



Sustainable Development Program

October 14, 2011





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“The future belongs to those who understand that doing more with less is compassionate, prosperous and enduring and thus more intelligent, even competitive.”

– Paul Hawken

Executive Summary

Overview

The Candelas¹ Sustainable Development Program (the Program) provides a comprehensive approach for sustainable community development for the benefit of present and future generations. The Program presents a balanced model to meet environmental, social, and economic needs of the community while accommodating the financial commitments and realities of the development environment. The policies, guidelines, and standards of the Program provide a wide range of activities that are reinforced by complementary sustainable design features included in the Candelas Residential Design Guidelines. The sustainability initiatives provided herein are for the residential portion of Candelas (as included in the Residential Development Boundary, see pg. 5). Separate initiatives will be researched for the commercial development at Candelas.

Smart Growth Design

Smart Growth Design (development that recognizes connections between development and quality of life – see Glossary) and Traditional Neighborhood Development (TND) principles support sustainability by incorporating a mix of uses within a compact environmental footprint. Attributes of the community promote connectivity, walkability and diversity in both employment and housing options. Centrally located neighborhoods, schools, parklands, trail systems, and community facilities become primary educational and social venues for resident interaction. These combined attributes create a sense of place.

Site Development

Consideration for the environment has been translated into best management and site development practices that are woven into the fabric of Candelas including:

- Drainage and wetland enhancements
- Water quality and Stormwater management program
- Landscape irrigation conservation measures
- Alternative energy programs and systems

Energy Efficiency and Green Construction

Vertical building construction shall be guided by green building rating systems based on established principles and practices included in the Energy Star® Version 3 program for all residential construction within the Residential Development Boundary and Leadership in Energy and Environmental Design (LEED®) for the construction of community centers throughout Candelas.

Candelas Sustainability Trust

Objective

The Developer of Candelas, Arvada Residential Partners, LLC (“ARP”), will create a unique vehicle through which residential renewable energy systems for homes built within Candelas will be financed and implemented. The Candelas Sustainability Trust (“Trust”) will provide future grants to Candelas homeowners who wish to install renewable energy systems, such as ground source heat pumps or solar PV panels, that generate electricity or that heat and/or cool their homes.

¹ The term ‘Candelas’ or the ‘Candelas Community’ is strictly defined as and limited to the residential property within the Candelas master planned community which is owned by Arvada Residential Partners, LLC.

Philosophy

ARP's philosophy behind creating the Trust is to provide a flexible, future funding source that shall be used specifically for residential renewable energy systems installation and related educational and community programs relating to sustainability. We believe that building flexibility into this program will greatly benefit Candelas residents, specifically on two fronts. First, renewable systems technology, particularly related to solar PV and wind systems is changing rapidly. Building a Trust funding source for systems installation in the future provides a vehicle through which Candelas residents may take advantage of technological gains in these systems over time. Second, as renewable systems technology improves and the adoption of these systems increases, the cost of the systems should decrease over time. Providing a flexible funding source that will be available in the future will allow Candelas residents to take advantage of the projected economic improvements that may result from lower incremental costs to manufacture and install renewable energy systems.

Formation

The Master Developer shall form the Trust prior to the approval of Candelas' first filing final plat.

Funding

The Trust will be funded by fees charged to the homebuilders by the Master Developer until the District is operational. The fees will be due to the Master Developer/District when a building permit is pulled by each respective homebuilder. The amount of the fee will be determined by the Master Developer prior to the approval of the Candelas first filing final plat. The fees will be based upon a sliding scale relative to the residential product type. For example, single family units will pay the highest fee while town-homes, condominiums and apartments will pay a lower fee.

Upon collection of the fees the Master Developer/District will transfer those funds to the Trust. The Master Developer/District will select a professional manager to manage the Trust's assets and who will direct the investment of the Trust proceeds according to the Trust governing documents. Over time the asset base of the Trust is projected to grow to a level that will be sufficient to fund the Trust's objectives.

Disbursements

The Trust governance documents will provide the framework for how the Trust is administered. The documents shall, however, require that the following disbursement guidelines be met:

- Funds may only be disbursed to residents of Candelas;
- At least 75% of the funds disbursed by the Trust must be used for residential renewable energy systems installation. Should renewable energy requirements be required as a part of the Energy Star® Version 3 program, the trust fund will be reduced by the amount of rebates that are given back to builders for adopting renewable energy systems. To the extent that there are more renewable energy homes built there will be less money in the trust as a result of the increased rebates.
- The Sustainability Trust will begin to disburse grants to qualified homeowners after the 800th Certificate of Occupancy. Should the Trust not disburse grants after the 800th Certificate of Occupancy, the City shall enforce this requirement by withholding approval of building permits within the Candelas Residential Boundary until this requirement is met.
- A uniform grant amount and disbursement strategy for each type of residential product shall be determined by the Trust manager with the objective of providing enough funding for every home in Candelas. The grant amount may not be sufficient to cover 100% of the then current renewable energy systems installation costs since the grant amounts will be largely dependent upon absorption rate of the community, future investment performance of the Trust and the future costs of installing residential renewable energy systems;
- Any homeowner who purchased a home that was built with renewable energy systems included is not eligible for a grant from the Trust;
- The remaining 25% of the funds, net of management fees and overhead, may be disbursed by the Trust to fund community wide sustainability programs such as the purchase of renewable energy credits, to fund installation of renewable energy systems that benefit the entire community, educational scholarships (for example, funding opportunities to collaborate with local colleges and corporations), or other programs that fall within the parameters of the Candelas Sustainability Plan. These funds will not be used to install the renewable energy systems that power 50% of the Community Centers, as required within this plan or the sustainable features already outlined in the PDP's / FDP's and scheduled to be built by the Developer / the District (i.e., solar lighting on pedestrian trails, entry monument lighting, solar lighting on kiosks);
- Homeowner's may apply for renewable energy systems installation grants from the Trust in the chronological order in which they purchased their homes.

Community Programs

A wide variety of activities, events, and programs will help strengthen social networks and health initiatives within the community. The District shall provide long term management for both the community programs and the Community Centers. The District shall serve as a champion of the Sustainability Development Program, will administer the Candelas Sustainability Trust, and will facilitate environmental education, community events, and aid in creating a vibrant local business community.

Economic and Transportation

The TND Neighborhood and the Town Center designs encourage diverse and creative living and working opportunities in Candelas and help to reduce residents' dependency on the automobile. An extensive hiking and biking trail network and bike storage areas will facilitate the use of alternative modes of transportation and may help to capture local internal trips within the community. Employment centers with transit and "rideshare" programs can also reduce vehicular use to and from Candelas.

Education and Research

Education and awareness are central to building a sustainable community. Newsletters, community web sites, campaigns, initiatives, events, forums, demonstration projects, and stewardship programs may involve residents, workers, and visitors in an understanding of sustainable living practices. Ensuring a better built environment involves training and collaborating with designers, builders, and tenants regarding integrated design, evolving technologies, and construction practices.

Research and development of ongoing green construction activities and monitoring of annual community facility operational costs will help to measure the effectiveness of the standards and practices and will assist in identifying emerging technical resources for future applications.

Performance Objectives

The strategies of the Program identify proposed objectives and desired outcomes to work toward for energy efficiency, water conservation, construction standards, and trip reduction which will develop over time. The proposed objectives and performance measures will be assessed annually: please refer to page seven for the Objectives Chart.

A summary of the sustainable initiatives to which Candelas is committed to can be found on pages ten and eleven and in Appendix 2. Additionally, Arvada Residential Partners, LLC (ARP) is researching additional financing vehicles to further promote the sustainable initiatives at Candelas. Although ARP and the District are committed to implementing the Candelas Sustainability Trust, additional initiatives may require other capital resources. As this research progresses the Program may be updated.

Collaboration

The success of the Program relies on the collaboration and active participation of the residents, the City of Arvada, Jefferson County School District, and the businesses in the surrounding research corridor. Viable long-term partnerships will be invaluable to promote the vision and projects for community wide sustainable living at Candelas.

Implementation and Management

The Program is developed by the Master Developer, Arvada Residential Partners, LLC, (ARP) and shall be administered by the District. The Master Developer will initially administer the program until the District is operational. The Master Developer/District will engage an outside consultant as a program manager who will coordinate and implement the Program strategies. The Program is intended to evolve over time and shall be reviewed and revised on an annual basis to meet changing technologies and environmental, social, and economic conditions of the community. As residents move into Candelas over time, it is intended that the District will adopt a formal committee of four members. The Candelas Sustainable Development Committee (CSDC) will serve as an advisory committee to the District Board of Directors with regard to updating the Sustainability Program and oversight of the various implementation strategies. Timing of the renewable energy systems is based on market absorption of the community.

Please see section 2.2 for more information on the Program management.

Candelas Vision

Candelas is a 1,451 acre mixed use community located in Northwest Arvada that embraces a new way of life - one that is built upon a devotion to open space, progressive technology and sustainable stewardship.

The Candelas community is founded on several different design principles that target a responsible land stewardship ethic and the cultural values of Colorado's 'research corridor.' Through its mixed use design, tree-lined thoroughfares, generous parks and open space and a compatible mixture of urban and suburban design qualities, Candelas embodies the principles desired in a sustainable neighborhood and community.

Three guiding principles provide the framework for the development of the community:

- **Community** – A focus on neighborhood and housing differentiation will enhance the community's residential, diversity, employment and civic goals. A substantial portion of Candelas will be pedestrian-oriented. In particular, the future Town Center will serve as a focal point for neighborhood retail, restaurants, entertainment and civic opportunities. The Candelas Sustainability Trust will become a defining community program that will draw residents together to achieve community-wide environmental goals.
- **Innovation** – Candelas will be designed with an emphasis on leveraging progressive technology such as renewable energy systems and innovative thinking. This infrastructure, coupled with the implementation of renewable energy technologies in our community centers, and providing funding through the Candelas Sustainability Trust for renewable energy system installation in our residential homes, will set Candelas apart as a model community for the 21st century.
- **Stewardship** – Green building standards, renewable energy systems, methods, programs, and sustainable design guidelines will be established and continually researched with the objective to increase efficiency and to reduce energy consumption throughout the community. This environmentally conscious community will promote best practices in recycling, water conservation, light pollution mitigation, soil preservation, wildlife protection and sustainable development. Ideally located in the heart of Colorado's "Research Corridor", Candelas aims to capitalize on the significant educational, research and technology installations nearby, such as: CU-Boulder, National Institute of Standards and Technology (NIST), National Oceanic and Atmospheric Administration (NOAA), Interlocken Technology Park, National Renewable Energy Laboratory (NREL), and Colorado School of Mines.

Candelas is founded upon the principles of a sustainable community designed for the well-being of current and future generations. Both development and community living shall be guided by

principles to:

- Incorporate the values of conserving resources, preserving the environment, recycling, and creating a healthy environment that encourages outdoor recreation activity throughout the community;
- Promote sustainability through economically viable planning guidelines, construction techniques, and maintenance operations;
- Increase understanding of green building construction and promote educated design choices;
- Build the education opportunities for residents, occupants, and guests to inform and to encourage active participation in moving toward sustainable lifestyle;
- Foster partnerships for innovative demonstration projects and research development;
- Create and maintain a sense of community through communication, culture, and gathering opportunities;
- Enhance the quality of daily life in healthy living and working environments.

Residential Development Boundary



* This graphic is conceptual and subject to change.
 * Not to scale

Sustainable Design Features Exhibit



Sustainable Design Features

ITEM	DESCRIPTION
1	Wetland and Water Body Conservation
2	Drainage Access / Corridor Access for Animal Access to RFWR
3	Pedestrian Connectivity / Bicycle Network
4	Open Community
5	Leed Certified Community Centers
6	Access to Diverse Uses
7	Walkability
8	Light Pollution Reduction
9	Solar Thermal / PV on Community Centers
10	Heat Island Reduction
11	Recycled Content
12	Sense of Community
13	Interpretive Signage
14	Aquifer Recharge
15	Stormwater Management Runoff
16	Wind Mitigation
17	Elimination of Turf in Street ROW
18	Solar Powered Lighting
19	Reduced Potable Water Use
20	Permeable Pavement
21	Energy Start Version 3 Homes
22	Energy Star Appliances
23	Coordination with Jefferson County Schools
24	Planning and Site Design
25	Synergies Between Residential, Commercial, and Mixed Use
26	Residential Product Diversity / Affordability
27	Best Management Practices

Sustainable Design Features

OTHER
Imperiled Species and Ecological Communities
Community Wide Recycling Program
Turf Limitation for Homes
Landscaping / Xeriscaping
Renewable Energy Credits
Sustainability Grant / Contest for Green Home
Fiber to Homes
Encourage Entrepreneurship
On-Site Construction Recycling Program
Light Pollution Reduction
Local Suppliers
Create and Administer the Sustainability Trust
ISO 140001 Certified Site Furniture
Encourage On-Site Material Usage in Construction
Public Transportation
Sustainability Manager Through the District
Community Website on Sustainability
Native Plants
Material Selection

Performance Objectives Chart

Performance Objectives

Component	Objectives	Initiatives
Transportation	<ul style="list-style-type: none"> Reduce internal vehicle trips / miles 	<ul style="list-style-type: none"> Create opportunities for living and working to reduce dependency on the automobile 4 6 25
		<ul style="list-style-type: none"> Build trail network, bike storage areas, and showers with changing facilities 3 7
		<ul style="list-style-type: none"> Employment centers with transit and ride-share programs 4 6 25
		<ul style="list-style-type: none"> Connect to existing public transportation network (RTD) 4
Education	<ul style="list-style-type: none"> Raise awareness of sustainable construction and living practices 	<ul style="list-style-type: none"> Ongoing commitment to green construction activities 5 9 11 18 20 21 22
		<ul style="list-style-type: none"> Research baseline energy consumption and waste disposal rates
		<ul style="list-style-type: none"> Implementation of interpretive signage program outlining community wide initiatives and building practices 13
Environment	<ul style="list-style-type: none"> Develop the site with respect to the interdependent natural systems and features 	<ul style="list-style-type: none"> Network of linked dedicated green spaces and trails for recreation and wildlife movement 1 2 3 7 24 27
		<ul style="list-style-type: none"> Concentration of mixed-use development in appropriate locations to reduce regional sprawl 6
Energy Efficiency	<ul style="list-style-type: none"> Reduce building and site energy consumption through thoughtful design and construction 	<ul style="list-style-type: none"> Residential construction will meet Energy Star® Version 3 requirements 21 22
		<ul style="list-style-type: none"> Community Centers will be LEED Certified 5
		<ul style="list-style-type: none"> Candelas Sustainability Trust provides opportunities for residential renewable energy components
		<ul style="list-style-type: none"> Commitment to renewable energy system within each community center
Water Conservation	<ul style="list-style-type: none"> Promote and specify native plantings and xeriscape principles 	<ul style="list-style-type: none"> Reduce consumption and promote community wide water conservation 17 19
		<ul style="list-style-type: none"> Reduce interior water usage through fixture and appliance selection
Materials	<ul style="list-style-type: none"> Promote regionally sourced and manufactured products (preferably within 500 miles of the project site) 	<ul style="list-style-type: none"> Reduce the use of non-renewable resources, incorporate environmentally responsible materials, and minimize solid waste production 19
		<ul style="list-style-type: none"> Reduce construction materials disposal
Social	<ul style="list-style-type: none"> Livability and walkability in compact and efficient neighborhoods designed to a pedestrian scale 	<ul style="list-style-type: none"> Create a physically healthy and socially interactive community in a safe environment 3 6 7 8 12 25 26
		<ul style="list-style-type: none"> Community parks located within 1/2 mile walking distance of all residential units
Economic	<ul style="list-style-type: none"> Develop and support an innovative local business community involved in sustainable practices 	

See Sustainable Design Features Exhibit for examples, pg. 7.

Candelas Sustainability Initiatives Commitments

Candelas Committed Sustainability Initiatives

<p>Transportation</p>	<ul style="list-style-type: none"> • Fiber to the home (reduce traffic trips) • Pedestrian connectivity/bicycle network 3 • Access to diverse uses 6 • Walkability 7 • Public transportation • Open Community 4
<p>Education</p>	<ul style="list-style-type: none"> • Sustainability Manager through the District • Interpretive signage 13 • Community web site – sustainability • Coordination with Jefferson County schools to ‘brand’ new high school as sustainable & curriculum 23 • Create and administer the Sustainability Trust
<p>Environment</p>	<ul style="list-style-type: none"> • Light pollution reduction 8 • Native plants • Drainage access/corridors for animal access to Rocky Flats Wildlife Refuge 2 • Wetland and waterbody conservation 1 • Local construction suppliers • Permeable pavement 29 • LEED® Community Centers 5 • Energy Star® Version 3 residential standard 21 • Renewable Energy Credits • Wind mitigation 16 • Heat island reduction 10 • Create and administer the Sustainability Trust • Aquifer recharge 14 • Imperiled species and ecological communities • Planning and Site Design 24 • Best management practices 27
<p>Energy Efficiency</p>	<ul style="list-style-type: none"> • LEED® Certified Community Centers 5 • Energy Star® Version 3 residential standard 21 • Energy Star® appliances 22 • Solar powered pedestrian lights 18 • Local suppliers • Solar thermal/PV on Community Centers 9 • Create and administer the Sustainability Trust
<p>Water Conservation</p>	<ul style="list-style-type: none"> • Landscaping / xeriscaping • Elimination of turf in street ROWs 17 • Turf limitation for homes (see design guidelines) • Stormwater management runoff 15 • Reduce potable water use 19
<p>Materials</p>	<ul style="list-style-type: none"> • Community-wide recycling program • Encourage onsite material usage in construction • Local suppliers • Permeable pavement 20 • LEED® certified Community Centers 5 • Onsite construction recycling program • Create and administer the Sustainability Trust • Recycled content 11 • ISO 140001 Certified site furniture • Material Selection



Social	<ul style="list-style-type: none">• Sustainability Manager through the District• Pedestrian connectivity/bicycle network ³• Access to diverse uses ⁶• Residential product diversity/affordability ²⁶• Sense of Community ¹²• Pedestrian connectivity/bicycle network ³• Sustainability grant/contest for 'green home'• Create and administer the Sustainability Trust
Economic	<ul style="list-style-type: none">• Synergies between residential, commercial and mixed use sites ²⁵• Encourage entrepreneurship• Create and administer the Sustainability Trust

See Sustainable Design Features Exhibit for examples, pg. 7.

Candelas Master Plan

CANDELAS MASTER PLAN

Based on combining Live, Work and Play principles

- Sense of place
- An appropriate mix of compact and open development pattern
- Mix of land uses
- Enhanced site environment
- Green space connections
- Neighborhood connections
- Community connections
- Livable, walkable streets
- Lively urban center
- Well defined public realm
- Housing and demographic diversity
- Employment diversity

Each neighborhood is composed of residential lots, blocks, thoroughfares, parks and open spaces leading to appropriate connections with commercial spaces. These components are arranged in a variety of ways to create unique places within the community. Four types of neighborhoods within the Residential Development Boundary have been programmed for Candelas, each representing its own character based on location, topography, focal points, demographics and a unique mix of uses. Together, the neighborhoods support the Town Center to create a special place and foster a sense of community.

“**Treat the Earth well. It was not given to you by your parents. It was loaned to you by your children.**”

– **Kenyan Proverb**

TRADITIONAL NEIGHBORHOOD DESIGN –

Regulates land use and urban form of buildings, urban spaces, thoroughfares, park lands and open spaces.

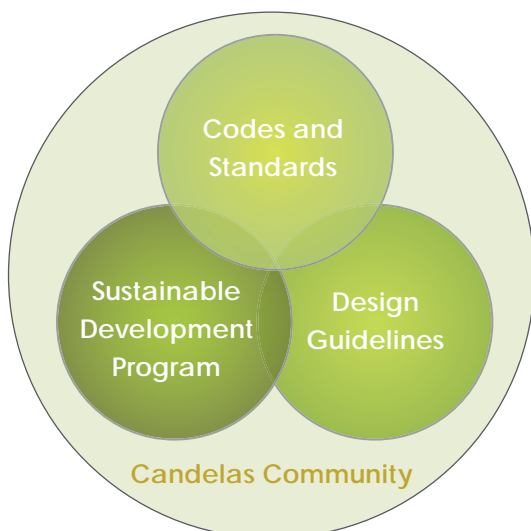
DESIGN GUIDELINES –

Guides architectural and landscape design development of built environment incorporating universal sustainable design principles.

SUSTAINABLE DEVELOPMENT PROGRAM –

Provides comprehensive community-wide policies and guidelines for sustainable development and construction promoting ecological and social planning practices.

The neighborhood is the fundamental building block of Candelas.





PREFACE

The Program is intended to establish the general principles, guidelines, and standards for a comprehensive sustainable development program for the areas within the Residential Development Boundary. The Program is designed as an incremental system that will evolve over time to balance the changing environmental, social, and economic needs of the community. Furthermore, it is important to emphasize that elements of the Program must be financially feasible to the participants to operate effectively. Both the design and development of the Candelas Sustainable Development Program are challenged to seek a balance among the following commitments and conditions:

- New and improved infrastructure serving the area;
- Substantial dedications for municipal uses, neighborhood and community parks, schools, and hospital;
- Diverse housing stock to meet demand across a spectrum of market price points;
- Increasing construction costs and associated development impact fees.

The creation, ongoing development, and success of the Candelas Sustainable Development Program is dependent upon the collaboration and active participation of varying interests and partnerships from within the Arvada community and Metro Denver.

The management and operations of the Candelas Sustainable Development Program will require ongoing funding support through the District, from the Candelas Sustainability Trust, donations and contributions, additional matching grants, and coordination with local governments and initiatives.



“When we tug at a single thing in nature, we find it attached to the rest of the world.”

– John Muir

1. Overview



Mission: To create a healthy, livable, and sustainable community with an enhanced quality of life for present and future generations at Candelas.

1.1 BACKGROUND

The Candelas Sustainable Development Program (the Program) presented herein is based upon:

- Concepts of the Sustainable Development Implementation Strategy, A Road map for Green Development at Candelas, included in the approved Candelas ODP Narrative.
- Elements of the U.S. Green Building Council's Leadership in Energy and Environmental Design-Neighborhood Development Pilot Program (LEED-ND[®])
- Elements of the U.S. Green Building Council's Leadership in Energy and Environmental Design-New Construction (LEED-NC[®])
- Elements of the Energy Star[®] Version 3 Program

1.2 PURPOSE

The Candelas Sustainable Development Program provides developers, architects, home-builders, and managing entities with integrated planning guidelines for sustainable community development, and ecological and social planning practices. The Program is intended to provide a comprehensive approach to ensure the long-term sustainability and vitality of the Candelas Community.

1.3 SUSTAINABLE DEVELOPMENT DEFINED

Sustainable development is that “which meets the needs of the present without compromising the ability of future generations to meet their own needs.” (United Nations World Commission on Environment and Development). Sustainable development recognizes the complex balance for accommodating human needs without diminishing the health and productivity of natural systems of the shared world.



1.0 OVERVIEW

- 1.1 Background
- 1.2 Purpose
- 1.3 Sustainable Development Defined
- 1.4 Role of Candelas

2.0 A SUSTAINABLE FUTURE

3.0 EDUCATION

4.0 ENVIRONMENT

5.0 ENERGY

6.0 WATER CONSERVATION

7.0 MATERIALS AND RESOURCES

8.0 SOCIAL

9.0 ECONOMIC

10.0 TRANSPORTATION

11.0 IMPLEMENTATION PLANS



1.4 ROLE OF CANDELAS

As Master Developer of Candelas, ARP assumes leadership for economically viable, sustainable development at Candelas by adopting policies, guidelines, and standards to:

- Seek and support practical applications of sustainable development moving from extractive and disposable practices;
- Integrate restorative practices balancing quality of life, community well-being, and economic growth;
- Develop and maintain long-term partnerships in the Arvada community and within the surrounding 'research corridor' which support and further sustainable development;

2. A Sustainable Future



Mission: To create a healthy, livable, and sustainable community with an enhanced quality of life for present and future generations at Candelas.

2.1 FRAMEWORK

Planning Foundation

The planning and design process for development of Candelas carefully integrates site-specific Traditional Neighborhood Development (TND) principles, Town Center design principles, incorporation of open space parks and trail networks, and sustainable site design practices guiding land use, urban form and design standards including:

- Candelas Outline Development Plan (ODP)
- Candelas ODP Narrative
- Candelas Residential Design Guidelines
- Candelas TND Design Guidelines
- Project web site: www.candelas39.com

2.2 GOVERNANCE AND MANAGEMENT POLICY

Governance

The Board of Directors (Board) of the District shall administer the Candelas Sustainable Development Program. The Board shall employ the services of a consultant as a Sustainability Development Program Manager (SDP Manager) responsible for coordinating Community / Development Programs as necessary. The SDP Manager shall work closely with the Candelas Sustainability Development Committee (CSDC) which will operate as an advisory committee to the Board, the Board itself, the Candelas Design Review Committee (CDRC), and the Master Developer regarding the performance of design and construction policies and standards. ARP shall define, initiate, and coordinate the Program in its initial stages and shall provide sufficient operating funds as needed during this start up period.



1.0 OVERVIEW

2.0 A SUSTAINABLE FUTURE

2.1 Framework

2.2 Governance and Management Policy

2.3 Program Components

2.4 Program Structure

2.5 Program Strategies

3.0 EDUCATION

4.0 ENVIRONMENT

5.0 ENERGY

6.0 WATER CONSERVATION

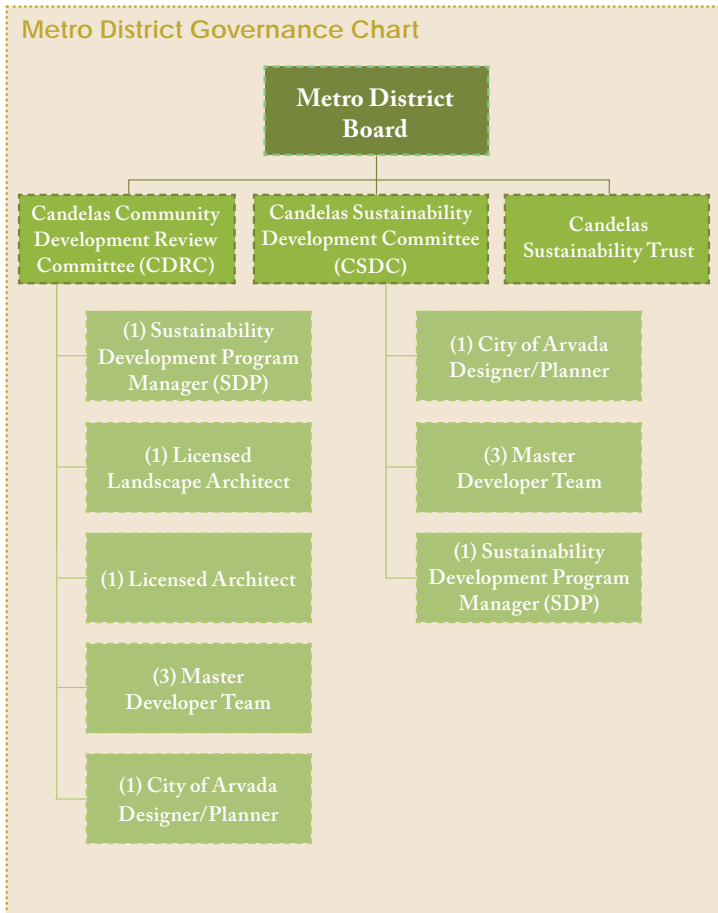
7.0 MATERIALS AND RESOURCES

8.0 SOCIAL

9.0 ECONOMIC

10.0 TRANSPORTATION

11.0 IMPLEMENTATION PLANS



The Candelas Sustainable Development Program shall address such matters as green construction and landscape design standards while allowing for a diversity of options for integration. Design Standards of the Program shall be applied by the Candelas Design Review Committee (CDRC) in accordance with internal governance mechanisms described in the Master Declaration of Covenants, Conditions, Restrictions, and Reservations of Easements for Candelas.

Program Review and Evaluation

The Board of Directors of the District shall evaluate proposed sustainability programs, their economic feasibility, metrics for gauging effectiveness, and assist in redefining new approaches and initiatives for implementation on an annual basis. The Metro District Board shall also be responsible for administering the Candelas Sustainability Trust fund.

In order to implement a program that continually makes sense for the community; this plan will be re-evaluated each year as both the market and technology change.

2.3 PROGRAM COMPONENTS

The Guiding Principles of the Candelas Vision shape the goals and action plans for eight (8) fundamental sustainable areas:

1. **Education**–To create ongoing awareness and understanding of sustainable design, construction, and daily practices and operations at all levels of the community
2. **Environment**–To develop the site with sensitivity to the ecological and natural elements
3. **Energy Efficiency**–To create an energy-conserving and energy-efficient community moving toward reduced impacts on the natural world
4. **Water Conservation**–To promote potable water economies and water quality and conservation measures for existing and future users in the community
5. **Materials and Waste**–To reduce the use of non-renewable resources, incorporate environmentally responsible materials, and minimize solid waste production
6. **Social**–To create a physically healthy and socially interactive community in a safe environment
7. **Economic**–To develop and support an innovative local business community involved in sustainable practices
8. **Transportation**–To reduce dependency on the automobile and encourage alternative transportation modes


2.4 PROGRAM STRUCTURE

The goals of the eight sustainable areas are implemented into action through Principles, Guidelines, Standards and Initiatives as defined:

- Principles explain the broad, general concepts of intended sustainable objectives
- Guidelines promote the intended objectives and typically use the term ‘should’ to indicate that compliance is not mandated, but is highly encouraged to achieve the overall vision for Candelas
- Standards are specific performance criteria intended to aid the implementation and evaluation process. Standards are based on a stated sustainability intent or goal, and typically use the terms “shall” or “will” to indicate that compliance is mandated.
- Initiatives are programmatic elements that the Developer is including in the community design and are representative of the implementation of the Program.

2.5 PROGRAM STRATEGIES

Specific Program strategies are discussed in Chapter 11 with central emphasis on the inclusion of green construction policies



to guide design/construction. Vertical construction in Candelas shall be guided by frameworks established in Energy Star® Version 3 and Leadership in Energy and Environmental Design for assessing building performance and meeting sustainability goals to:

- Increase energy and water efficiency
- Decrease material waste
- Improve durability
- Utilize environmentally responsible materials
- Improve indoor air quality
- Reduce maintenance of the built environment



“Study nature, love nature, stay close to nature. It will never fail you.”

– Frank Lloyd Wright

3. Education



Goal: To create ongoing awareness and understanding of sustainable design, construction, operations, & daily practices at all levels of the community.

3.1 COMMUNITY EDUCATION

Principle

The vision for sustainability includes life-long learning opportunities to comprehend sustainable practices in daily living.

Guidelines

- Education on sustainability issues should be an evolving and growing initiative utilizing a variety of resources and programs reaching out to all sectors of the community
- Education programs should serve to raise awareness, develop community ethic, and foster changes in consumer habits and behavior patterns
- Innovations in design, construction, and operations should be a central focus
- Promotion of active on-going collaboration through key partnerships is central to researching, developing, and monitoring programs and projects

Standards – Program Management

The Candelas Sustainable Development Program shall:

- Establish educational communication infrastructure to include a variety of resources such as community web site(s), flyers, brochures, newsletters and other media
- Develop and implement community campaigns, events, and forums in the community on a regular basis to teach children, adults, and businesses about sustainable issues and innovations
- Develop demonstration projects and xeriscape areas in the community, including interpretive signage to showcase alternative design, xeriscape principles, best management practices, green building techniques, and usage efficiencies
- Establish on-going commitments to encourage City of Arvada, Arvada Fire District and Jefferson County School District to incorporate green building elements in the design and construction of civic and educational facilities with demonstra-



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tion and experiential components

- Foster partnerships with Jefferson County School District to develop and ‘brand’ their on site school as a ‘green’ school. This new school could implement green education curriculums and the facility could serve as a green building laboratory featuring ecological and conservation features as one of its hallmarks
- Develop eco-awareness interpretive signage throughout the community including buildings, parks, and trails to educate the public about the natural environment, responsible design, efficiency, and conservation
- Collaborate with local and regional service providers and initiatives to promote sustainable education in forums, workshops, and conferences for the public, professionals, and decision-makers
- Hire a Sustainable Development Manager through the District to facilitate educational initiatives throughout the community
- Develop a web site and an interpretive signage program containing up-to-date information regarding national and international environmental initiatives

3.2 DESIGNER / BUILDER / TENANT EDUCATION

Principle

Education and training on sustainable design features strengthen the commitment to a better built environment at every level.

Guidelines

- Involvement of designers, the sustainability program manager, construction professionals and tenants in the design process is integral to the delivery of environmentally responsible site design, construction, and maintenance.

Standards – Program Management

The Candelas Sustainable Development Program shall:

- Participate with the Arvada Community and Development Department and the Project Team (owners, designers, other consultants, and builders) during pre-application process to review economically viable site design opportunities, local alternative design resources, eco-friendly building materials, and design standards
- Require review and approval of all builder plans by the Sustainability Committee prior to construction to ensure proper compliance and best practices are implemented
- Establish Design Guidelines that require solar-ready features in every home for the future installation of solar PV panels.

3.3 PURCHASER EDUCATION

Principle

Eco-awareness education for purchasers reinforces a sustainable culture for resource conservation and efficient household operations.

Guidelines

- Eco-awareness education for purchasers should take place during the marketing and sales process.

Standards – Program Management

The Candelas Sustainable Development Program shall:

- Coordinate development of a Design Resource Center within the community center that contains collateral materials on eco-friendly design and materials choices.
- Market and communicate the Candelas Sustainability Trust program to prospective purchasers and home buyers.
- Provide homebuyers, at the time of purchase, educational material outlining common xeriscaping principles and practices. This material will include (3) sample water-wise residential landscape plans for thier individual products, a master community plant list, the City of Arvada Water-Wise plant list, an explanation of common best practice management techniques, and a keyed Candelas Community Site Map locating xeriscape examples and practices throughout the community. These 3 sample water-wise landscape plans must be submitted and reviewed by the city prior to obtaining the first building permit for that product.

3.4 OCCUPANCY, OPERATIONS, AND MAINTENANCE

Principle

Post-construction education is key to ensuring that buildings and landscapes operate as originally designed.

Guidelines

- Builders will educate occupants, owners, maintenance professionals, and equipment managers about the sustainable design elements incorporated into the building and the site.

Standards – Design and Construction

Designers/Builders shall:

- Develop manuals including Occupancy and Operations Manuals for community center buildings to provide:
 - › Building and equipment warranties
 - › General operations and troubleshooting

Standards – Program Management

The Candelas Sustainable Development Program shall:

- Coordinate with Designers/Builders to develop Operations and Maintenance Manuals for Community Center use to include:
 - › Conservation and efficiency recommendations
 - › Landscaping recommendations
 - › Community resource directories
 - › Links to additional regional resources
 - › Eco-friendly maintenance practices

3.5 INITIATIVES

- Hire a Sustainable Development Manager initially by the Master Developer to facilitate educational initiatives
- Establish educational communication infrastructure (web site, brochures)
- Coordination with Jefferson County schools to ‘brand’ new high schools with a sustainable curriculum ²³
- Interpretive Education Signage Program ¹³
- Create and administer the Candelas Sustainability Trust with flexibility to utilize a portion of the Trust assets to fund scholarships for residents and/or other sustainability related educational programs

See Sustainable Design Features Exhibit for examples, pg. 7.



“The good building is not one that hurts the landscape, but one which makes the landscape more beautiful than it was before the building was built.”

– Frank Lloyd Wright

4. Environment



Goal: To develop the site with sensitivity to the natural features and systems.

4.1 PLANNING AND SITE DESIGN

Principle

Effective site design recognizes and respects the interdependent natural systems of the site in planning for the built environment.

Standards

The Candelas Plan and the governing documents (ODP and ODP Narrative, Overall Design Guidelines), ensure:

- Concentration of mixed-use development in appropriate locations to reduce regional sprawl
- Consideration of natural view sheds/vistas which tie the community with the natural environment
- Network of linked dedicated green spaces and trails for recreation and wildlife movement
- Protection and enhancement of drainage and wetland areas
- Landscape concepts planned in context with the regional landscape setting

4.2 ECOLOGY AND DESIGN

Principle

Effective site planning analyzes impacts on water quality, wetlands, and wildlife habitats.

Guidelines

In order to protect and enhance wetlands and riparian habitats, development plans and activities should:

- Plan and design to strengthen open space habitat systems
- Select specific plants and materials to support habitat



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4.0	ENVIRONMENT
4.1	Planning and Site Design
4.2	Ecology and Design
4.3	Air Quality and Microclimate
4.4	Stormwater Management
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- Create conditions for supporting biodiversity
- Link green spaces to support wildlife movement through corridors
- Minimize the impacts of both construction and occupancy on sensitive ecosystems

Standards – Site Development

The Master Developer shall:

- Develop the site in conformance with the Arvada Land Use Code, the Design Guidelines, the ODP and the Conceptual Master Plan with open space and park land dedications
- Develop the site utilizing Best Management Practices (BMPs) or a variety of effective methods in control of soil erosion, management of surface runoff, and conservation of irrigation water during development of the overall site. Best Management Practices may include among others:
 - Planning to incorporate drought tolerant native and/or Xeriscape plantings with low maintenance and provide for establishment and long term care
 - Creating vegetated swales fed by stormwater runoff from roadways that help sustain new plantings and clean storm water before it reaches the existing wetlands and waterways
 - Incorporating irrigation systems designed for establishment of native plantings with the capability to turn off when plants' root systems are established and to turn on again during periods of drought, if necessary
 - Implementing bioengineering techniques, such as willow staking, to stabilize the toe of slope in some drainage channels
 - Clearly identify those areas to be preserved by erection of construction fence and/or silt fencing
 - Completing Erosion and Sediment Control Plan prior to construction

4.3 AIR QUALITY AND MICROCLIMATE

Principle

Development and habitation of the site should recognize and strive to mitigate associated impacts on both microclimate and atmospheric conditions.

Guidelines

- The Master Plan design for the mixed-use community provides for pedestrian-friendly street networks, bicycle paths, transit stops, and fosters work opportunities in the community

- Thoroughfare planning and design should incorporate vegetation along planned thoroughfares
- Development should minimize wide-spread pollutants from site work and construction activities
- Habitation of the site should seek to minimize associated pollutants from heating/ventilation/cooling systems
- Long term background monitoring of local air quality conditions can serve to provide data regarding air quality conditions

Standards – Site Development

The Master Developer shall:

- Develop the site in conformance with the Outline Development Plan with mixed-use community design, trail networks, and bike routes
- Install thoroughfare landscaping that provides street trees and water conserving landscape treatment
- Require landscape designs/installations to conform to the Candelas Residential Design Guidelines to reduce the heat island effect of buildings and parking lots
- Control disturbance during site preparation and construction per local permit standards for dust control

4.4 STORMWATER MANAGEMENT

Principle

Effective resource management and application of emerging technologies for stormwater systems can improve water quality, increase groundwater recharge, and nourish the watershed.

Guidelines

To minimize the water quality problems associated with stormwater runoff and release of excess nutrients, planning and site development should:

- Reduce flood impacts by dispersing and regulating flood flows
- Implement an overall stormwater management plan
- Incorporate best management practices to address water quality
- Incorporate best management practices to address soil erosion
- Protect drainages and wetlands from sedimentation with landscape buffers
- Treat water quality through series of focused treatment structures and basins, and the introduction of pervious paving in select areas.

- Redirect runoff to support landscaping
- Monitor water quality
- Develop maintenance guidelines to minimize use of chemical fertilizers/pesticides

Standards – Site Development

The Master Developer shall:

- Develop the site in conformance with the Candelas Residential Design Guidelines with careful design of impervious surface areas, pocket parks, and landscape edges
- Require Developers and Builders to design and construct according to the Candelas Residential Design Guidelines with limitations on lawn coverage in order to control urban pollutants and possible impacts to stormwater.
- Follow City of Arvada and State requirements for stormwater discharge management

Standard – Education, Research, and Demonstration

The Candelas Sustainable Development Program shall:

- Coordinate community projects promoting the experiential elements of water management in the green spaces of the community. Projects may include such educational venues as: interpretive areas, bird roosts and wildlife viewing blinds, boardwalk trails, and water quality monitoring, planting displays within treatment areas, permeable pavements for parking areas, and treatment option demonstrations.
- Coordinate operations and maintenance manuals for community center projects to address practices to minimize stormwater contamination

4.5 INITIATIVES

- Native plants
- Drainage access/corridors for animal access to RFWR ²
- Wetland and water body conservation
- Local construction suppliers (shortened trips = reduced pollution)
- Permeable pavement to manage surface run-off ²⁰
- LEED® certified Community Centers ⁵
- Energy Star® Version 3 residential standards ²¹
- Candelas Sustainability Trust funds will be used to purchase renewable energy credits to offset residential home electricity use

- Candelas Sustainability Trust funds will be granted to Candelas residents to pay for some portion (to be determined in the future) of residential renewable energy system installation costs
- Planning and Site Design ²⁴
- Best Management Practices ²⁷

See Sustainable Design Features Exhibit for examples, pg. 7.



“ We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.”

– Aldo Leopold

5. Energy



Goal: To create an energy-conserving and energy-efficient community moving toward reduced impacts on the natural world.

5.1 ENERGY EFFICIENCY

Principle

The most critical mission for ensuring a sustainable future is to reduce building energy consumption through responsible design implementation and construction.

Guidelines

- The design and construction for energy efficiency in community recreation buildings should adhere to the proven guidelines in LEED®
- Design and construction of all residential structures shall comply with the Energy Star® Version 3 program
- All residential structures shall comply with the Energy Star® program when selecting and installing major household appliances
- Designers and Builders should be strongly encouraged to achieve exemplary energy performance
- The value of energy efficient homes should be translated effectively to prospective purchasers

Standards – Design and Construction

Designers and Builders shall:

- Work closely with the Candelas Design Review Committee and the Arvada Community Development Department in the pre-design phase to incorporate energy savings through improvements to building shell, thermal insulation, HVAC systems, water heating, day lighting, and shading, and incorporate the Candelas Sustainable Development Program as is appropriate.

Residential Energy Efficiency Standards:

Designers and Builders are required to meet the Energy Star® requirements by either the Prescriptive or Performance Paths as outlined by the Energy Star® Version 3 Program. Designers and Builders shall meet the following Candelas Standards:



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5.0	ENERGY
5.1	Energy Efficiency
5.2	Energy Alternatives
5.3	Initiatives
6.0	WATER CONSERVATION
7.0	MATERIALS AND RESOURCES
8.0	SOCIAL
9.0	ECONOMIC
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- All homes shall meet the Energy Star® Requirements
- Install Energy Star® qualified appliances, if appliances are provided. Installation of Energy Star® qualified light bulbs and fixtures are recommended including the Energy Star® Advanced Lighting Package (ALP). If appliances are not provided, a list of energy efficient appliances shall be provided to the purchaser.

Community Center Energy Efficiency Standards:

Designers and Builders of Community Center projects are required to meet for LEED-NC® Prerequisites and Credits for energy performance. At minimum, Designers and Builders shall incorporate the following:

- Install Energy Star® qualified appliances, if appliances are provided. Installation of Energy Star® qualified light bulbs and fixtures are recommended. The installation of the Energy Star® Advanced Lighting Package (ALP) is highly recommended.
- Incorporate parking lot landscape planting islands to reduce heat island effect. Installation of paving materials with a Solar Reflectance Index (SRI) of 29 is recommended.
- Building shading and green roofs (approximately 50% of roof area) are highly encouraged to reduce energy loads. Installation of roofing materials having a Solar Reflectance Index (SRI) equal to or greater than LEED-NC® requirements is encouraged.

Standards – Education, Research, and Demonstration

The Candelas Sustainable Development Program shall:

- Collaborate with other entities to establish a reliable and comprehensive baseline of current energy use in Jefferson County and neighboring communities by household
- Collaborate with the building community to host building science workshops to provide design, construction techniques, and compliance methodology with Energy Star® and/or LEED® energy performance optimization technologies
- Develop programs and exhibits in the Design Resource Center to educate prospective purchasers about the characteristic features of an Energy Star® labeled home and provide recommendations for consumer efficiency products and operations
- Develop and promote consistent energy saving campaigns aimed at consumer habits and appliance efficiencies
- Coordinate with XCEL to promote alternative energy options and savings, including purchase of green power and net metering policy revisions
- Coordinate with designers, builders, and owners of high

profile community buildings to feature demonstration projects/programs about the building's design and operational optimization

5.2 ENERGY ALTERNATIVES

Principle

The integration of alternative energy use is critical to reducing the environmental impacts of operations and lessening reliance on finite resources.

Guidelines

The design and construction of alternative energy systems will be encouraged throughout the community

- All building design should consider the site opportunities for optimal solar orientation and the available technology for active or passive solar use
- Implemented alternative energy projects offer opportunities for demonstration projects to further ongoing renewable energy education.
- The solutions and technological advances of renewable energy alternatives are evolving and, where feasible, will be researched for applicability in the community.

Standards – Design and Construction of Community Centers

Designers and Builders shall:

- Coordinate with the SDP Manager to develop and promote incorporated applications in demonstration projects
- Incorporate solar energy design and/or geothermal applications in the design and construction of the Community Centers at Candelas.
- Employ solar PV/solar thermal for the pool heating and Ground Source Heat Pump (GSHP) for heating and cooling the facilities themselves.
- Incorporate renewable energy systems to power at least 50% of the community centers.

Standards – Design and Construction of Residential Homes

Residential Alternative Energy Standards:

In addition to the Energy Star® standards all builders in Candelas will be required to solar-ready their homes to accommodate future solar PV panel installation. The specifications of the solar-ready program include:

- Designing and constructing homes such that a minimum

of 300 square feet of roof area is generally South or Southeast facing. In the event that lot configurations and design constraints preclude the builder from meeting such requirements, a renewable energy surcharge fee will be assessed to the builder at the time of building permit. This fee is an additional fee above and beyond the initial fee the Builder pays in to the Trust based on the type of house constructed.

- Installing two conduit systems that extend from the home utility area to the attic of the home. Such conduits will be sized to accommodate electrical wiring and plumbing that is anticipated for future hook up of solar PV systems. Homes that adopt a PV system at initial construction will not be required to install conduit.

The Master Developer shall:

- Cause the Metro District to establish the Candelas Sustainability Trust fund through which grants shall be made to offset at least a portion of the installation costs of renewable energy systems such as solar pv and ground source heat pumps;
- Support alternative energy solutions through the purchase of REC's (Renewable Energy Credits).
 - Through the Trust Candelas will seek to offset as much of the annual electricity consumed by the new residential homes built as the Trust fund investment earnings allow. While the Trust's goal will be to offset 100% of the electricity consumed by residential homes at Candelas, the actual amount of REC's purchased by the Trust in any given year will be a function of a) the investment returns earned by the Trust and b) the then market price of RECs available for purchase.
- Require that 20% of all residential units located within the Residential Development Boundary be originally built with new, operational renewable energy systems. With each FDP, a minimum of 20% of homes shall be built with renewable energy systems. To the extent that one FDP exceeds the 20% minimum, the excess amount can be applied towards future FDP filings at the applicant's preference. The minimum requirement of 20% will apply across all residential product types (including the TND multi-family homes, townhomes, condominium, apartments and single family detached homes). The ODP allows a maximum of 2,240 units within the Residential Development Boundary. If the project builds out to this unit count, 448 units will be required to have new, operational renewable energy systems. The Metro District will keep records of the homes with renewable energy systems

installed with the initial construction of the home and will keep track of where the project is in meeting this requirement. Renewable energy systems that satisfy this requirement include: active solar, geothermal and solar water heating systems that are designed to offset a minimum of 1/3 of the energy usage that a standard non-renewable system would otherwise use. Initial research suggests that a majority of the homes within Candelas could accommodate active solar systems that offset some portion of the electricity consumption and that most of the larger single family lots (60' wide or larger) could accommodate ground source heat pumps based on lot size and configuration.

- Active Solar Systems (photovoltaic systems) convert sunlight directly to electricity by means of photovoltaic cells of semiconducting materials. A system includes: PV panels, batteries, a charge regulator / controller, wiring and mounting hardware. (US Department of Energy)
- Geothermal Heat Pumps are used for heating, cooling and water heating. The system works by concentrating naturally existing heat rather than producing heat through the combustion of fossil fuels. Using a looped pipe system, the heat pump transfers heat stored in the Earth (or groundwater) into a building during the winter and out of the building during summer. The systems includes through main components: geothermal earth connection subsystem, geothermal heat pump substation and geothermal heat distribution substation. (US Department of Energy)
- Solar Water Heating Systems contain a solar collector that faces the sun and either heat water directly or heat a fluid that is then used to heat water. (US Department of Energy)

Designers and Builders:

- Private residential homes may consider implementing the following renewable energy systems alternatives:
 - Installation of ground source heat pumps
 - Installation of solar photovoltaic panels
 - Additional energy savings systems in homes

Standards - Education and Research

The Candelas Sustainable Development Program shall:

- Collaborate with service providers, local and regional initiatives, and educational and governmental entities to develop economically viable energy efficient programs and policies favoring more alternative energy solutions
- Develop collaborative partnership agreements among key

partners (City of Arvada, XCEL, Jefferson County School District, and other agencies) to secure commitments and funding for proposed programs.

5.3 INITIATIVES

- Candelas Sustainability Trust
- Renewable Energy Credits purchased to offset residential home electricity usage
- LEED® Certified Community Centers ⁵
- Energy Star® Version 3 standards applied to every residential SFD home ²¹
- Energy Star® appliances required in every SFD residential home ²²
- Solar powered light bollards ¹⁸
- Solar powered pedestrian lights ¹⁸
- Renewable Energy Systems to power Community Centers ⁹
- 20% of residential units within the Residential Development Boundary will be built with renewable energy systems

See Sustainable Design Features Exhibit for examples, pg. 7.

6. Water Conservation



Goal: To promote potable water economies, water quality, and conservation measures for existing and future users in the community.

6.1 POTABLE WATER CONSERVATION

Principle

The most significant water conservation measures in this semi-arid environment can be achieved through a reduction of landscape irrigation followed by a reduction in household consumption.

Guidelines

- Consumer water conservation measures should be guided by the proven design and construction measures in Energy Star® Version 3 (residential construction) and LEED® criteria (community centers)
- Designers and builders should be strongly encouraged to achieve optimal water savings
- The efficiencies of water conservation plans, devices, and operations should be communicated to prospective buyers and occupants

Standards – Public Landscaping

The Master Developer shall establish irrigation policies for governing associations and coordinate with the City of Arvada Parks Department to implement practices which comply with:

- The Residential Design Guidelines outline principles and standards for common or public landscape, irrigation, and maintenance
- Traditional turf tree lawns have been eliminated from Candelas. A mix of street trees, native plant material, and mulch will be installed in all tree lawns.

Standards – Construction

Designers, Builders, and Tenants shall:

- Work closely with the CDRC and the SDP Manager to review Design Guideline standards and identify water saving measures. Designers and Builders shall be required to establish water budgets for the project and incorporate xeriscaping



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- 5.0 ENERGY

6.0 WATER CONSERVATION

- 6.1 Potable Water Conservation
- 6.2 Initiatives

- 7.0 MATERIALS AND RESOURCES
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principles including minimal use of turf areas, indigenous plant palette, and other water saving measures as part of their improvements.

Residential and Community Center Landscape Design Standards:

Landscape Design Standards:

Designers and Builders are encouraged to reduce potable water consumption for landscape irrigation by at least 30% annually and comply with Arvada's Land Development Code 6.5.2H and at a minimum include the following standards:

- **Design Alternatives** – Builders will provide single-family home purchasers educational material outlining common xeriscaping principles and practices. This material will include (3) sample water-wise residential landscape plans, a master community plant list, the City of Arvada Water-Wise plant list, an explanation of common best practice management techniques, and a keyed Candelas Community Site Map locating xeriscape examples and practices throughout the community. This literature will be designed to explain and illustrate different landscape options, best management practices, and the importance of implementing xeriscape principles both in their own yards and across the community. These (3) sample landscape plans will be included for review in each of the respective FDP level submittals. Site specific considerations and final acceptance of designs shall be contingent on CDRC review and approval. Property owners may be required to install private backyard landscapes within 12 months of home purchase. Water-wise landscapes are strongly encouraged for backyard landscapes.
- **Landscape Plans** – Shall emphasize the use of native and drought tolerant species that reduce water consumption using xeriscape principles and reflect the character of the native landscape. Designers and homeowners are strongly encouraged to select all tree and shrub species from the Candelas Plant List and /or the City of Arvada water-wise plant list.
- **Soil Amendment** – Install at least three cubic yards of soil amendment (coarse organic material) per 1,000 square feet of installed landscape area, based on soil analysis. Amendment must be tilled to a minimum depth of 6" below the surface prior to installation of any further topsoil, seed, or sod/turf.
- **Rainwater Reuse** – Direct rainwater toward landscaping needs where practical. Encourage the establishment of rain gardens and bioswales to reduce run-off, encourage aquifer recharge, and improve stormwater quality. Landscapes

receiving redirected water must be at least five feet from the building foundation.

- **Turf** – Limit water consumptive turf areas (unless noted otherwise in the Design Guidelines) and promote water conserving landscape principles. Prohibit the installation of turfgrass in areas less than 8' wide, slopes greater than 4:1, and densely shaded areas. Drought tolerant turfgrass alternatives are encouraged. Turfgrass shall be limited in residential landscape designs as shown in the overall design guidelines. No turf shall be permitted adjacent to curbs.
- **Bedding Areas** – Shall be mulched to a minimum depth of 3" to cool root zones, reduce weed growth and minimize evapotranspiration. Organic mulch shall be a clean organic shredded fibrous bark material of a dark brown / reddish color which mats down and is wind tolerant. Large cobble should not be used as mulch except in small areas or landscape features. In a residential setting, shredded wood mulch is preferred. Bed planting coverage should be at a minimum of 50% at time of planting to reduce the effects of wind.
- **Irrigation Systems** – Install irrigation system to include soil moisture or rain sensor devices. Efficient drip, bubbler and/or spray irrigation systems are required. All public area irrigation systems will be Motorola brand controllers, which meet City of Arvada existing specifications.

6.2 INITIATIVES

- Landscape – using native plants, xeriscaping ¹⁹
- Elimination of turf in street right-of-ways ¹⁷
- Turf limitation in design guidelines for homes
- Stormwater management runoff ¹⁵

See Sustainable Design Features Exhibit for examples, pg. 7.

7. Materials & Resources



Goal: To reduce the use of non-renewable resources, incorporate environmentally responsible materials, and minimize solid waste production.

7.1 MATERIAL USE

Principle

A conscientious, creative design approach is necessary in the incorporation of environmentally responsible materials for construction projects in the community.

Guidelines

- Designing for durability, flexibility, and adaptability is a priority.
- The wise material use ethic promotes using less, reusing materials, and making careful selections.
- Designers, builders, purchasers, and consumers should be educated about appropriate regional materials and refer to Design Guidelines for examples.

Standards – Design and Construction

Designers, Builders, and Tenants shall:

- Work closely with the SDP Manager and CDRC to ensure that designs incorporate economically viable options for:
 - › Flexible and adaptable features to enhance building longevity
 - › Space efficiency to minimize overall size in construction
 - › Simple building geometry to optimize standard building material sizes and avoid waste from over-design, where practical
 - › Alternative materials including salvaged, reused, and recycled materials
 - › Responsible building materials
 - › Locally or regionally produced building materials to reduce transportation costs/impacts
- At a minimum, Designers and Builders shall refer to the Sustainable Design Initiatives found in the Residential Design Guidelines.



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Standards – Education, Research, and Demonstration

The Candelas Sustainable Development Program shall:

- Establish eco-friendly materials list and green building education in the Design Resource Center including:
 - Local and regional alternative design resources and building material sources
 - Interior design choices for purchasers/consumers
- Promote awareness of wise material use selection in daily living for both environmental and health benefits

7.2 MATERIALS & INDOOR ENVIRONMENTAL HEALTH

Principle

The selection of building materials affects indoor environmental quality and productivity of construction personnel and occupants.

Guidelines

Designers, builders, purchasers, and consumers should be educated about environmentally sensitive materials and application practices in order to improve and enhance comfort and productivity of both construction personnel and occupants.

Standards – Design and Construction

Tenants, Designers, and Builders shall:

- Work closely with the Arvada Community and Development Department, SDP Manager, and the CDRC in the design phase to create healthy indoor environments.

Community Center Construction Indoor Environmental Health Standards:

- Include at least two (2) credit options to implement from Indoor Environmental Quality including Outdoor Air Delivery Monitoring, Increased Ventilation, Construction IAQ Management Plan, Low Emitting Materials, Indoor Chemical and Pollutant Source Control, Controllability of Systems, Thermal Comfort, Daylight and Views.

Standards – Education, Research, and Demonstration

The Candelas Sustainable Development Program shall:

- Develop a partnership with a local builder to feature a model home designed to exhibit materials and construction practices to promote healthy indoor environments.

7.3 WASTE MANAGEMENT

Principle

A comprehensive waste management system designed to both reduce solid waste streams bound for landfills and promotes recycling and reuse in the community.

Guidelines

- Unavoidable construction waste should be separated for recycling purposes, where feasible
- Domestic and commercial waste management should include infrastructure for consumer recycling, composting, and considerations for hazardous waste products
- Community education should promote recycling as a way of life and develop a culture for reuse

Standards – Construction Waste

The Master Developer shall:

- Collaborate with a service provider to establish an on-site waste and construction recycling facility to reduce the construction waste diverted from the landfill. The facility should be capable of sorting and recycling wood, metals, brick/concrete, and corrugated cardboard and provide products for re-use from crushed aggregate materials and mulch. All Builders/Contractors and Subcontractors at Candelas shall contract for these services. The facility may also be utilized by other construction contractors in the area.

Standards – Design and Construction

Builders and Contractors shall:

- Provide outdoor recycle pick-up bins in screened enclosures per Design Guideline Standards for Community Center buildings where practical or coordinate with other buildings on joint-use centers.

Standards – Community Waste

The Master Developer shall:

- Coordinate with the City of Arvada for hazardous waste disposal

The Metro District shall:

- Contract with trash hauling companies to provide a community wide recycling program

Standards – Education, Research, and Demonstration

The Candelas Sustainable Development Program shall:

- Coordinate with City of Arvada Public Works and Utilities Department to promote recycling campaigns and programs community-wide

- Collaborate with Jefferson County School District on recycling, reuse, and wise material use programs in the schools
- Promote applied material use efficiencies in construction demonstration projects in the built environment
- Coordinate with City of Arvada, Soil Conservation Service, and local nurseries to educate and encourage the community-at-large to compost organic waste for targeted use in both community and individual gardens
- Establish reuse initiatives throughout all sectors of the community through notifications in newspaper, web site, and kiosk postings for free offerings, garage sales, mending services, and repair directories
- Develop information programs which encourage low waste shopping (minimum packaging)
- Investigate community programs for delivery/pickup services
- Investigate and plan cooperative centers for shared services, i.e., shared tools, computers, etc.

7. 4 INITIATIVES

- Candelas Sustainability Trust
- Community-wide recycling program
- Encourage on-site material usage in construction
- Specify materials from local suppliers
- LEED certified community centers ⁵
- Onsite construction recycling program
- Material Selection

[#] See Sustainable Design Features Exhibit for examples, pg. 7.



“The environment is where we all meet; where we all have a mutual interest; it is the one thing that all of us share. It is not only a mirror of ourselves, but a focusing lens on what we can become...”

– Lady Bird Johnson

8. Social



Goal: To create a physically healthy and socially interactive community in a safe environment.

8.1 SENSE OF COMMUNITY

Principle

Sensible mixed-use land planning fosters smart-growth community development patterns that promote social, educational, and recreational gathering.

Guidelines and Standards

The Candelas Master Plan is designed to provide:

- Livability and walk ability in compact and efficient neighborhoods designed to a pedestrian scale with a school, neighborhoods, civic, and community parks located within 1/2 mile walking distance of residential units and the urban center
- Social interaction opportunities in the vibrant urban center with central plazas, shops, restaurants, sidewalk cafés, offices, and live/work units
- Neighborhood gathering facilities throughout the community including multiple parks and three community centers
- Pocket parks and community gardens, where practical, providing resources for gathering and interaction
- Sponsor / encourage various events throughout the year

8.2 RESIDENTIAL DIVERSITY AND AFFORDABILITY

Principle

Residential development should enable citizens from a wide range of economic levels and age groups to interact in the community.

Guidelines

Community planning and design should provide for:

- Sufficient variety of housing sizes and types, and a mix of demographic socio-economic layers



- 1.0 OVERVIEW
- 2.0 A SUSTAINABLE FUTURE
- 3.0 EDUCATION
- 4.0 ENVIRONMENT
- 5.0 ENERGY
- 6.0 WATER CONSERVATION
- 7.0 MATERIALS AND RESOURCES
- 8.0 SOCIAL**

- 8.1 Sense of Community
- 8.2 Residential Diversity and Affordability
- 8.3 Health and Well-Being
- 8.4 Community Center
- 8.5 Community Stewardship
- 8.6 Initiatives

- 9.0 ECONOMIC
- 10.0 TRANSPORTATION
- 11.0 IMPLEMENTATION PLANS

- Proportion of affordable and attainable housing units integrated into the community as shown in the approved ODP
- Options for elderly housing including transitional and assisted care facilities

Standards – Planning

The Master Developer shall incorporate planning and design considerations in compliance with:

- The approved care and support programs for independent elderly living in the community shall also be investigated.

Standards – Education

The Candelas Sustainable Development Program shall investigate:

- Viability of Energy Efficient Mortgages (EEM) that incorporate the energy efficient improvements as added present value when evaluating a home’s market value
- Tax Incentives Assistance Project to assist consumers and businesses with applicable information regarding Federal income tax incentives for energy efficient products and technology
- A sustainability grant/contest between homes with extraordinary sustainability initiatives

8.3 HEALTH AND WELL-BEING

Principle

Healthy living and productivity for occupants and residents alike are promoted through physical activity and health networks in the community.

Guidelines

- Convenient recreation and outdoor activities should be incorporated into daily living
- Improved and enhanced indoor environmental quality should contribute to both comfort and productivity
- Ongoing health programs and initiatives are necessary to support individual and community well-being

Standards – Recreation / Outdoor Activities

The Candelas Sustainable Development Program shall:

- Encourage occupants, residents, and visitors to utilize the community’s three Community Centers, convenient network of hiking and biking trails through tours and walking/biking clubs
- Develop competitive events and programs for all ages to provide incentives to stay fit

Standards – General Health and Welfare

The Candelas Sustainable Development Program shall:

- Develop partnerships with local healthcare providers and health initiatives to incorporate regular wellness related programs, campaigns, and site-specific projects. Programs may include health fairs, nutrition, blood drives, inoculation clinics, well-child care, elderly assistance, and family support networks.
- Community gardens located in common pocket parks and green spaces conveniently located near neighborhoods, as practical

8.4 COMMUNITY CENTER

Principle

Social sustainability depends upon a commitment to provide centralized community facilities and management infrastructure to establish and maintain long-term program development.

Guidelines

- A flexible indoor facility for meetings, social functions, activities, and education should be located in the heart of the community
- Coordinated programs for communication networks, education and health programs, and arts/cultural program planning should be developed to serve the community

Standards – Planning and Design

The Master Developer shall:

- Design and construct (2) Community Centers located throughout the community with indoor and outdoor reception areas, meeting spaces, business center, activity rooms, reading areas, kitchen, and restrooms in a flexible design
- Design and construct outdoor amphitheater for cultural and educational productions

Standards – Program Management

The Metro District shall:

- Manage and operate the Community Centers
- Administer the Candelas Sustainable Development Program through a SDP Manager responsible for managing ongoing research, informational, educational, health, cultural, and economic sustainability programs and initiatives. The Master Developer shall initiate and provide coordination of the Program during the time prior to establishment of the Metro District.

8.5 COMMUNITY STEWARDSHIP

Principle

Proactive sustainability activities involving volunteers are encouraged to further community service and environmental causes.

Guidelines

- A community grant program for non-profit organizations should be established to support new or ongoing sustainable programs
- Experiential learning opportunities in the community should be developed to foster participation by students (elementary through college) in sustainable practices

Standards – Program Management

The Candelas Sustainable Development Program shall:

- Encourage the development of a foundation to support sustainability initiatives through private and public partnerships
- Develop programs for service learning in the community for college students, Jefferson County School District students, and the medical and business communities
- Serve as a resource for residents in determining feasibility and available public programs (grants/rebates) involved with solar and other energy saving improvements.

8.6 INITIATIVES

- Candelas Sustainability Trust
- Sustainable Development Manager through the District
- Pedestrian connectivity/Bicycle network ³
- Access to diverse uses ⁶
- Sense of community ¹²
- Residential product diversity/affordability ²⁶
- Sustainability grant/contest for 'green home'

[#] See Sustainable Design Features Exhibit for examples, pg. 7.



“Though I do not believe that a plant will spring up where no seed has been, I have great faith in a seed. Convince me that you have a seed there, and I am prepared to expect wonders.”

– Henry David Thoreau

9. Economic



Goal: To develop and support an innovative local business community involved in sustainable practices.

9.1 EMPLOYMENT DIVERSITY

Principle

A viable business community consists of diversity, creativity, and entrepreneurial spirit.

Guidelines

- Master planning and infrastructure should provide opportunities for residents to live and work in the neighborhood
- Business development should focus on established local/regional enterprises, sustainable industries, and entrepreneurial ventures, as well as, non-profit organizations

Standards – Master Developer / Planning

The Master Developer shall develop a business community in Candelas in compliance with:

- The ODP and ODP Narrative to define the mixed-use lot types, lodging, office, and commercial/retail uses allowed throughout the community.
- The ODP and ODP Narrative to define Mixed Use Urban Centers:
- The Town Center
- The TND Mixed Use Parcel

Standards – Business Development

The Master Developer shall:

- Encourage business development and the establishment of:
 - › Local businesses providing medical service, retail, and other services
 - › Local and regional office centers
 - › Non-profit organizations and sustainable initiatives in cooperative settings



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- 5.0 ENERGY
- 6.0 WATER CONSERVATION
- 7.0 MATERIALS AND RESOURCES
- 8.0 SOCIAL

9.0 ECONOMIC

- 9.1 Employment Diversity
- 9.2 Sustainability Focus
- 9.3 Business Networks
- 9.4 Initiatives

10.0 TRANSPORTATION

11.0 IMPLEMENTATION PLANS

- › Industries focusing on sustainability

9.2 SUSTAINABILITY FOCUS

Principle

Businesses that promote and practice optimal efficiencies in green building techniques are showcases for innovation with added exposure for the community overall.

Guidelines

Business development should pursue local or regional eco-oriented businesses committed to innovative design and operations

Standards – Sustainable Business Development

The Master Developer shall:

- Encourage businesses and partnerships interested in outreach and demonstration of building design, programs, or activities which economically integrate:
 - › Optimal energy efficiency
 - › Water conservation
 - › Alternative building materials
 - › Mutual waste/reuse benefits

The Candelas Sustainable Development Program shall:

- Coordinate public relations locally and regionally for demonstration projects

9.3 BUSINESS NETWORKS

Principle

A healthy and growing business sector contributes directly to the viability of living and working in the community.

Guidelines

- Community planning should incorporate business support areas including:
 - › Centralized meeting space for business education, job fairs, and training
 - › Small business center with computer, copying, and faxing services for common use
 - › Operations in the community should provide general information about local and community business services and programs

Standards – Master Developer / Planning

The Master Developer shall:

- Design the Community Center to include:
 - › Small and large meeting rooms with break-out capabilities

and kitchen support areas

- › Business center room with common general office uses including computer, copying, and faxing equipment

Standards – Program Management

The Candelas Sustainable Development Program shall:

- Coordinate business related information to the community through the web site with business/education links, community newsletter, and kiosks
- Coordinate with the Arvada Economic Development Association and the Arvada Chamber of Commerce to provide lunch session workshops of interest to the business community

9.4 INITIATIVES

- Synergies between residential, commercial and mixed use sites ²⁵
- Encourage entrepreneurship

See Sustainable Design Features Exhibit for examples, pg. 7.

10. Transportation



Goal: To reduce dependency on the automobile and encourage alternative transportation modes.

10.1 PEDESTRIAN AND BICYCLE NETWORKS

Principle

Interconnected walkways and multi-use trails promote viable alternative transportation modes such as bicycling and walking within the community.

Guidelines

The pedestrian and biking experience should be pleasant, convenient, and connect neighborhoods, businesses, schools, amenity areas, and adjoining properties

Standards – Master Plan

The Parks, Trails and Open Space Map found in the ODP defines:

- Thoroughfare network system designed for transportation through neighborhoods with pedestrian crossings, underpasses, shared on-street bike routes (where available) and an extensive trail network, connecting people with public transportation options
- Tree-lined thoroughfares with detached sidewalks and improved native landscaped environments
- Braided network of paved shared-use pathways served by underpasses at certain roadway intersections
- Secondary footpaths connecting neighborhoods to integrated community amenities, adjoining public lands Rocky Flats Wildlife Refuge (RFWR), and the proposed regional Front Range Trail

10.2 PUBLIC TRANSIT

Principle

Public transit is an environmentally responsible solution to reducing single-occupancy driving.



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- 8.0 SOCIAL
- 9.0 ECONOMIC

10.0 TRANSPORTATION

- 10.1 Pedestrian and Bicycle Networks
- 10.2 Public Transit
- 10.3 Alternative Transportation Incentives
- 10.4 Advocacy
- 10.5 Initiatives

11.0 IMPLEMENTATION PLANS

Guidelines

- Transit routes and transit stops throughout the community for public transportation should be convenient and centrally located

Standards - Master Developer / Planning

The Master Developer shall:

- Coordinate with RTD and the City of Arvada to establish transit services at the time the community residential and business density is able to support regular services

Standards – Program Management

The Candelas Sustainable Development Program shall:

- Communicate public transportation information through the kiosks, signage, and web site

10.3 ALTERNATIVE TRANSPORTATION INCENTIVES

Principle

The key incentives for considering alternative transportation modes are access, convenience, and financial savings.

Guidelines

All levels of the community should be involved in promoting creative means of supporting alternative transportation to the single-occupant vehicle

Standards – Master Developer / Planning

ARP shall design community infrastructure to ensure:

- Public shower and locker facilities in the Community Center
- Teleconference centers in the Community Center
- Close proximity to commercial and mixed use sites

Standards – Design and Construction

Tenants, Designers, and Builders of Community Center buildings shall:

- Incorporate bike racks near the building entrance. Changing rooms including storage, showers, and lockers will be provided.

Standards – Program Management

The Candelas Sustainable Development Program shall coordinate with the medical and business communities to:

- Design alternative work shifts to avoid peak rush hour
- Encourage financial incentives for employees who rideshare, bicycle, or walk to work
- Encourage employee-based transit subsidy pass programs

- Facilitate rideshare networks
- Assist with community wide rideshare matching
- Investigate the feasibility of a small bicycle fleet for common use in the business community
- Promote bicycle maintenance through regular maintenance workshops
- Promote community service activities located within walking distance including health, child care, and recreation

10.4 ADVOCACY

Principle

The role of reducing air pollution and CO₂ emissions through alternative fuels and transportation modes requires committed involvement.

Guidelines

- The development of sustainable transportation should extend beyond the boundaries of the community

Standards – Program Management

The Candelas Sustainable Development Program shall:

- Support regional initiatives to promote alternative fuel markets
- Coordinate with regional trail networks to raise funds to maintain and connect local trails to the regional network
- Showcase innovative technologies in the community, i.e., hybrid auto shows/test drives
- Support the completion of Jefferson Parkway through the Northwestern portion of the metro area.

10.5 INITIATIVES

- Pedestrian connectivity/Bicycle network **3**
- Access to diverse uses **6**
- Walkability **7**
- Public transportation

See Sustainable Design Features Exhibit for examples, pg. 7.

11. Implementation Plans



Goal: To integrate planning guidelines into projects, initiatives, and practices supporting an evolving sustainable community.

11.1 GREEN CONSTRUCTION STANDARDS

The Master Developer shall establish green construction standards and procedures for residential and Community Center development in the Candelas Community. The standards incorporate applicable criteria established in the Energy Star® Version 3 (residential) and Leadership in Energy and Environmental Design-LEED-NC® (Community Centers) for assessing building performance and meeting sustainability goals. Applicable green construction standards shall be evaluated annually and updated, as necessary, to include appropriate revisions as approved by Energy Star® and/or LEED-NC® which address desired outcomes.

11.2 RESIDENTIAL CONSTRUCTION (SINGLE-FAMILY AND MULTI-FAMILY):

Designers and Builders shall register, construct, and certify buildings under the guidelines of the Energy Star® Version 3 program with 5% random field verification for compliance with Energy Star®. In addition, Designers and Builders shall also comply with the specific following Candelas Standards:

Energy Efficiency Standards:

Designers and Builders are required to meet the Energy Star® requirements by either the Prescriptive or Performance paths as outlined by the Energy Star® Program.

Solar Panel "Pre-Solar"

All homes within the Candelas Residential Development Boundary that are not constructed initially with a solar PV system will be required to install a conduit system to facilitate an easier installation of a solar PV system at a future date.

Renewable Energy Systems:

The Developer shall require that 20% of all residential units built within the Residential Development Boundary shall be originally constructed with at least one renewable energy system. Examples of such systems include ground source heat pumps, solar PV



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- 8.0 SOCIAL
- 9.0 ECONOMIC
- 10.0 TRANSPORTATION

11.0 IMPLEMENTATION PLANS

- 11.1 Green Construction Standards
- 11.2 Residential Construction (Single Family & Multi-Family)
- 11.3 Community Center Construction
- 11.4 Education and Assessment
- 11.5 Community Center Buildings Design Guidelines
- 11.6 High Profile Community Buildings
- 11.7 Sustainable Development Program Management
- 11.8 Program Manager
- 11.9 Research and Baseline Data Collection
- 11.10 Annual Evaluation of Sustainability Efforts
- 11.11 Initial Implementation Strategies

panels, or other system that does not rely on carbon based fuels to generate energy or electricity. With each FDP, a minimum of 20% of homes shall be built with renewable energy systems. To the extent that one FDP exceeds the 20% minimum, the excess amount can be applied towards future FDP filings at the applicant's preference. The minimum requirement of 20% will apply across all residential product types (including the TND multi-family homes, townhomes, condominium, apartments and single family detached homes).

Water Management Standards:

Landscape Design Standards:

Designers and Builders are encouraged to reduce potable water consumption for landscape irrigation by at least 30% from a calculated mid-summer baseline case and at minimum shall include the following standards:

- **Design Alternatives** – Builders will provide single-family home purchasers with a minimum of (3) sample water-wise landscape designs for front and side yard areas for installation at time of home purchase when landscaping is not installed. These (3) samples will be included for review in each of the respective FDP level submittals. Site specific considerations and final acceptance of designs will be contingent on CDRC review and approval. Property owners may be required to install private backyard landscapes within 12 months of home purchase. Water-wise landscapes are strongly encouraged for private backyard landscapes.
- **Landscape Plans**–Shall emphasize the use of native and drought tolerant species that reduce water consumption using xeriscape principles and reflect the character of the native landscape. Designers and homeowners are strongly encouraged to select all tree and shrub species from the Candelas Plant List and /or the City of Arvada water-wise plant list.
- **Irrigation Systems**–Install irrigation system to include soil moisture or rain sensor devices. Efficient drip, bubbler and/or spray irrigation systems are required. All public area irrigation systems will be Motorola brand controllers, which meet City of Arvada existing specifications.

Interior Use Standards:

Designers and Builders are encouraged to employ strategies that use at least 20% less water than the water use baseline calculated for the building (not including irrigation) and at minimum shall include the following fixtures:

- Specify and install Energy Star® dishwashers and clothes washers where these appliances are provided.
- Faucets fitted with aerator restricting flow in bath

rooms (1.8 gpm or less) and kitchens (2.0 gpm) are highly recommended.

11.3 COMMUNITY CENTER CONSTRUCTION

Designers and Builders of Community Centers are required to develop documentation for certification in the LEED® green building ratings for Certified, Silver, Gold, or Platinum status. LEED® is a voluntary green building rating system based on accepted energy and environmental principles with established green building practices and emerging concepts. Designers and Builders of Community Center projects shall be guided by the LEED-NC® for certification levels (Certified, Silver, Gold, or Platinum). At minimum, all projects shall comply with the following specific Candelas Sustainability Program Standards:

Energy Efficiency Standards:

Designers and Builders of Community Center projects will meet LEED® criteria for LEED-NC® and Atmosphere Prerequisites and Credits for energy performance. At minimum, Designers and Builders shall incorporate the following:

- Meet the 2006 International Energy Conservation Code adopted by the City of Arvada including specifications of Chapter 8, Design by Acceptable Practice for Commercial Buildings-Climate Zone 15. Designers and Builders are encouraged to meet the specifications of Chapter 7 of the 2006 International Energy Conservation Code over Chapter 8 and provide 15-25% better efficiency than the American Society of Heating, Refrigeration and Air-Conditioning Engineers/Illuminating Engineering Society of North America (ASHRAE/IESNA) Standards 90.1-2004.
- Install Energy Star® qualified appliances, where these appliances are provided. Installation of Energy Star® qualified light bulbs and fixtures are recommended. The installation of the Energy Star® Advanced Lighting Package (ALP) is highly recommended.
- Incorporate parking lot landscape planting islands per Candelas Design Guidelines Parking Standards to reduce heat island effect. Installation of paving materials with a Solar Reflectance Index (SRI) of 29 is recommended.
- Building shading and green roofs (approximately 50% of roof area) are highly encouraged to reduce energy loads. Installation of roofing materials having a Solar Reflectance Index (SRI) equal to or greater than LEED-NC® requirements is encouraged.
- Incorporate renewable energy systems to power at least 50% of the community centers.

Water Management Standards:

Landscape Design and Standards:

Designers and Builders are encouraged to reduce potable water consumption for irrigation by at least 30% annually and comply with Arvada's Land Development Code 6.5.2H and at a minimum include the following standards:

- **Design Alternatives** – Builders will provide single-family home purchasers with a minimum of (3) sample water-wise landscape designs for front and side yard areas for installation at time of home purchase when landscaping is not installed. These (3) samples will be included for review in each of the respective FDP level submittals. Site specific considerations and final acceptance of designs will be contingent on CDRC review and approval. Property owners may be required to install private backyard landscapes within 12 months of home purchase. Water-wise landscapes are strongly encouraged for private backyard landscapes.
- **Landscape Plans** – Shall emphasize the use of native and drought tolerant species that reduce water consumption using xeriscape principles and reflect the character of the native landscape. Designers and homeowners are strongly encouraged to select all tree and shrub species from the Candelas Plant List and /or the City of Arvada water-wise plant list.
- **Irrigation Systems** – Install irrigation system to include soil moisture or rain sensor devices. Efficient drip, bubbler and/or spray irrigation systems are required. All public area irrigation systems will be Motorola brand controllers, which meet City of Arvada existing specifications.

Interior Uses:

Designers and Builders are encouraged to employ strategies that use at least 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements and at minimum shall include the following fixtures:

- Install low-flow shower heads (<2.5 gpm); alternative is a venturi-type valve
- Install low-flow toilets (1.6 gpf) with a maximum performance factor greater than 400 grams/flush. Dual-flush, pressure or vacuum assist toilets averaging 1.1 gpf are highly recommended.
- Install Energy Star® dishwashers and clothes washers where these appliances are provided
- Faucets fitted with aerator restricting flow in bathrooms (1.8 gpm or less) and kitchens (2.0 gpm) are highly recommended.

Materials and Resources Standards:

New Construction shall meet LEED-NC® Materials & Resources prerequisites and select at minimum one credit option for Materials and Resources criteria for implementation from Building Reuse, Resource Reuse, Recycled Content, Regional Materials, Rapidly Renewable Materials, and Certified Wood criteria.

- Provide outdoor recycle pick-up bins in screened enclosures per Design Guidelines recommendations where practical or coordinate with other buildings on joint outdoor recycle use areas.
- Contract and utilize the on-site construction waste and recycling center services to reduce construction waste and divert it from the landfill.

Indoor Environmental Health Standards:

Builders and Designers of New Construction and Core and Shell projects are highly encouraged to meet the applicable LEED® Prerequisites for Minimum Indoor Air Quality Performance and Environmental Tobacco Smoke (ETS Control) and at minimum shall include:

- At least two (2) credit options for implementation from Indoor Environmental Quality including Outdoor Air Delivery Monitory, Increased Ventilation, Construction IAQ Management Plan, Low Emitting Materials, Indoor Chemical and Pollutant Source Control, Controllability of Systems, Thermal Comfort, Daylight and Views.

11.4 EDUCATION AND ASSESSMENT

Post-construction education is critical to ensuring that buildings and landscapes operate as originally designed. Designers and Builders of all projects shall educate occupants, owners, maintenance professionals, and equipment managers about the sustainable design elements incorporated into the building through Operations/Maintenance Manuals which shall include:

- Building and equipment warranties
- General operations and troubleshooting
- Conservation and efficiency recommendations
- Landscaping recommendations
- Community resource directories
- Links to additional regional resources
- Eco-friendly maintenance practices

11.5 COMMUNITY CENTER BUILDINGS

Designers and Builders of Community Centers are required to develop documentation for certification in the LEED® green

building ratings for Certified, Silver, Gold, or Platinum status. Designers and Builders shall work closely with the Arvada Planning and Development Department and the Candelas Sustainable Development Program Manager in the design, development, and educational promotion of sustainable design features in demonstration projects.

The Master Developer shall design and construct the two Community Centers depicted in the Candelas Master Plan to earn at least Certified or higher status under the LEED-NC® credit system for Certified, Silver, Gold, or Platinum.

LEED-NC 2.2 Green Building Certification Levels

Rating	Points
Platinum	52-69 points
Gold	39-51 points
Silver	33-38 points
Certified	26-32 points
Non-Leed Construction	1-25 points

11.6 DESIGN GUIDELINES

The Candelas Design Guidelines address the integration and compatibility of architectural, landscape design, and sustainable design elements. The Guidelines promote design that strives to mitigate the impacts of buildings on the environment, community, and workplace. Builders and Designers should refer to the Design Guidelines for sustainable design principles.

The Candelas Design Review Committee (CDRC) shall administer the design review and construction compliance in accordance with the Candelas Residential Design Guidelines. The CDRC reserves the authority to waive the application of certain green construction standards in such cases as affordable housing projects or other projects that may present significant benefit to the community and yet have budget implications (such as assisted living or civic non-profit functions).

11.7 SUSTAINABLE DEVELOPMENT PROGRAM MANAGEMENT

The District shall have the authority to govern the management of the Sustainable Development Program. The Master Developer shall define, initiate, and coordinate the Program as needed prior to establishment of the Board of Directors

11.8 PROGRAM MANAGER

The Master Developer shall hire a Sustainable Development Program Manager (Person or Company) within the initial year to coordinate and manage the implementation of the Candelas Sustainable Development Program and serve as a resource for planning, development, and community networks. Essential duties and responsibilities include:

- Advocates for improved standards, technology and best practices in planning and construction and develops program infrastructure including policies, guidelines, standards, procedures, handbooks, and compliance records.
- Develops ongoing assessment tools including baseline data on energy and water conservation programs, trip reduction, recycling and construction waste management and others an continually monitors and evaluates annual operational and management programs as required (see 11.10 Research and Baseline Data Collection below).
- Works closely with the Candelas/ Planning and Development Department, the Candelas Design Review Committee (CDRC), and consultants, designers, and builders during the design review process providing technical resource coordination to ensure green construction standard compliance.
- Collaborates with consultants, designers, builders, local initiatives, and the educational community for demonstration projects, experiential learning, and stewardship projects in the community.
- Provides education and training for construction field personnel, consultants, and trade partners.
- Facilitates education and targeted campaigns on sustainability issues through the community newsletter, web site, and classroom sessions.
- Coordinates the establishment of the Design Resource Center as an information center of design options and sustainable practices for prospective purchasers. Provides on-going information on products, systems, practices, and local service providers.
- Coordinates with local and regional service providers and initiatives to promote sustainable education in forums, work shops, expos, and conferences for the students, general public, construction professionals, and policy decision-makers.
- Identifies and cultivates strategic partnerships with mission-aligned organizations, consultants, and educational institutions. Collaborates with key partners on grants and funding opportunities.
- Performs ongoing research initiatives with key partners to obtain baseline data/monitoring to track performance and

costs of program activities.

- Coordinates post-occupancy research to determine effective green construction components and shares information with the building community.
- Coordinates with non-profit foundation dedicated to community stewardship and sustainability initiatives and seeks funding for projects.
- Develops comprehensive community calendar of events, develops publicity, and coordinates production of events and activities promoting health and well-being and arts/cultural.
- Manages programs, activities, facility operations, and staff of the Community Center.
- Serves as District Board liaison and attends all meetings. Assists with development of annual budget for programs, assists with agendas and long range goals, compiles both quarterly and annual review, and provides assessments and recommendations for program development strategies.

11.9 RESEARCH AND BASELINE DATA COLLECTION

The SDP Manager shall collaborate with key partnerships which may include, among others, the City of Arvada, Jefferson County School District, RFWR, Energy Renewal Lab, University of Colorado, and others to research and compile baseline data. The performance of program standards should be carefully monitored to demonstrate tangible results and measure progress over time. Program standards may include but are not limited to the following:

- Energy Demand
- Energy Supply
- Water Use
- Air Pollution-Trip Reduction
- Job Creation
- Operational and Maintenance

11.10 ANNUAL EVALUATION OF SUSTAINABILITY EFFORTS

An annual report containing program updates, successes, and recommendations for changes to the Sustainability Development Program will be issued by the SDP Manager. This report will be presented to The Board and shared with The City of Arvada. These findings will assist in refining and developing performance

and costs metrics at Candelas and help gauge the program's effectiveness.

11.13 INITIAL IMPLEMENTATION STRATEGIES

The following implementation strategies for Years 1-4 are designed to accommodate innovative design, advancing technologies, and developing opportunities over time and shall be reviewed annually by the District Board:

Governance

- Formation of the District and governing structure/funding
- Creation of the Candelas Sustainability Trust

Policies/Procedures

- Establish Construction Policies and Standards
- Coordinate Design Review Procedures/Compliance

Education

- Builder Program: Construction Guidelines/Training
- Prospective Purchaser: Design Resource Center & Directory
- Communications: Monthly Newsletter, Web site, Internet
- Signage: Informational Signage/Kiosks
- Demonstration Project Public Relations/Awareness
- Parks and School Eco-Awareness Programs
- Sustainable Issues Forums, Programs, Expos
- Consumer Best Practices Campaigns
- Builder University: Energy Star®

Community/Social

- Arvada Center for the Arts and Humanities
- Community Center Programs/Activities
- Operation Healthy Communities Initiatives
- Community Arts, Festivals, and Events
- Stewardship Programs

Public Transportation

- Service Commitments for Frequency of Service

Design and Construction

- Construction Waste Recycling Facility
- Community Center Design / Development

Business Sector

- Recruitment/Orientation
- Business Networks



Research and Monitoring

- Partnership Collaborations
- Comprehensive Baseline Data for Future Analysis
- Site Specific Monitoring
- Shared Benefit Research Data

Operations and Maintenance

- Operations and Maintenance Handbook Templates
- Residential Association (RA)
- Mixed Use Association (MUA)
- Metro District



GLOSSARY

Candelas Design Review Committee or CDRC – review body authorized to administer the Design Review Process in accordance with the Design Guidelines and the Sustainable Development Program. The CDRC is comprised of seven (7) voting members including representation from each of the following: (3) Members of the Master Development Team, (1) Licensed Architect, (1) Licensed Landscape Architect, (1) Sustainability Consultant and (1) Representative from The City of Arvada Planning and Development Department

Candelas Master Plan – an internal guide to illustrate the land use and urban form, open spaces and circulation attributes of the overall planned development on the 1,451-acre site.

Candelas Outline Development Plan – Development plan approved by the City of Arvada (April 2008) to define land use concepts and conceptual densities for Candelas.

Candelas Sustainability Trust – vehicle through which residential renewable energy systems for homes built within Candelas will be financed and implemented. The Trust will provide future grants to Candelas homeowners who wish to install renewable energy systems.

Design Guidelines or The Guidelines – tool to guide the architectural design of all structures and landscapes within Candelas are implemented in a cohesive and effective manner. The Guidelines define architectural styles and character, building types, massing, materials and color for a range of mixed-use

commercial, civic, single-family and multi-family residential uses as well as public and private landscapes in Candelas.

Energy Star® – a government-backed (EPA) program assisting builders and individuals to protect the environment through superior energy efficiency. Energy Star® qualified homes are independently verified to be at least 15% more efficient than 2004 International Energy Conservation Code (IECC) Qualified Home pertinent to the region using a new HERS rating system (see HERS). Builders may meet the Energy Star® requirements by either a Prescriptive or Performance Paths. Energy savings are based on heating, cooling, and hot water energy use and are typically achieved through a combination of building envelope upgrades, high performance windows, controlled air infiltration, upgraded heating and air conditioning systems, tight duct systems and upgraded water-heating equipment. Energy Star® also encourages the use of energy-efficient lighting and appliances. (www.energystar.gov)

Energy Efficient Mortgages or EEM – FHA or HUD insured mortgages for home purchase or refinancing designed to grant mortgage credits for savings on monthly utility bills in purchase of an energy efficient home or installation of energy-saving improvements. The EEM is designed to achieve national energy-efficiency goals (and reduce pollution) and provide better housing for borrowers who might not otherwise qualify for conventional loans.

Green Building Rating Systems – tools developed by the U.S. Green Building Council as part of a rating system portfolio

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Green Building Rating Systems – tools developed by the U.S. Green Building Council as part of a rating system portfolio for Leadership in Energy and Environmental Design (LEED®) certifications. The rating systems provide nationally-recognized standards based on accepted energy and environmental principles and are revised periodically to incorporate emerging concepts. (www.usgbc.org)


LEED-NC® or Leadership in Energy and Environmental Design-New Construction – rating system with national standards to address green building construction and high performance for new construction or major renovations in commercial (office/retail) or institution settings. (www.usgbc.org)

LEED-ND® or Leadership in Energy and Environmental Design-Neighborhood Development – rating system addressing the principles of smart growth, urbanism, and green building into a national neighborhood design standard including site design, compact mixed-use design, proximity to transit, diverse housing types, and pedestrian/bicycle-friendly design. (www.usgbc.org)

ODP Parks, Trails and Open Space Plan – community-wide plan to define routes for shared use paths, equestrian trail and connector trails as required in the Candelas ODP.

Residential Development Boundary – boundary showing the residential land owned by Arvada Residential Partners, LLC (ARP), which will follow the initiatives established within this plan. Separate initiatives will be researched for the commercial development at Candelas.

RESNET – Residential Energy Services Network (RESNET) formed by the National Association of State Energy Officials and Energy Rated Homes of America to develop national standards for home energy rating systems and energy efficient mortgages.



The RESNET standards primarily provide accreditation of rating providers, rater training providers, rating software tools, verification of energy savings for energy efficient mortgages (EEMs), verification of a home's energy performance for EPA's Energy Star® Homes Program. (www.natresnet.org)

Smart Growth – development that recognizes connections between development and quality of life. It leverages new growth to improve the community. The features that distinguish smart growth in a community vary from place to place. In general, smart growth invests time, attention, and resources in restoring community. New smart growth is more town-centered, is transit and pedestrian oriented, and has a greater mix of housing, commercial and retail uses. It also preserves open space and many other environmental amenities

Stormwater Management Plan – Best Management Practices (BMPs) designed for stormwater discharge treatment to include vegetated channels, vegetated swales, a pond/wetland system and structural elements include drop structures as part of the permitting process

The Metropolitan District – Title 32 quasi-governmental districts designed to provide financing, acquisition, completion and operation of public infrastructure including maintenance of parks and plazas and management of the Community Centers and trail networks.

Traditional Neighborhood Development – a comprehensive planning system that includes a variety of housing types and land uses in a defined area. The variety of uses permits educational facilities, civic buildings and commercial establishments to be located within walking distance of private homes.

U.S. Green Building Council or USGBC – a national coalition of building industry leaders dedicated to sustainable building performance. USGBC develops the LEED® products/resources and provides policy guidance and educational tools. With a broad and active membership base, USGBC is a leader in key industry and research organization through federal, state, and local government agencies. (www.usgbc.org)



“One generation plants the trees; another gets the shade”

– Chinese Proverb

Appendix 1 – Sustainable Design Features Exhibit



Sustainable Design Features

ITEM	DESCRIPTION
1	Wetland and Water Body Conservation
2	Drainage Access / Corridor Access for Animal Access to RFWR
3	Pedestrian Connectivity / Bicycle Network
4	Open Community
5	Leed Certified Community Centers
6	Access to Diverse Uses
7	Walkability
8	Light Pollution Reduction
9	Solar Thermal / PV on Community Centers
10	Heat Island Reduction
11	Recycled Content
12	Sense of Community
13	Interpretive Signage
14	Aquifer Recharge
15	Stormwater Management Runoff
16	Wind Mitigation
17	Elimination of Turf in Street ROW
18	Solar Powered Lighting
19	Reduced Potable Water Use
20	Permeable Pavement
21	Energy Star Version 3 HOmes
22	Energy Star Appliances
23	Coordination with Jefferson County Schools
24	Planning and Site Design
25	Synergies Between Residential, Commercial, and Mixed Use
26	Residential Product Diversity / Affordability
27	Best Management Practices

Sustainable Design Features

OTHER
Imperiled Species and Ecological Communities
Community Wide Recycling Program
Turf Limitation for Homes
Landscaping / Xeriscaping
Renewable Energy Credits
Sustainability Grant / Contest for Green Home
Fiber to Homes
Encourage Entrepreneurship
On-Site Construction Recycling Program
Light Pollution Reduction
Local Suppliers
Create and Administer the Sustainability Trust
ISO 140001 Certified Site Furniture
Encourage On-Site Material Usage in Construction
Public Transportation
Sustainability Manager Through the District
Community Website on Sustainability
Native Plants
Material Selection



Performance Objectives Chart

Performance Objectives

Component	Objectives	Initiatives
Transportation	<ul style="list-style-type: none"> Reduce internal vehicle trips / miles 	<ul style="list-style-type: none"> Create opportunities for living and working to reduce dependency on the automobile 4 6 25
		<ul style="list-style-type: none"> Build trail network, bike storage areas, and showers with changing facilities 3 7
		<ul style="list-style-type: none"> Employment centers with transit and ride-share programs 4 6 25
		<ul style="list-style-type: none"> Connect to existing public transportation network (RTD) 4
Education	<ul style="list-style-type: none"> Raise awareness of sustainable construction and living practices 	<ul style="list-style-type: none"> Ongoing commitment to green construction activities 5 9 11 18 20 21 22
		<ul style="list-style-type: none"> Research baseline energy consumption and waste disposal rates
		<ul style="list-style-type: none"> Implementation of interpretive signage program outlining community wide initiatives and building practices 13
Environment	<ul style="list-style-type: none"> Develop the site with respect to the interdependent natural systems and features 	<ul style="list-style-type: none"> Network of linked dedicated green spaces and trails for recreation and wildlife movement 1 2 3 7 24 27
		<ul style="list-style-type: none"> Concentration of mixed-use development in appropriate locations to reduce regional sprawl 6
Energy Efficiency	<ul style="list-style-type: none"> Reduce building and site energy consumption through thoughtful design and construction 	<ul style="list-style-type: none"> Residential construction will meet Energy Star® Version 3 requirements 21 22
		<ul style="list-style-type: none"> Community Centers will be LEED Certified 5
		<ul style="list-style-type: none"> Candelas Sustainability Trust provides opportunities for residential renewable energy components
		<ul style="list-style-type: none"> Commitment to renewable energy system within each community center
Water Conservation	<ul style="list-style-type: none"> Promote and specify native plantings and xeriscape principles Reduce interior water usage through fixture and appliance selection 	<ul style="list-style-type: none"> Reduce consumption and promote community wide water conservation 17 19
Materials	<ul style="list-style-type: none"> Promote regionally sourced and manufactured products (preferably within 500 miles of the project site) Reduce construction materials disposal 	<ul style="list-style-type: none"> Reduce the use of non-renewable resources, incorporate environmentally responsible materials, and minimize solid waste production 19
Social	<ul style="list-style-type: none"> Livability and walkability in compact and efficient neighborhoods designed to a pedestrian scale Community parks located within 1/2 mile walking distance of all residential units 	<ul style="list-style-type: none"> Create a physically healthy and socially interactive community in a safe environment 3 6 7 8 12 25 26
Economic	<ul style="list-style-type: none"> Develop and support an innovative local business community involved in sustainable practices 	

See Sustainable Design Features Exhibit for examples, pg. 7.



“Small actions and choices can have major, although unpredictable effects in determining what comes next.”

– Chinese Proverb



TERRA CAUSA CAPITAL, LLC
Capital Formation And Land Development Services
Arvada Residential Partners, LLC



100% total recycled fiber
30% Post Consumer

edited by:



NORRIS DESIGN
Planning | Landscape Architecture

