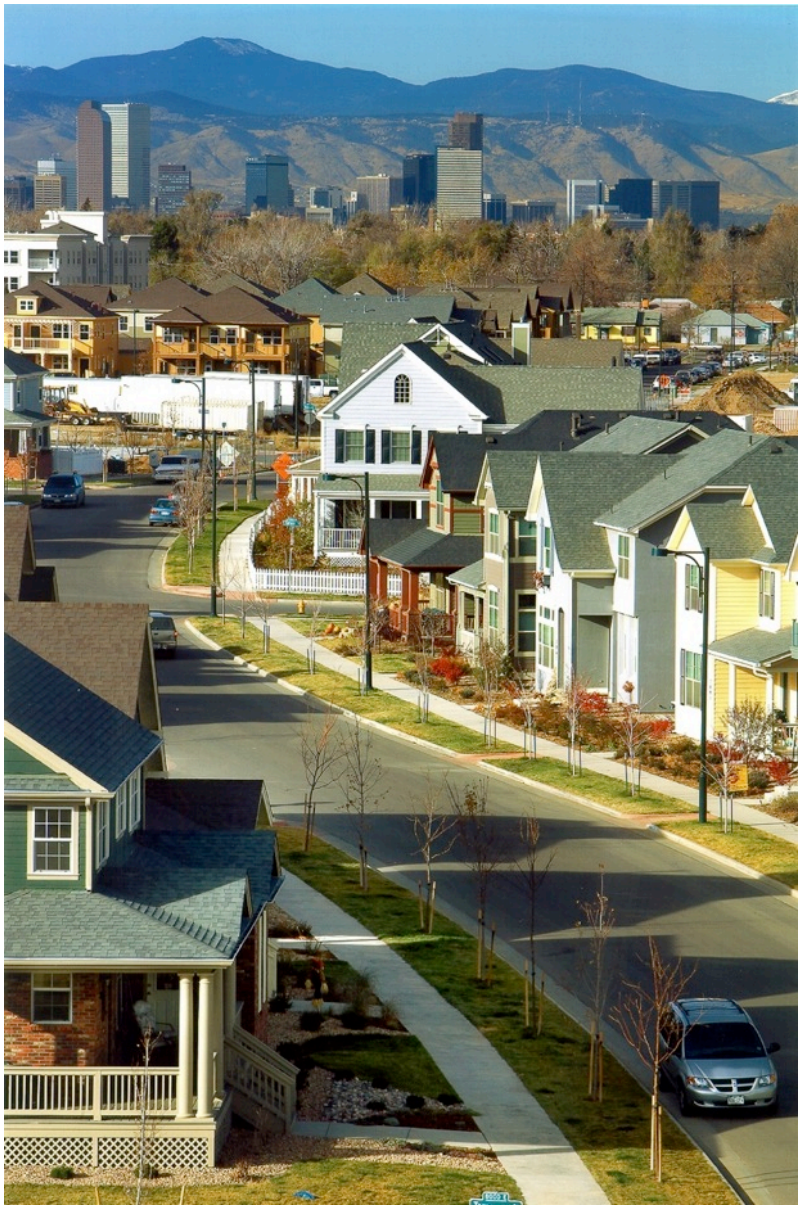


Photo: Forest City Enterprises Inc.

Stapleton was intended to be less dependent on the private automobile than most developments in the USA. Compared to most suburban development this goal has been met in an uninspired way. However, there is progress that will improve the public transportation infrastructure. The essential problem is the low density residential development which makes operating public transportation expensive. However, since Stapleton is on the route to the international airport regional access to buses is very good. At last, a new transit oriented neighborhood with a light rail station is under construction. This will provide a much needed option for those without a private automobile.

Light Rail

- The Stapleton transit oriented neighborhood will have a light rail station at the center. The 1/2-mile radius area around the station will be the focus of high-density mixed-use development
- There will be 45 acres of parkland within the one-half mile radius of the transit station providing an unusual mixture of high-density residential and commercial use and open space access.

Photo: Denver Urbanism, Robert Wilson
http://denverurbanism.com/wp-content/uploads/2012/12/2012_12_14_SandCreekBridges02.jpg

Central Park Station Area Plan, City of Denver, 2012.

Pedestrian and Bicycle Access

Pedestrian and bicycle routes through the community are abundant due to the green infrastructure network. There are many separated paths that are safe routes to school and shopping. 80% if the children in Stapleton walk to school.

Currently, there are barriers to the northern portion of the project posed by the freeway and rail line. These will be reduced as bridges and underpasses are constructed to support new neighborhoods including the transit oriented development.

Currently there are 38 miles of trails in Stapleton connecting 50 parks.

Trails in Central Park. Photo: Austin, 2013.

Education

Stapleton is a community largely composed of families. Therefore, there are 12 schools and a public library. These are adjacent to green infrastructure and opportunities for environmental learning. Some of this takes place at the Bluff Lake Nature Center and at the larger of the community agriculture facilities.

Montessori School at Stapleton. Photo: http://www.stapletondenver.com/community/whats-here/schools.

Public Library at Stapleton. Photo: http://ozarch.com/wp-content/uploads/2013/09/DPL_Sam-Gary-Branch-_2.jpg

Education

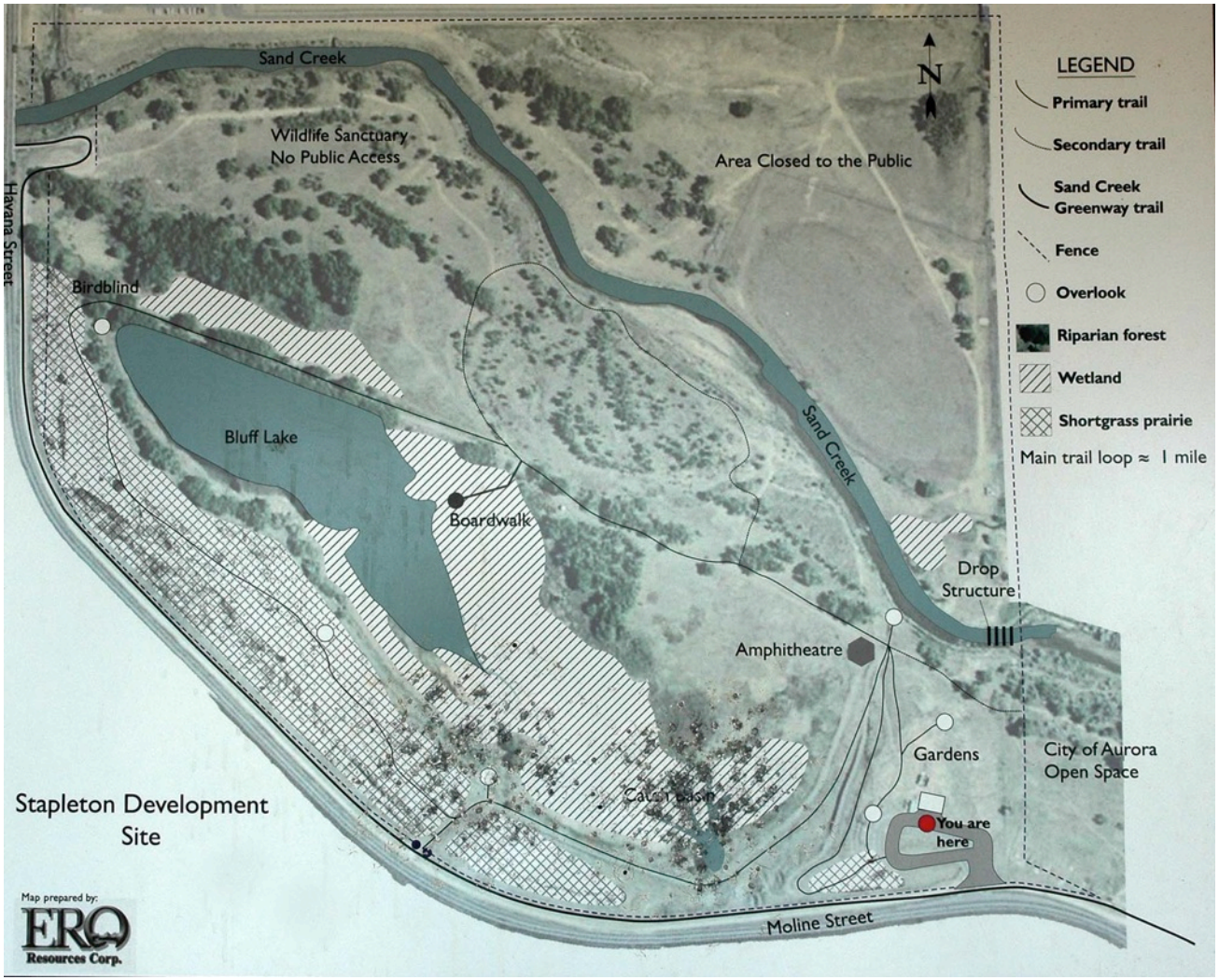
Stapleton is a community largely composed of families. Therefore, there are 12 schools. These are adjacent to open space and opportunities for environmental learning. Some of this takes place at the Bluff Lake Nature Center and at the larger of the community agriculture facilities.

Mountain view at the Bluff Lake Nature Center. Photo: www.stapletondenver.com

Bluff Lake interpretive area. Photo: Austin, 2013

Environmental Education

Bluff Lake Nature Center is a community education and open space resource as well as a refuge for wildlife.



Bluff Lake Nature Center Plan. Photo: Austin, 2013

Environmental Education

Outdoor class room and trails through the Bluff lake Nature area provide rich environmental education opportunities.

Bluff Lake gazebo. Photo: www.stapletondenver.com

Environmental Education

Bluff Lake interpretive area. Photo: Austin, 2013

Green Infrastructure Assessment of Stapleton

- Percentage of open space - marginal
- Ecological corridors – excellent to good
- Corridor and habitat network – marginal
- Expansion of biodiversity – excellent
- Pedestrian and bicycle system – excellent
- Proximity to open space – excellent
- Association with schools – good
- Multi-functional stormwater management - excellent
- Integration with public transportation – poor
- Urban framework – good
- Support of civic and social use – excellent
- Range of recreation amenities - excellent
- Compact development – marginal
- Aesthetics – good
- Food security - fair
- Energy Conservation - poor

- Green Infrastructure Assessment of Stapleton
  - Percentage of open space – marginal

Photo: Austin, 2013.

Conclusion

North Central Blve.39°45'31.32" N 104°52'35.95" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Less useful open space39°45'50.28" N 104°53'07.51" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

- Green Infrastructure Assessment of Stapleton
  - Ecological corridors – excellent to good

Photo: Austin, 2013.

- Green Infrastructure Assessment of Stapleton
  - Corridor and habitat network – marginal

Photo: Austin, 2013.

Green Infrastructure Assessment of Stapleton

- Expansion of biodiversity – excellent

39°45'46.49" N 104°52'15.02" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

Green Infrastructure Assessment of Stapleton

- Pedestrian and bicycle system – excellent

Photo: Austin, 2013.

- Green Infrastructure Assessment of Stapleton
  - Proximity to open space – excellent

Founders Green. Photo: Forest City Enterprises Inc.

Green Infrastructure Assessment of Stapleton

- Association with schools – good

39°45'09.73" N 104°53'59.83" W, Oct. 6, 2013
Google Earth accessed Oct. 30, 2014

Green Infrastructure Assessment of Stapleton

- Multi-functional stormwater management - excellent

Photo: Austin, 2013.

Conclusion

Westerly Creek in flood. Photo: http://globallinks.travel/denver-kristyn/wp-content/uploads/sites/14/2013/09/run-stapleton.jpg

Green Infrastructure Assessment of Stapleton

- Integration with public transportation – poor

Photo: http://stapletonion.com/wp-content/uploads/2013/09/bus-almost-causes-issue.jpg

Green Infrastructure Assessment of Stapleton

- Urban framework – good

Crescent Flats. Photo: Forest City Enterprises Inc.

Conclusion

Photo: Austin, 2013.

Conclusion

Photo: Austin, 2013.

Conclusion

Photo: Austin, 2013.

Conclusion

City center park. Photo: Forest City Enterprises Inc.

- Green Infrastructure Assessment of Stapleton
  - Support of civic and social use – excellent

http://www.stapletoncommunity.com/_photos/homepage-slider-backgrounds/Winter%20Welcome%20web2.jpg

- Green Infrastructure Assessment of Stapleton
  - Range of recreation amenities - excellent

Photo: Austin, 2013.

Conclusion

Photo: Austin, 2013.

Conclusion

http://www.stapletondenver.com/sites/default/files/imagecache/page/dog%20park%20image%20for%20blog.JPG

Dog Park. 39°44'58.47" N 104°53'48.94" W, Oct. 6, 2013
Google Earth accessed Oct. 30, 2014

Conclusion

Photo: Austin, 2013.

Green Infrastructure Assessment of Stapleton

- Compact development – marginal

Photo: Austin, 2013.

Conclusion

Photo: Austin, 2013.

Conclusion

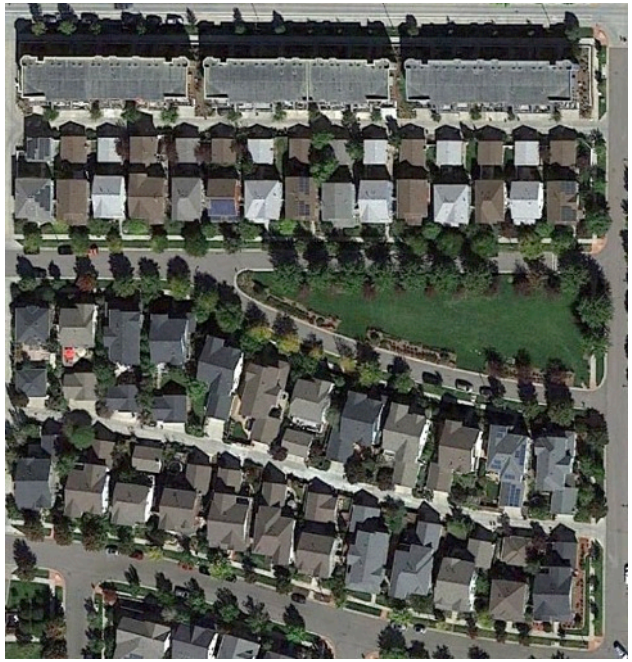
Photo: Austin, 2013.

Conclusion

Affordable Houstin. Bot 11. Photo: Forest City Enterprises Inc.

Conclusion

Adjacent neighborhood. 39°44'54.91" N 104°54'02.23" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014



Stapleton neighborhood. 39°45'23.54" N 104°53'31.95" W, Oct. 6, 2013 Google Earth accessed Oct. 30, 2014

- Green Infrastructure Assessment of Stapleton
  - Aesthetics - good

Auto-oriented retail development at Northfield . Photo: Forest City Enterprises Inc.

Conclusion

Stapleton has a public art program and an interpretive guide to the pieces displayed.

Photo: Austin, 2013.

Conclusion

Green Infrastructure Assessment of Stapleton

- Food security – fair

Community garden Photo: www.stapletondenver.com

Green Infrastructure Assessment of Stapleton

- Energy Conservation - poor

Photo: Austin, 2013.

Thank you

Questions and Discussion

29th commercial center. Photo: Forest City Enterprises Inc.

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