ABU DHABI ESTIDAMA PROGRAM

INTERIM ESTIDAMA COMMUNITY GUIDELINES

ASSESSMENT SYSTEM FOR COMMERCIAL, RESIDENTIAL, AND INSTITUTIONAL DEVELOPMENT

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for

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1.0 INTRODUCTION

The Abu Dhabi Government has recently initiated the Estidama Buildings and Communities Program under the direction of the Emirate of Abu Dhabi Urban Planning Council (UPC). The ultimate goal of this ambitious program is to transform Abu Dhabi into the sustainable capital of the Arab world. The Interim Estidama Community Guidelines (IECG) are an important element of this effort. The objective of these guidelines is to guide residential, commercial, and institutional projects in a way that will build sustainable developments, neighborhoods, and communities in the Emirate of Abu Dhabi. Their focus goes beyond individual buildings in a development (the focal point of the Estidama Pearls Rating Systems) and more on establishing a sustainable relationship of those buildings to their site and further to the greater community of which they are a part.

Figure 1 – The City of Abu Dhabi is projected to triple in size to 3 million people by 2030.

A number of powerful forces spurred development of the IECG. Huge, world-class developments such as Masdar City, among others, are projected to increase the size of Abu Dhabi City from about 930,00 to 3 million people by the year 2030. The City of Al Ain is also grappling with the prospect of major projects such as the massive Jebel Hafeet resort development already on the drawing boards and a population increase from 330,000 to 800,000 by the year 2030. The leadership of Abu Dhabi and the UPC recognize that along with the significant economic and other benefits these projects will bring to the country—many of which are already underway—they will also pose significant challenges in terms of energy consumption, natural resource impacts, housing affordability, traffic congestion, pollution, water conservation, and social harmony, just to mention a few. The eyes of the world are on Abu Dhabi as it wrestles with these challenges. The 2006 Living Planet Report from the World Wildlife Fund International singled out the United Arab Emirates as having the largest ecological footprint per person on the planet, mostly due to high carbon dioxide emissions from fossil fuels.

Figure 2-- Plan Abu Dhabi 2030 presents a bold vision for the city.

These pressures led to creation of the Estidama Buildings and Communities Program in late 2007. The program has six main elements that are being carried out simultaneously:

1. New Green Building Guidelines
2. Institutions and Pearls Rating System
3. Existing Building Guidelines
4. Public Building Guidelines
5. Industrial Buildings Guidelines
6. Community Guidelines (this program)

The first five elements will focus primarily at the building level, functioning to ensure that existing and new buildings incorporate a

variety of construction and operational techniques and technology to advance sustainability goals such as energy and water conservation. The Estidama Community Guidelines will look beyond the realm of the building to include site, block, neighborhood/district, and regional considerations in promoting sustainability. The six elements are currently at various levels of completion, but when finally in place in 2009 will represent a comprehensive approach to achieving sustainability in Abu Dhabi.

The IECG will be utilized in the development review process in Abu Dhabi. The Urban Planning Council has been assigned responsibility for reviewing all major projects within the Abu Dhabi Emirate, and currently its staff has little in the way of development standards and guidelines to assist it this task. Policies contained in documents such as Plan Abu Dhabi 2030 provide some direction in reviewing new developments, but were intended to provide general policy direction and not used as regulations. The IECG will help bridge this gap. Addressing issues such as efficient land development patterns, alternative energy production, water conservation, and natural resource protection, the IECG will be an important tool in helping Abu Dhabi become the sustainable capital of the Arab world—while at the same time providing more certainty in the development review process.

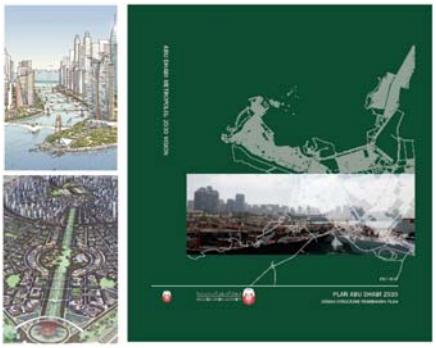

Figure 3 – Plan Abu Dhabi 2030 provides general policy direction.

2.0 OVERVIEW OF THE INTERIM ESTIDAMA COMMUNITY GUIDELINES

2.1 APPLICABILITY

The IECG will apply to all projects now being reviewed by the Urban Planning Council—basically all new residential, commercial, and institutional developments of more than one building and also to major renovation projects. The IECG will not apply to industrial developments or single- or multi-family residential development of less than 10 lots or units. They will only apply to renovation or rehabilitation projects that cost more than 50% of value of the existing structure(s). Some of the IECG will only apply to large, major developments as discussed later in this document.

While the UPC eventually intends to apply the IECG throughout the Abu Dhabi Emirate, initially they will apply only to the areas within PAD 2030 boundary. If there is any conflict or inconsistency with existing municipal laws or regulations, the IECG will take precedence.

To provide necessary flexibility in application of the IECG, we recommend that the UPC staff be granted the authority to modify a guideline if in a particular situation it creates a conflict or inconsistency with another guideline. In doing so, the staff would be required to make a finding that the modification advances the overall goal of

IECG APPLICABILITY SUMMARY

The IECG will apply as follows:

1. To all projects currently reviewed by UPC—residential, commercial, institutional.
2. Industrial and small residential excluded.
3. IECG override conflicting municipal regulations and requirements.
4. UPC staff has authority to modify guidelines where in conflict with another guideline to increase sustainability.
5. UPC can consider equivalent alternative compliance proposals to meet guidelines.
6. UPC staff may waive guideline if found to be technically or economically infeasible.

sustainability. Similarly, we suggest the staff be authorized to consider equivalent alternative compliance proposals--well-documented proposals to allow an alternative approach to a specific guideline that will produce an equal or better result from a sustainability perspective (e.g., for an infill project). Furthermore, during the testing period through 2008, we recommend that staff have the authority to waive a particular standard upon a finding that it is not feasible either from a technical or institutional perspective (again, this may be particularly true for infill projects).

2.2 How The IECG Were Drafted

The UPC retained Clarion Associates, based in Denver, Colorado, to assist its staff in drafting the IECG. Clarion Associates is a firm of land use planners and attorneys that has drafted numerous development guidelines and regulations for communities across the United States and Canada, including many for major cities in dry climates (Salt Lake City, Reno, Tucson, Santa Fe, Denver). The firm is currently drafting the development code for the fastest-growing city in the United States, Henderson, Nevada, which is located in the Las Vegas Valley. Clarion Associates is also developing a model Sustainable Community Development Code in collaboration with the University of Denver School of Law.

Figure 4 – Numerous major new developments like this one on Al Reem Island are rapidly changing Abu Dhabi's skyline.

In drafting the IECG, Clarion Associates drew from several sources. First, to understand the environmental, economic, and social aspects of Abu Dhabi, the consulting team, under the direction of the UPC project managers, conducted four focus group meetings in Abu Dhabi. These included workshops with representatives from the municipalities, government agencies (e.g., Department of Transportation, Abu Dhabi Water and Electricity Authority, Environment Agency), and the development community/consultants. Additionally, the Clarion team interviewed a number of UPC staff who conduct development reviews, sat in on several Urban Design Review panel meetings, and conducted tours of Abu Dhabi City and Al Ain. Out of these meetings, interviews, and tours, Clarion Associates developed a series of observations and findings that helped guide the consulting team in drafting the IECG.[1]

In addition to the meetings and tours, the consulting team whenever possible drew on sustainability guidelines and standards already adopted by desert communities (e.g., water-conserving landscape standards from Tucson, Arizona) or recommended by credible sources such as:

[1] These observations and findings are included as Attachment A to this document.

- The United States Green Building Council (e.g., Leadership In Energy and Environmental Design (LEED) For Neighborhood Development Pilot Program)
- The Rocky Mountain Land Use Institute (Model Sustainable Community Development Code).
- Project SUNtool (Sustainable Urban Neighborhoods modeling tool) developed by six European partners for the European Community (www.suntool.net).
- Building Research Establishment, Greenprint: A Sustainability Checklist For Development (2002)
- Diana Balmori and Gaboury Benoit, Land And Natural Development (LAND) Code: Guidelines For Sustainable Land Development (2007).
- We also cited exemplary aspects of proposed developments such as Motor World, Masdar City, and the Al Falah New community.

Based on this foundation, Clarion Associates prepared a Draft Annotated Outline of the IECG that was presented to the UPC staff. The Annotated Outline (dated June 27, 2008) provided a suggested framework for the IECG as discussed below. After receiving comments and direction from the UPC staff, Clarion produced a draft of the IECG which was reviewed by UPC staff and stakeholders including representatives of the development community, government agencies, and municipalities. Based on comments from these stakeholders, the final draft of the IECG was produced (this document).

2.3 GUIDING PRINCIPLES

The IECG system should first and foremost advance the goal of making the Emirate of Abu Dhabi a model of sustainability in the Arab world and beyond. It must address key topics that define sustainability in the Emirate such as water conservation, appropriate and efficient land development patterns, and natural resource protection.

Additionally, in view of the economic and social goals of this undertaking and the context that exists in Abu Dhabi, the IECG system must also be easy to understand and contain measurable standards. This will help to provide certainty for developers as well as being straightforward to apply and administer by staff. At the same time, the guidelines must be flexible enough to respect the varying development, market, and cultural contexts that exist throughout the Emirate of Abu Dhabi. Because some aspects of the IECG will be new to the development community, incentives are included where appropriate.

2.4 KEY IECG TOPICS

The IECG will address the following eight major topics distilled from the PAD 2030, other key documents (such as the Estidama Green Building Guidelines/Estidama Pearls and the Urban Design Review

Panel summary sheets) and discussions with UPC staff and government agencies.

1. Development Patterns—Compact, Mixed-Use Development
2. Alternative energy production and energy conservation
3. Mobility/transportation
4. Water conservation
5. Natural resources, ecology, open space
6. Building design/form (e.g., building orientation, compatibility transitions, Arab-inspired architecture)
7. Balanced, livable communities (affordable housing, adequate community facilities, gathering places, safety, etc.)
8. Integrated Solid Waste Management: Reduce, Reuse, and Recycle

2.5 PROJECT WORK PLAN/SCHEDULE/NEXT STEPS

With the completion of the IECG, the UPC project management has indicated that they will work with the development community and UPC staff to test the interim guidelines, which will be applied on a voluntary basis for a period of approximately six months (through December 2008). At that point and drawing on the testing, the UPC will work with consultants to revise the Interim Estidama Community Guidelines and produce the final Estidama Community Guidelines. The intent is to have UPC staff apply the final Estidama Community Guidelines on a mandatory basis at some future date.

3.0 IECG FRAMEWORK SUMMARY

3.1 OVERVIEW

The suggested framework for the IECG includes eight major topic areas as set forth above (e.g., alternative energy, water conservation). The proposed IECG assessment system is similar to the Green Building Guidelines/Estidama Pearls rating system, which establishes a point system with a menu of actions that qualify towards credits to achieve a minimum score necessary for project approval.

However, the recommended IECG structure differs from the Estidama Green Building Guidelines/Estidama Pearls system in that it sets forth a top tier of 3-5 actions that are the primary approaches to achieve sustainability in a specific topic area (e.g., water conservation). These top tier guidelines are quantified and measurable to the maximum extent possible to provide certainty and ease of administration. Initially, developers will be strongly encouraged to adopt each one of the top tier guidelines. The guidelines could possibly be made mandatory when the system is fine-tuned and finalized in 2009.

These top-tier actions are supplemented by a longer list of from five to ten optional/suggested sustainability measures from which the

applicant can pick and choose as most appropriate for the proposed development site and surrounding community and from an economic feasibility perspective. For this second tier, each tool or approach is assigned a point value, and the IECG system establishes a minimum overall score that is suggested to be attained in that topic area.

When preparing a development application, the developer will be required to self-evaluate the proposal to document compliance with the first tier guidelines and to self-score the second tier guidelines. The Urban Planning Council staff will review this material and have authority to make the final determination as to compliance and scoring.

The specific guidelines suggested here have, as noted above, been drawn from established sources or from standards that have been adopted in other communities. They will need to be reviewed and discussed with staff and then tested with the development community to ensure they are feasible, appropriate for conditions in Abu Dhabi, and will not unduly restrict desirable projects. Because there is overlap among topics (e.g., approaches to compact development patterns will also be applicable to mobility), there is some overlap among suggested guidelines.

3.2 Guideline Format

Each Tier 1 guideline follows the same overall format:

- Discussion of the goal of that particular guideline (e.g., reduction of water consumption),
- How that guideline goal relates to the overall sustainability goal in that topic area (e.g., water conservation), and
- Sources/references for the guideline.

The format for the Tier 2 guidelines is as follows:

- An overall point value is first assigned for the topic area along with a suggested minimum score that the development should strive to achieve.
- This is followed by 5-10 specific actions geared to promoting the topic area's sustainability goals. Each action is assigned a point value. The developer/applicant is free to choose from the menu of actions to achieve the minimum score.

4.0 INTERIM ESTIDAMA COMMUNITY GUIDELINES

4.1 Development Patterns—Compact, Mixed-Use Developments

4.1.1 BACKGROUND/GOAL

As highlighted in Plan Abu Dhabi 2030, the greatest challenge facing Abu Dhabi is where and how it will grow over the next quarter century. PAD 2030 documented how a sprawling, expansive development pattern and urban form with single-use developments would make a sustainable community nearly impossible. The transportation system will be overwhelmed and congested, air pollution and greenhouse gases from cars will soar, the efficient provision of infrastructure will be nearly impossible, and the loss of natural areas significant. Overall, the quality of life for Abu Dhabi's citizens will steadily erode.

Goal: Promote compact, mixed-use development that will (1) substantially reduce vehicle miles traveled and greenhouse gas emissions, (2) reduce costs of providing infrastructure and public services, and (3) support mass transit.

Figure 5: Compact, mixed-use developments can reduce traffic and support mass transit while providing attractive amenities for their residents and workers.

4.1.2 RELATIONSHIP OF GUIDELINES TO GOAL

Compact, mixed-use development, if undertaken carefully, can help avoid these problems. Such a development pattern furthers the PAD 2030 guiding principle that land use and development will be based on a framework of connected centers, public places, and open space that together offer an accessible and hospitable public realm. Many studies show that higher density, compact, mixed-use developments can greatly reduce the use of the automobile (and thus air pollution) and make needed mass transit feasible:

- An analysis of 83 metro areas in the United States (Reid Ewing) revealed that residents in compact regions (Boston, Portland) drove 25% less than those in sprawling regions (Atlanta, Raleigh).
- Several assessments of mixed-use development projects in Los Angeles and elsewhere show they can reduce auto use by 5-15%.
- An evaluation of a compact growth scenario in Sacramento, California, showed a 25% reduction in vehicle miles traveled per house per day.

Moreover, defining urban growth boundaries and requiring new development to be contiguous with existing built-up areas can help preserve sensitive natural areas on the city's edge while at the same time making cost-effective infrastructure and government services feasible. Numerous studies[2] document the costs associated with sprawl and scattered developments compared to compact growth. Some of their findings include:

- 50% longer ambulance response times,
- 33% longer fire response times,
- 120% increase in the cost of roads,

[2] Smart Growth Network, Cost of Community Services Studies (2002)

- 80% increase in the cost of utilities.

While compact, higher density development has much to offer in terms of sustainability, it will require careful attention to quality and compatibility with existing neighborhoods. These more concentrated developments must also be accompanied by adequate infrastructure and community facilities and amenities such as schools, mosques, roads, transit, and open space so as not to overwhelm and strain existing infrastructure (See discussion of the topic "Balanced, Livable Neighborhoods" below.).

The proposed guidelines address this range of issues, fostering compact, mixed-use, higher density development while seeking to ensure provision of adequate infrastructure and community facilities.

4.1.3 GENERAL SOURCES/REFERENCES

- International City/County Management Association, Getting To Smart Growth: 100 Policies For Implementation. (2002)
- SUNtool, Strategies—Urban Community/Concentration (www.suntool.net).
- Reid Ewing, Best Development Practices: A Primer For Smart Growth (1998).
- U.S. Green Building Council, LEED-For Neighborhood Development Rating System Pilot Program (2007).

4.1.4 TIER 1 GUIDELINES (STRONGLY ENCOURAGED)

i. Compact Development/Sprawl Control

New development should be contiguous on at least 25% of its perimeter with existing development that is already served by public infrastructure such as water, wastewater, roads and power or proposed development that has received conceptual approval by the UPC. Developments may be considered contiguous even though separated by roads, bodies of water, and other physical features.

Purpose: Limiting sprawl and leapfrog development helps reduce the cost of infrastructure service, reduces automobile use, and supports mass transit.

Sources/References:

- Many western states in the United States such as Arizona and Colorado require contiguity between a proposed development and existing city boundaries before annexation into a city is permitted. The goal is to prevent leapfrog development and creation of unincorporated enclaves within a municipality.
- Vancouver, British Colombia has curbed sprawl and improved transportation alternatives through compact development. Since

2006, the city has used the term "Eco-Density" to talk about density as a way to reduce the city's overall ecological footprint. www.vancouver-ecodensity.ca

ii. Mandatory Use Mix

All major developments[3] must have a minimum of three use types (residential, office, retail, or institutional/public). No use type shall amount to less than 10% or more than 80% of the total development gross floor area. Individual phases of multi-phase projects may have a lesser mix of uses if the applicant provides assurances that later phases will produce the required mix of uses overall. Single buildings/small developments shall have at least two use types.

Incentive: Developments that provide four use types or that include 25% of residential units as affordable workforce housing shall be eligible for a 20% height bonus or a 20% density bonus above that specified in applicable development regulations or in PAD 2030.

Purpose:

Mixed-use developments can reduce automobile use, support mass transit, promote a jobs-to-housing balance, and reduce the cost of providing infrastructure and other government services.

Sources/References:

- Florida Department of Transportation, Model Regulations and Plan Amendments for Multimodal Transportation Districts (2004) and Multimodal Transportation Districts and Areawide Quality of Service Handbook (2003)
- To promote mixed-use projects, transit service, and a jobs/housing balance, Colorado Springs, Colorado, specifies a minimum mix of use in mixed-use zone districts similar to what is proposed here. Orange County (Orlando), Florida, is considering similar requirements for new master planned communities around the Orlando International Airport.
- Under the category of Neighborhood Pattern and Design Category #2, the U.S Green Building Council's LEED For Neighborhood Development Rating System (LEED-ND) awards significant points for a diversity of uses within a development.
- Several of the proposed major developments in Abu Dhabi including Motor World, Masdar City, and the Al Falah new community have an exemplary mix of uses proposed that would exceed this guideline.

[3] Major developments are tentatively defined as projects having two or more buildings larger than 10,000 square meters each.

iii. Minimum (Transit-Supportive) Residential Density

In Abu Dhabi City, residential developments should have an overall minimum density of 30 units/hectare (assuming adequate public facilities are available, unless otherwise specified in PAD 2030 or in adopted UPC density regulations. The minimum density of any development within 1,500 meters of a transit stop shall be 75 units/hectare(assuming adequate public facilities are available), unless otherwise specified in PAD 2030 or in adopted UPC density regulations

Purpose:

Compact developments with minimum residential densities are a key to successful mass transit systems. Low-density developments undercut cost-effective mass transit and lead to increased auto-dependency.

Figure 6 —The Washington, D.C.., mass transit system has a large number of units concentrated within walking distance of its stations.

Sources/References:

- Research shows that a minimum density of 30-35 units per hectare is required to support mass transit service. Many communities require densities of 75 units and more per hectare near mass transit stations. Under the category of Neighborhood Pattern and Design, LEED-ND awards an increasing number of points for higher density developments with a minimum of 30-60 units per hectare up to 175+ units/hectare.
- SUNtool (Urban Community—Strategies/Transportation Performance) incorporates criteria for development concentration to support public transport and walkability.
- Curitaba, Brazil, has organized the city along transit corridors, with the highest zoned housing densities near high capacity transit lines, and lower densities further away. The transit system (bus rapid transit) is used by approximately 85% of the population.
- Zoning in Toronto, Canada, encourages new construction to be located along its primary transit line, the Yonge Street subway line.

iv. Connections With Surrounding Developments and Neighborhoods

All developments shall provide multiple pedestrian and vehicular connections with surrounding developments and neighborhoods. The layout of streets and pedestrian pathways in a proposed development shall provide for alignment and continuation of existing or proposed streets and pedestrian pathways in adjacent properties. Where only a limited number or no access points exist on adjacent property, at least one pedestrian and one vehicular connection shall be provided every 500 meters on each side of the proposed development unless prevented by topographical or environmental conditions.

Purpose:

One of the most significant criticisms of proposed master planned developments in Abu Dhabi is the lack of connections with surrounding developments and neighborhoods. Proposed developments often tend to be isolated, stand-alone projects that are not well-integrated into the existing fabric of the city. The City of Dubai provides a good glimpse of the future if this pattern is replicated in Abu Dhabi—isolated, stand-alone developments with little sense of overall community or relationship to the rest of the city. Improved connections between developments will not only help avoid this sense of isolation but provide enhanced mobility and reduce the use of autos (and thus greenhouse gas emissions.

Sources/References:

- Smart Growth Network and ICMA, Getting To Smart Growth, 100 Policies For Implementation, "Create Walkable Communities." (2002) (at p. 25)
- SUNtool, Strategies—Concentration; Quality of Life—Access (www.suntool.net).
- PAD 2030, Section 8.4 Transportation Framework Policies (at p. 144).

v. Minimum Open Space Requirement

All major developments shall provide 2 hectares of public open space[4] for every 1,000 residents or fraction thereof. This open space should be located and configured to the Abu Dhabi Open Space and Parks Plan, when adopted. To the maximum extent practicable, the open space shall be contiguous and have a minimum width of 20 meters, except for pathways and trails. In infill areas (to be defined), alternative open space may be provided in the form of improved public gathering places, courtyards, playgrounds, green roofs on parking structures, and ball courts. The minimum size of such alternative open space amenities shall be 3 square meters for every 300 square meters of residential gross floor area. At least 50% of all on-site open space shall be located within 225 meters (approx. 3 minutes walking distance) of 50% of the developments residents.

Figure 7—Urban open space may include courtyards and plazas.

If the Urban Planning Council staff determines that provision of all or a portion of the required open space off-site is preferable to on-site provision, the applicant may provide equivalent land area in a location approved by the UPC or at the option of the

[4] Open space shall be defined as land or water areas used for active or passive recreational uses, natural and cultural resource protection purposes, or agricultural production. It shall not include development setback areas, street rights-of-way, street medians, and utility corridors (unless improved for recreational use).

UPC, provide a cash-in-lieu payment to the Abu Dhabi municipality for the purpose of open space acquisition. The cash-in-lieu payment shall be based on a professional appraisal acceptable to the UPC of the value of an equivalent amount of land required under this section.

Purpose:

As pointed out in PAD 2030, there is a serious shortage of public open space in Abu Dhabi City. This shortage is particularly acute in older, mature portions of the city where there are few parks and public gathering places.

Sources/References:

- The National Recreation and Parks Association (USA) recommends a general guideline of 2 hectares of parks and open space lands for every 1,000 residents of a community. The British Sport and Recreation Council recommends approximately 2.8/1,000.
- Several of the proposed master planned communities in Abu Dhabi have notable open space systems that would meet and surpass this requirement. Motor World, for example, will set aside 16% of the development for an open space network that includes a good hierarchy of parks/open areas and innovative rooftop gardens.

4.1.5 TIER 2 GUIDELINES (OPTIONAL MENU)

COMPACT MIXED-USE DEVELOPMENT PATTERNS

Total Points Available: 17

Minimum Recommended Score: 9

i. Appropriate Development Location

New development should be in conformity with the location and density for the site as provided in PAD 2030, if specified, or in adopted UPC district and density regulations. If not specified in PAD 2030, the applicant shall apply for a formal amendment to PAD 2030. **2 points**

Source/Reference:

- Chapter 5 (Overall Patterns) and Chapter 6 (Zooming In) of PAD 2030 provide direction as to the appropriate height and densities in certain precincts of Abu Dhabi City.

Figure 8 – Mixed use developments help promote a balance between jobs and housing.

ii. Mixed Use—Jobs-To-Housing Balance

For major developments with more than 250 residential units, to help ensure a jobs/housing balance, include a non-residential component equaling at least 25% of the project's total square meters of building area. **2 points**

Source/Reference:

- Source/Reference: Urban Land Institute, Growing Cooler: The Evidence On Urban Development And Climate Change (2008) at p. 153.
- SUNtool, Quality of Life—Urban Policy/Economic Development. (www.suntool.net)

iii. Compact Development—Walkability

For major developments, locate or design the project so that at least 50% of the project dwelling units are within 350 meters (approximately 5 minutes) walking distance of an existing or planned mosque, school, and community center. 2 points

Source/Reference:

- SUNtool, Urban Community--Concentration (www.suntool.net).
- Urban Land Institute, Growing Cooler: The Evidence On Urban Development And Climate Change (2008) at p. 153.

iv. Compact Development—Surface Parking Limit

No more than 10% of the site area of the development up to a maximum of 5 acres may be devoted to surface parking. 2 points

Source/Reference:

- The Abu Dhabi Municipality already requires that a high percentage of parking be structured or underground (Need specifics.)
- Under the category of Neighborhood Pattern and Design, LEED-ND limits the parking area to 20% with no surface lot allowed to be larger than 2 acres.

v. Transit-Supportive Development

Provide transit service within 350 meters walking distance of at least 50% of the projects' dwellings and business entrances. 3 points

Source/Reference:

- See Florida Department of Transportation, Multimodal Transportation Districts and Areawide Quality of Service Handbook (2003) at p. 26.
- The Al Falah new community proposes that bus stops will be available within 350 meters of all homes.

vi. Adequate Community Facilities

Demonstrate compliance with the Requirements of Community Facilities For New Residential Areas in Abu Dhabi City and Environs as applied to mosques, schools, and public safety

(police/fire) facilities either through existing facilities or provision of land and construction of new facilities. **4 points**

Source/Reference:

- See Requirements of Community Facilities For New Residential Areas in Abu Dhabi City and Environs

vii. Adequate Community Facilities

Improve all public open spaces provided in the development with public amenities such as seating, shade structures such as canopies and screens, trees, and similar features. **2 points**

Source/Reference:

- PAD 2030, Urban Design Policies (Response to Climate)
- See draft Al Ain Architectural Design Guidelines regarding shading of public realm when available.

5.1 Alternative Energy Production/Energy Conservation

5.1.1 Background/Goal

Although Abu Dhabi has abundant oil reserves, its leaders recognize that fossil fuels are a finite resource that should be conserved to the extent practicable and that the country should embrace alternative energy sources in anticipation of the time these resources will be depleted. Moreover, use of alternative fuels can help reduce greenhouse gas emissions. Extensive use of fossil fuels in Abu Dhabi and Dubai and the resulting high level of carbon dioxide emissions were cited as the primary factor for the United Arab Emirates having the largest ecological footprint per person on the planet.

Figure 9 —An increasing number of countries and communities throughout the world are requiring that a minimum percentage of energy used come from alternative energy sources.

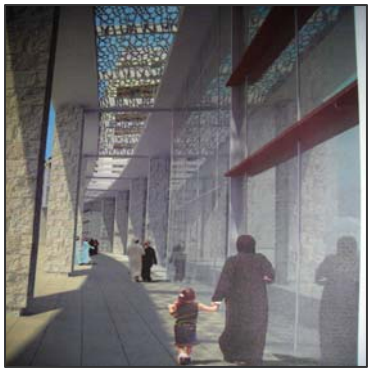

Figure 10—Some developments in Abu Dhabi are being designed to provide shade structures and take advantage of natural ventilation to reduce energy consumption.

A great deal of emphasis has been placed on the role of sustainable building design and construction techniques to conserve energy. The Leadership in Energy and Environmental Design (LEED) Green Building Rating System is a good example. Much less emphasis, however, has been placed on the role of site planning in a sustainable design program—and more specifically on alternative energy sources for developments and energy conservation at the site level. Without careful consideration during the planning stages of major new developments and neighborhoods, opportunities for future installation of passive and active solar features or wind power may be dramatically reduced or eliminated altogether.

Goal: To promote the production of energy from alternative sources such as solar and wind and encourage energy conservation at the site and community level.

5.1.2 RELATIONSHIP OF GUIDELINES TO GOAL

The IECG can help address the goals of providing alternative energy sources and promoting energy conservation in several ways.

For example, an increasing number of countries and communities throughout the world are requiring that a minimum percentage of energy used in a development come from alternative energy sources. Other jurisdictions encourage or require that buildings and residential lots be oriented to maximize solar access for purposes of solar power generation or providing solar hot water heating. The results can be significant—proper solar orientation of new homes built in San Jose, California (south of San Francisco) produced total energy savings of 10-16.5%--with up to 40% savings from space cooling.

Similarly, other communities are adopting design guidelines that promote energy conservation. An increasing number encourage "cool" roofs that reflect harsh sunlight and help to reduce air-conditioning costs by up to 20 percent. Some desert climate jurisdictions are encouraging developers to build narrower streets that are more easily shaded by bordering buildings, creating a better pedestrian environment. Developments in Abu Dhabi like Masdar City are being designed to take advantage of natural ventilation and cool night breezes to reduce energy consumption. All of these initiatives suggest that the IECG can make a substantial contribution to alternative energy production and conservation.

5.1.3 GENERAL SOURCES/REFERENCES

- Urban Land Institute, Growing Cooler: The Evidence On Urban Development And Climate Change (2008)
- Rocky Mountain Land Use Institute, Model Sustainable Community Development Code, "Renewable Energy Chapter" (2008)
- U.S. Green Building Council, LEED-For Neighborhood Development Rating System Pilot Program (2007).
- SUNtool, Guidelines—Energy (www.suntool.net)

5.1.4 TIER 1 GUIDELINES (STRONGLY ENCOURAGED)

i. Alternative Energy Production

10% of all energy projected to be consumed by the development at full build-out must come from alternative renewable energy sources (solar, wind, geothermal, biofuels) generated on- or off-site.

Purpose:
Using alternative energy sources helps to create an incentive for off-site alternative energy production facilities and to encourage site planning to accommodate small-scale solar and wind power facilities on-site.

Source/Reference:

- Under the category of Green Construction and Technology, LEED-ND requires that at least 5% of electrical energy needs be generated on-site. The State of Colorado requires its energy utilities to generate at least 20% of their power from alternative sources.
- The proposed Abu Dhabi Green Building Assessment System awards points for on-site renewable energy generation (ADE9).
- Model Sustainable Community Development Code Renewable Energy Chapter (Rocky Mountain Land Use Institute, University of Denver School of Law).

Figure 11—Proper solar orientation of a residential structure or lot can help maximize the efficiency of solar panels and solar thermal heating devices.

ii. Alternative Energy Production

A minimum of 30% of all residential units or lots in a development must have a maximum solar orientation or use solar energy, thermal, or cooling devices. 50% of non-residential project buildings shall have one axis 1.5 times longer than the other and that long axis should be east-west oriented. For infill projects in which the street framework or building orientation is already established, the development shall provide adequate space on the building or on-site for installation of solar or wind power devices.

Purpose:

Proper solar orientation of a residential structure or lot can help maximize the efficiency of solar panels and solar thermal heating and cooling devices. Similarly, configuring and orienting non-residential buildings as recommended can increase solar access.

Source/Reference:

- Model Sustainable Community Development Code Renewable Energy Chapter (Rocky Mountain Land Use Institute, University of Denver School of Law) citing Fort Collins, Colorado, Solar Access, Orientation, and Shading regulations in Land Use Code.
- Since 2000, the City of Barcelona, Spain, has required installation of solar thermal units on all new buildings. By April 2004, more than 19,000 square meters of new panels were installed, saving an average of 15.7 MW of demand per year.
- Under the category of Green Construction and Technology, LEED-ND incorporates a provision requiring that 75% of a project's buildings have a long axis oriented east-west.

Figure 12—Shade structures such as roof-top canopies, brise-soleil devices, and screens help reduce energy consumption for cooling.

iii. Energy Conservation

All buildings shall provide shade structures in the form of roof-top canopies, brise-soleil devices, screens, and similar devices to reduce energy consumption for cooling. Such structures should provide at least 50% shading of the façade on June 21.

Purpose:

Cooling and air-conditioning of buildings in Abu Dhabi accounts for 75% of electricity consumption in the summer months and is the major consumer of electricity. Not only do shading devices help improve the hospitality of the public realm, but they can substantially reduce cooling costs.

Sources/References:

- Austin, Texas, requires shade and shelter amenities including shaded sidewalks along all building frontages and shade devices over building entries as part of its commercial design standards.
- The major proposed master planned communities (e.g., Masdar City, Motor World, Al Falah, MGM-Mina Pier) all propose extensive use of shade structures.

iv. Energy Conservation

All major developments with more than 10 centerline miles of streets shall conduct windflow modeling to determine the optimal layout of streets and building orientation for natural cooling purposes.

Purpose:

Cooling and air-conditioning of buildings in Abu Dhabi accounts for 75% of electricity demand in the summer months and is the major consumer of electricity. Natural wind ventilation and cooling, particularly in the evening, can help reduce power demand for cooling.

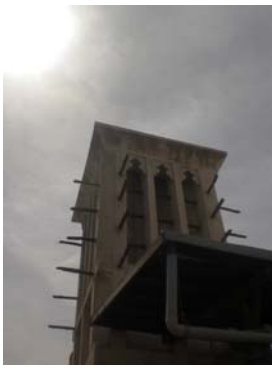

Figure 13 -- A traditional Arab wind tower.

Sources/References:

- Historically, many Arab buildings like those found in the historical area of Bastakia in Dubai, utilized wind towers for cooling.
- Masdar City is proposing to utilize wind towers and natural ventilation that takes advantages of night breezes to aid in cooling.
- Peter Busby, "The Roots of Environmental Building In The Arab World," Al Ain 2030 Charette Proceedings (at p. 179).

v. Energy Conservation

All buildings shall include a "cool roof" with a Solar Reflectance Index of 78 for flat roofs or 29 for roofs with a slope greater than 2:12. In the alternative, install a green or vegetated roof on at least 50% of the roof area of all buildings in the project (25% for renovated buildings). Green roofs shall use water-conserving landscaping as specified in Section 7.1.4.iii.

Figure 14—Chicago, Illinois, requires most major buildings to have green roofs.

Incentive:
Any building that installs a "green roof" that covers at least 50% of the roof square footage (25% for renovated buildings) shall be eligible for a floor-area bonus of two times the allowable floor area of the roof or an increase in height of 2 stories over the maximum permissible height.

Purpose:
Studies show that cool and green roofs can substantially reduce cooling costs by 10-30% as well as provide amenity space for residents.

Sources/References:

- Austin, Texas, awards points for cool roofs as part of its commercial design review regulatory point rating system.
- Chicago, Illinois, requires green roofs on all major developments approved as planned unit (master planned) developments. At least 50% of the roof must be vegetated.
- Portland, Oregon, provides a floor area bonus equivalent to an additional story on a building that provides a green roof.
- A pproximately 10% of all flat roofs in Germany are vegetated, as well as some pitched roofs. Tax incentives and regulations encourage green roofs. The German city of Stuttgart has a particularly strong green roof ordinance.
- A U.S. E.P.A study of cool roofs in Florida and California demonstrated cooling energy savings of 20-70 percent.
- LEED-ND Green Construction and Technology Credit #10 for heat island reduction and LEED-SS Credit #7.2 for Urban Heat Island Reduction: Roof.

5.1.5 TIER 2 GUIDELINES (OPTIONAL MENU)

Figure 15--District cooling systems can provide substantial energy savings.

ALTERNATIVE ENERGY/ENERGY CONSERVATION

Total Points Available: 17

Minimum Recommended Score: 9

i. Alternative Energy—Cooling Systems

Utilize a centralized, district cooling system. **4 points**

Sources/References:

- District cooling can reduce overall demand for electricity and greenhouse gas emissions. It also helps reduce peak power demands by storage using ice or chilled water.
- The National Central Cooling Company of the UAE (Tabreed) is one of the world's largest district cooling utilities and has a proven track record. It is currently developing a plan to provide district

cooling services to Abu Dhabi University's new campus in Khalifa City.

- District cooling systems are suggested as part of the UAE mitigation plan to reduce greenhouse gas emissions (UAE Initial National Communication To The United Nations at p. 57)

ii. Alternative Energy—Preferred Parking

Provide preferred parking spaces near building entrances/elevators for hybrid/low-energy or car-pool vehicles. Devote at least 1% of all parking for such vehicles or a minimum of 1 space, whichever is more. 1 point

Figure 16—Prefered parking space for hybrid/ low-energy vehicles

Sources/References:

- An increasing number of communities are providing preferential parking for hybrid vehicles similar to parking incentives for compact cars.

iii. Energy Conservation—Ventilation Systems

Employ natural ventilation systems (wind scoops, wind towers) that take advantage of coastal breezes and diurnal wind shifts on 25% of all buildings in the development. 2 points

Sources/References:

- Masdar City plans to make extensive use of natural ventilation and cooling through appropriate building design to reduce cooling costs.
- Peter Busby, "The Roots of Environmental Building In The Arab World," Al Ain 2030 Charette Proceedings (at p. 179).
- The Eastgate Centre building in Harare, Zimbabwe, was modeled to mimic the natural ventilation in termite mounds and uses ten percent of the energy of similar buildings.

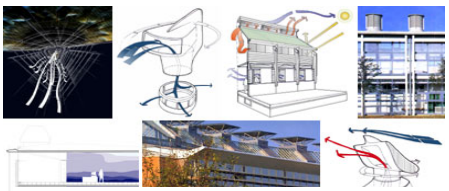

Figure 17— Wind towers and air scoops can provide natural ventilation and cooling for new buildings.

iv. Energy Conservation—Solar Reflectance

All paving materials should have a Solar Reflectance Index of at least 29 to reduce solar gain and the urban heat island effect. 2 points

Sources/References:

- LEED-ND Green Construction and Technology Credit #10 for heat island reduction.
- PAD 2030, Chapter 8 (III), Response to Climate.

v. Energy Conservation—Covered Parking

Locate at least 50% of all off-street parking spaces under cover (i.e., under a building, under a deck, underground, or under a shade structure) to reduce solar gain and the urban heat island effect. Any roof or shade must have a Solar Reflectance Index of 29. 2 points

Sources/References:

- LEED-ND Green Construction and Technology Credit #10 for heat island reduction.

vi. Energy Conservation—Secondary Street Widths

Design and construct secondary streets with narrow rights-of-way to encourage shading by adjacent buildings. 3 points

Sources/References:

- Santa Fe, New Mexico, and many desert climate communities designed under the Spanish Law of the Indies incorporated narrow streets to so that adjacent buildings would provide shade on buildings across the street and for pedestrians.
- Temperatures in neighborhoods with solar shading of streets can be as much as ten degrees cooler than where streets are not shaded. Judy Corbett and Michael Corbett, Designing Sustainable Communities (1999) at p. 161.

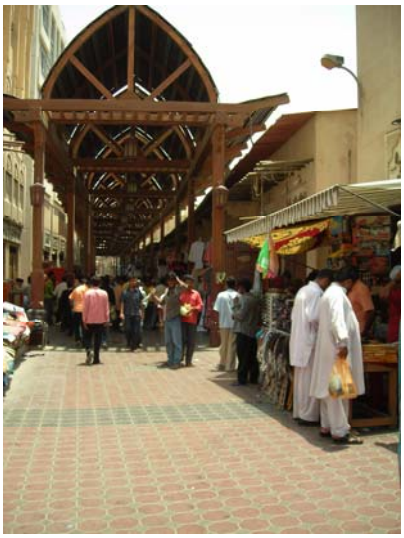

Figure 18—Souk-like roof structures can provide shade along major retail streets.

vii. Energy Conservation—Street Alignment/Design

For major retail streets, align north-south and install souk-like roof structures to provide shade. Alternative street orientation may be permissible if modeling demonstrates equivalent compliance to the satisfaction of the UPC or if the project is located in an area where the street pattern is already established. 3 points

Sources/References:

- As recommended in the Al Ain 2030 Charette (at p. 123).

6.1 Mobility/Alternative Transportation Modes

6.1.1 Background/Goal

Plan Abu Dhabi 2030 stresses the need for a "layered transportation network" that features a variety of modes—transit, vehicular, and pedestrian—to serve a future city of three million people. The plan recommends creation of a transit system as well as a "fine grain of interconnected streets."

Having a balanced transportation system and "complete streets" that accommodate pedestrians and bicyclists has some important benefits:

A balanced transportation system with interconnected streets can support economic growth and providing efficient connections between homes, schools, mosques, and businesses. Such a system will:

- Significantly reduce the number of cars on the road, reducing congestion and helping to enhance the potential for walking, especially for short distances. An analysis by the Victoria Transportation Policy Institute found that non-motorized options can replace some car trips and reduce total vehicle miles traveled.
- Encourage more walking and biking thus helping improve public health and reduce obesity. One study revealed that 43% of people with safe places to walk near home met recommended exercise levels.
- Improve safety for pedestrians, especially children—up to 28% less risk according to one study.
- Contribute to the reduction in greenhouse gas emissions associated with car exhausts. Substituting one bike trip per month for a car trip per person in a city the size of Al Ain would cut carbon dioxide emissions by about 4,000 tons annually.
- Goal: Encourage and promote a balanced transportation system that provides alternatives to automobiles including mass transit and pedestrian and bicycle systems.

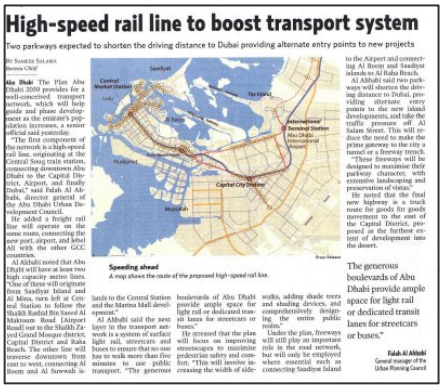

Figure 19: Abu Dhabi is planning an extensive mass transit system.

6.1.2 Relationship of Guidelines to Goal

The Interim Estidama Community Guidelines can make a major contribution towards supporting and promoting mobility and a balanced transportation system as recommended in PAD 2030. For example, development guidelines and standards can help produce the fine grain of interconnected streets that will be more conducive to walking by limiting block size and requiring connections between developments. Likewise, guidelines that encourage higher density mixed-use developments can make transit more feasible while at the same time making walking a more attractive alternative to driving.

Figure 20--Complete streets are designed to serve all modes of transportation.

6.1.3 General Sources/References

- The U.S. Congress and Senate are currently considering Complete Streets legislation. See Complete The Streets Coalition. www.completethestreets.org.
- Urban Land Institute, Growing Cooler: The Evidence on Urban Development and Climate Change (2008)
- U.S. Green Building Council, LEED-For Neighborhood Development Rating System Pilot Program (2007).
- SUNtool (Urban Community—Strategies/Transportation Performance) incorporates criteria for development of balanced transportation systems.

6.1.4 Tier 1 Guidelines (Strongly Encouraged)

i. Alternative Modes--Pedestrian Systems

No block length in a new development shall exceed 170 meters. If longer blocks are necessary, mid-block crossings must be provided every 170 meters. Exceptions are permitted to avoid

incursion into or damage to sensitive natural areas or to accommodate major institutional buildings or uses (e.g., hospitals, museums, parks), or for infill developments where the street pattern is already established.

Purpose:
Shorter, traditional block lengths encourage walking and provide multiple access points for cars.

Sources/References:

- Shorter block lengths create a better environment for pedestrians and encourage walking. www.walkableamerica.org.
- Model Sustainable Community Development Code Renewable Energy Chapter (Rocky Mountain Land Use Institute, University of Denver School of Law).
- SUNtool (Urban Community—Strategies/Transportation Performance) incorporates criteria for development concentration to support public transport and walkability.

Figure 21—(above) Provision of sidewalks encourages walking instead of driving to nearby destinations. (below) Avoid placing signs and utility poles in sidewalks.

ii. Alternative Modes--Pedestrian Circulation

Provide detached sidewalks (separated from the street by a planting strip or other space) with a minimum width of 1.5 meters on both sides of all non-arterial streets throughout a development and 2 meters wide on arterial streets. Exceptions are allowed to avoid intrusion into or damage to sensitive natural areas. Avoid placing signs, utility poles, and other structures in sidewalks that block pedestrian access.

Purpose:
Provision of sidewalks encourages walking instead of driving to nearby destinations, thereby reducing greenhouse gas emissions and reducing traffic congestion.

Sources/References:

- See recommended "complete streets" standards at www.completestreets.org
- Under the category of Neighborhood Pattern and Design #7, LEED-ND incorporates multiple standards to promote walkable streets.
- PAD 2030, Section 7.7 (Streetscape Revitalization: Existing Streets); Section 7.8 (New Streets)

iii. Alternative Modes—Internal Interconnected Street Network

To incorporate high levels of internal connectivity within a development, the average street grid density shall be at least 20 centerline miles per square mile or the development should

achieve a connectivity index score of at least 1.65 (See below for formula.).

Purpose:
Encourage fine-grained network of streets to promote walking and biking.

Sources/References:

- Under the category of Neighborhood Pattern and Design #8, LEED-ND establishes a measure for internal connectivity based on street miles/square mile.
- As an alternative, Franklin, Tennessee, and Orlando, Florida, have adopted an internal connectivity index based on a ratio of street links andsegments to street nodes and intersections. The higher the ratio of links to nodes, the more connectivity is achieved.

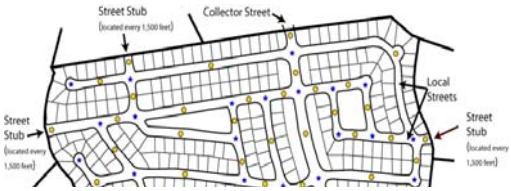

Figure 22 –Example of a diagram illustrating the Connectivity Index.

iv. Transit-Supportive Development

Major developments should concentrate at least 50% of all units/square footage within 350 meters (approximately a 5 minute walk) of any existing or planned mass transit station on or adjacent to the site. If this guideline cannot be met, then the development should provide an internal transit system that provides service at a frequency of one-half hour between the hours of 6 a.m. and 10 p.m.

Purpose: To ensure that a significant amount of higher density housing be located close to transit, providing for easy access for residents, and at the same time, strong support for transit.

Sources/References:

- See Florida Department of Transportation, Multimodal Transportation Districts and Areawide Quality of Service Handbook (2003) at p. 26.
- City of Toronto Green Standard for Mid to High Rise Residences, Commercial, Industrial and Institutional Development, Public Transit Accessibility section directs that the major entrance be located no further than 200 m from a transit stop.
- The Al Falah new community proposes that bus stops will be available within 350 meters of all homes.

6.1.5 TIER 2 GUIDELINES (OPTIONAL MENU)

MOBILITY/ALTERNATIVE TRANSPORTATION MODES
Total Points Available: 18
Minimum Recommended Score: 9

Figure 23—Shade structures (above and below) are important features along primary pedestrian routes.

i. Alternative Modes--Pedestrian Systems And Connectivity

Site plans should depict direct primary pedestrian routes/connections between residential developments and main activity centers on site (retail, schools, mosques, offices, transit stops) or in immediate neighborhood. 2 points

Sources/References:

- PAD 2030, Chapter 8.0 (IV) Streetscapes.
- The development plans for Masdar City, Al Falah, and Motor World all contain excellent depictions of planned pedestrian systems.

ii. Alternative Modes--Pedestrian Systems and Shade

Employ shade structures such as canopies, awnings, screens, and colonnades on buildings along primary pedestrian routes or plant trees for shade. 2 points

Sources/References:

- Al Ain Draft Architectural Design Guidelines address shading of the public realm, including sidewalks.

iii. Alternative Modes--Pedestrian Systems and Primary Building Entrances

Install direct pedestrian connections from all public streets/rights-of-way to the primary entrances of all commercial (retail, office) and institutional uses. 1 point

Sources/References:

- PAD 2030, Chapter 8.0 (IV) Streetscapes.
- Under the category of Neighborhood Pattern and Design #7, LEED-ND incorporates multiple standards to promote walkable streets.

iv. Alternative Modes--Pedestrian Systems and Parking Lot Connections

All developments served by on-site parking in surface lots or parking structures shall provide a designated pedestrian walkway from the parking structure or through the parking lot, extending from the rows of parking furthest from the building served to either a building entrance or to a sidewalk or walkway, leading to such entrance. 1 point

Purpose:

To encourage walking by providing easy and safe access to major destinations.

Sources/References:

Figure 24—Designated pedestrian walkway through a parking lot provides direct access to primary building entrances.

- Colorado Springs, Colorado, Mixed Use Development Design Manual.

v. Alternative Modes--Pedestrian Systems

Developments may attain one point for each of the following actions that encourage pedestrian activity/comfort: 5 points maximum

- The front facades of at least 50% of the buildings in the development are no more than 25 feet from the front property line.
- No more than 25% of the lot frontage of any building is occupied by surface parking.
- No blank building wall that lacks openings such as windows or doors may exceed fifty feet.
- On street parking should be provided on both sides of at least 70% of the new streets in a development (not including arterials).

Purpose:

To increase pedestrian interest and comfort by limiting parking and thereby promoting walking.

Sources/References:

- Under the category of Neighborhood Pattern and Design #7, LEED-ND incorporates multiple standards to promote walkable streets.
- Colorado Springs, Colorado, Mixed Use Development Design Manual.
- Reid Ewing. Pedestrian and Transit-Friendly Design: A Primer for Smart Growth. Smart Growth Network, U.S. EPA www.epa.gov/dced/pdf/ptfd_primer.pdf

vi. Alternative Modes--Bicycle Circulation Systems

All new developments shall provide bicycle systems that provide continuous access to all land uses within the development site and to land uses on adjacent properties. 2 points

Purpose:

To promote use of bicycles as a supplement to walking, thereby reducing auto use.

Sources/References:

- International Bicycle Fund, Planning: Bicycle and Pedestrian Friendly Land-Use Codes. http://www.ibike.org/engineering/landuse.htm

Figure 25—Bicycle systems should provide continuous access to land uses within the development site as well as land uses on adjacent properties. Contrast photos above and below.

vii. Alternative Modes--Bicycle Circulation Systems

Bicycle parking shall be provided for all multi-family residential uses larger than 25 units and commercial/institutional uses over 10,000 square meters. A minimum number shall be provided equal to 3% of the total number of automobile parking spaces provided by the development, with a minimum of 2 spaces. As an incentive, off-street parking spaces may be reduced by the number of bicycle parking spaces provided, to a maximum of 20 spaces. Bicycle parking facilities shall be located no further than 30 meters from a building entrance and shall not be located as to impede pedestrian access. **2 points**

Figure 26—Bicycle parking facilities should be located close to building entrances and where they do not impede pedestrian access.

Purpose:

To promote use of bicycles as a supplement to walking, thereby reducing auto use.

Sources/References:

- Colorado Springs, Colorado, Mixed-Use Development Design Manual.

viii. Vehicle Miles Traveled (VMT) Reductions—Car Ride Sharing/Bicycle Sharing

Establish a car ride-sharing system and/or bicycle sharing system within the development by providing free- or low-cost vehicles and bikes. Maintain a ride matching system. **2 points for car ride-sharing system and 2 points for bicycle sharing system.**

Purpose:

To promote car pooling, ride sharing, and bicycle sharing to reduce the number of vehicles used for commuting from and into a development.

Sources/References:

- Cities such as Mumbai, India, and Krakow, Poland, maintain ride sharing systems.
- For a good source of ride matching references, see http://www.nctr.usf.edu/clearinghouse/ridematching.htm
- A number of bike sharing programs exist in cities such as Paris, Vancouver, Barcelona, Copenhagen, Milan, and Portland, Oregon. Universities and colleges operate free campus bike share programs, including Drexel, Waterloo, University of Washington, Emory University, and University of Toronto, as do some companies, large and small, such as Ikea (a furniture retailer), New Belgium Brewing, Humana (a health care company), Children's Relief Nursery in Portland, Oregon, and Vancity Credit Union in Vancouver, Canada.

7.1 WATER CONSERVATION

7.1.1 BACKGROUND/GOAL

Because of its desert climate, water conservation will continue to be a primary concern in any system of growth management and sustainability in Abu Dhabi. This is reflected in the fact that 30% of the elements of the Estidama Pearls building rating system relate to water conservation—far more than any other category, including energy conservation.

The likelihood of the country becoming even drier—as discussed in the April 2006 UAE Initial National Communication to the United Nations on climate change—is a distinct possibility due to global warming. Coupled with a projected population increase to 3 million people in Abu Dhabi by 2030, the importance of accelerating water conservation and recycling efforts is obvious.

Figure 27—Abu Dhabi has one of the highest per capita levels of water consumption in the world—much of it used for landscape irrigation.

In cities with dry climates, it is not unusual for 50% or more of water usage to be devoted to landscape irrigation. Planting of non-native vegetation and growth of invasive species that demand more water than native species that have adapted to the climate only exacerbate the situation.

Water conservation in Abu Dhabi also has an important energy nexus. Water desalinization requires significant amounts of fossil fuels that generate greenhouse gases. Reducing water use will thus have a double benefit.

However, any water conservation effort must be balanced carefully with the need to provide green spaces and parks and maintain existing ones in Abu Dhabi City. The vision of His Highness, the late Sheikh Zayed Bin Sultan Al Nahyan to green the desert can be realized in a modern context of sustainability while providing adequate water resources for desirable new development and future residents of the city.

Figure 28—The use of water-efficient landscaping can result in a significant decrease in daily per capita water consumption.

Goal: To significantly reduce water consumption used for irrigation and domestic purposes through conservation and recycling.

7.1.2 RELATIONSHIP OF GUIDELINES TO GOAL

The development guidelines here can provide a very important complement to the building water conservation measures embodied in the Estidama Green Building Design standards. For example, many communities in dry climates (e.g., Tucson, Arizona, and Las Vegas, Nevada) have adopted aggressive guidelines and standards to encourage or require attractive, but water-conserving landscaping as part of their development review codes. Turf grass and vegetated areas are limited and attractive hardscaping and use of mulch

encouraged. The results have been impressive—Albuquerque, New Mexico, realized a 35% decrease in single-family residential daily per capita water consumption after adopting water-efficient landscaping provisions.

Other development codes focus on the use of recycled/grey water, either providing incentives for or requiring that a certain percentage of water used on a site be recycled or gray water. In this regard, Abu Dhabi has great potential because the Abu Dhabi Sewerage Services Company (ADSSC—an affiliated company of ADWEA) already has an established grey water recycling program that reuses approximately 65% of treated sewage effluent for irrigation purposes. It reportedly has plans to increase this number to 100% by 2010.

Figure 29—The use of turf grass in landscaping should be limited to reduce

Figure 30—Hardscaping can be used in conjunction with low-water landscaping to conserve water.

7.1.3 General Sources/References

- American Society of Landscape Architecture *Sustainable Sites Initiative*. http://www.asla.org/land/2006/0926/sustainablesites.html
- Rocky Mountain Land Use Institute, Model Sustainable Community Development Code, "Water Conservation" (2008)
- U.S. Green Building Council, LEED-For Neighborhood Development Rating System Pilot Program (2007).

7.1.4 Tier 1 Guidelines (Strongly Encouraged)

i. Water Conservation--Water-Conserving Landscaping

No more than 10% of any landscaped area (around buildings, street parkways and medians) in a commercial, multi-family residential, or institutional development may be planted in turf grass. This guideline shall not be strictly applied to public parks and open space, although it is encouraged. For single-family residential developments, no more than 25% of any landscaped area may be planted in turf grass.

Purpose:
Turf grass is one of the largest water consuming elements of vegetated landscaping.

Sources/References:

- Tucson, Arizona, limits vegetated "oasis" areas to 10% of overall landscaping.
- Model Sustainable Community Development Code Water Conservation Chapter (Rocky Mountain Land Use Institute, University of Denver School of Law).
- A multi-year study of conversions of turf to xeriscaping in the Las Vegas area found a 30% reduction in annual water use. Southern Nevada Water Authority. "*Conversion Study Final Report*." (2005). www.allianceforwaterefficiency.org

ii. Water Conservation--Water-Conserving Landscaping

No more than 50% of the total landscaped area of any development, including but not limited to street parkways, traffic circles, and medians, shall be devoted to vegetated landscaping.

Purpose:
Limit the amount of vegetation used in landscaping and encourage the use of attractive hardscaping (colored rocks, mulch, etc.)

Sources/References:

- The Municipality of Al Ain has reportedly adopted a standard limiting vegetated landscaping to 50% of landscaped traffic circles and street parkways.
- PAD 2030, Section 7.7 (Streetscape Revitalization: Existing Streets); Section 7.8 (New Streets)
- City of Toronto Green Standard for Mid to High Rise Residences, Commercial, Industrial and Institutional Development, Urban, Heat Island Reduction section specifies at least 50% light-colored hardscape materials.

iii. Water-Conservation--Water-Conserving Landscaping

All landscaping plants, including those used on green roofs, must be selected from a list of water-conserving vegetation maintained by the Abu Dhabi Environmental Agency. The use of native plants is strongly encouraged.

Purpose:
Use of drought-tolerant native and dry-climate vegetation can significantly reduce the need to irrigate landscaping.

Sources/References:

- Many desert communities in the American Southwest require the use of water-conserving landscape species (e.g., Tucson, Phoenix, Las Vegas, Albuquerque).
- The Abu Dhabi Environmental Agency maintains a list of water-conserving landscaping appropriate for Abu Dhabi's climate.

iv. Water Recycling[5]

A minimum of 50% of water used for irrigation in mixed-use, multi-family, commercial, and institutional developments should

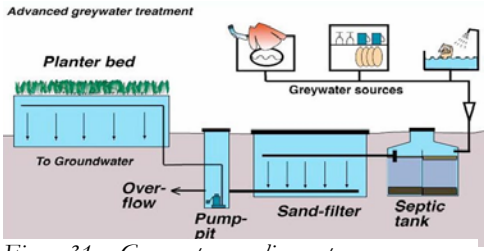

Figure 31 – Grey water recycling system

[5] The UPC recognizes there are institutional barriers to recycling in Abu Dhabi that must be addressed. For example, the ADSSC reports that legally they can only provide grey water to the Abu Dhabi municipality for distribution, not to individual developments.

come from recycled or gray water on site or from a centralized Abu Dhabi Water And Electricity Authority facility.

Purpose:
The use of recycled and gray water for irrigation will directly reduce the need for potable water.

Sources/References:
- Under the category of Green Construction and Technology #3, LEED-ND specifies the use only of captured rainwater, recycled water, or gray water for non-potable uses.

7.1.5 TIER 2 GUIDELINES (OPTIONAL MENU)

WATER CONSERVATION/RECYCLING
Total Points Available: 18
Minimum Recommended Score: 9

Figure 32--Water features should be limited in size and shaded to reduce evaporation.

i. Water Conservation—Efficient Irrigation Systems

Subsurface or drip irrigation systems should be utilized for all landscape irrigation systems when irrigation is necessary. 1 point for drip irrigation and 2 points for subsurface irrigation system.

Purpose:
Reduce the amount of water used for irrigation by utilizing the most efficient systems possible.

Sources/References:
- PAD 2030, Chapter 8.2 Environmental Framework Policies.

ii. Water Conservation—Water Feature Size

To reduce evaporative loss, limit open artificial water bodies and features such as fountains to no more than 5% of the overall site public parks and open space area. At least 50% of the water feature should be shaded by trees, shade structure, or other means. 2 points

Purpose:
Limit the loss of water on a site by evaporation from large ornamental water features.

Sources/References:
- PAD 2030, Chapter 8.2 Environmental Framework Policies.

iii. Water Conservation—Limiting Amount Of Landscaping

No more than 40% of the total site landscaped area including but not limited to street parkways, traffic circles, and medians is devoted to vegetated landscaping. 1 point (40%), 2 points (no more than 25%), 3 points (no more than 10%).

Purpose:
Limit the amount of vegetation used in landscaping and encourage the use of attractive hardscaping (colored rocks, mulch, etc.)

Sources/References:

- The Municipality of Al Ain has reportedly adopted a standard limiting vegetated landscaping to 50% of landscaped traffic circles and street parkways.
- PAD 2030, Section 7.7 (Streetscape Revitalization: Existing Streets); Section 7.8 (New Streets)

iv. Water Conservation—Landscape Film/Mulch

Utilize landscape film and mulch to reduce evaporation from landscaped areas. 1 point

Purpose:
Limit the amount of water loss from landscaping due to evaporation.

Sources/References:

- American Society of Landscape Architecture *Sustainable Sites Initiative*. http://www.asla.org/land/2006/0926/sustainablesites.html

v. Water Conservation—Overall Water Usage

Employ strategies that overall will reduce per capita water usage in the development by 20% of the normal baseline for Abu Dhabi City. One point awarded for each additional 10% reduction (e.g., 30% = 2 points) to a maximum of 4 points

Purpose: Reduce Abu Dhabi's very high per capita water use (approximately 250 liters/day for residential according to the Abu Dhabi Water Company) water use through a variety of tools at the developer's option.

Sources/References:

- Nature Conservancy., Top Ten Ways to Reduce Water Usage and Save Money. http://www.nature.org/pressroom/press/press3402.htmlhttp://www.nature.org/pressroom/press/press3402.html

- LEED-WE Credit #3.1 Water Use Reduction: 20% Reduction.

vi. Water Conservation/Recycling

Golf courses and other large private open space/recreational facilities shall irrigate only with on-site grey water (2 points) or with recycled water from a centralized recycling facility (1 point).

Purpose: Encourage large water users to rely on grey water.

Source/Reference:

- The category of No Potable Water or No Irrigation, LEED WE Credit #1.2, recommends water saving irrigation strategies.

vii. Water Recycling—Grey Water

In single-family developments, all greywater produced by the development shall be reused on-site for irrigation and other non-potable uses. 4 points

Sources/References:

- About 65% of domestic wastewater is grey water, according to the University of New Mexico, Guide M-106, Safe Use of Household Greywater.
- The U.S. states of Arizona and New Mexico have flexible laws that allow and facilitate the reuse of residential grey water for irrigation.
- The category of No Potable Water or No Irrigation, LEED WE Credit #1.2, recommends water saving irrigation strategies.

Figure 33—Residential grey water filtration system.

"We cherish our environment because it is an integral part of our country, our history, and our heritage. On land and in the sea, our forefathers lived and survived in this environment. They were able to do so only because the recognized the need to conserve it, to take from it only what they needed to live, and to preserve it for succeeding generations.

With God's will, we shall continue to work to protect our environment and our wildlife as did our forefathers before us. It is a duty and, if we fail, our children will rightly reproach us for squandering an essential part of their inheritance and of our heritage."

His Highness, The Late Sheikh Zayed Bin Sultan Al Nahyan

8.1 Natural Resources/Ecology/Open Space

8.1.1 Background/Goal

One of the fundamental building blocks of Plan Abu Dhabi 2030 is careful, sensitive growth that preserves critical natural environments that make Abu Dhabi unique. This includes protection of sensitive coastal and desert environments. The plan calls for the creation of a National Park System to preserve key areas, but goes beyond with the concept of a "green gradient" that denotes appropriate levels of conservation, restoration, and development from these natural areas to the urban core.

PAD 2030 also establishes an open space framework that envisions a system of formal and informal open areas throughout communities and connects them to the broader National Park System. Community green spaces and tree-lined streets will provide a series of safe and shaded outdoor areas for walking, gathering, and playing. Additionally, the plan envisions public plazas or squares in front of

government buildings and mosques to provide meeting space for large crowds.

The UPC has already begun work on the details of a park system for Abu Dhabi City and is preparing a plan to that end.

Goal: To protect existing natural resources in Abu Dhabi and to provide adequate open space throughout the city for all residents.

Figure 34– Development should avoid Abu Dhabi's coastal mangroves that are a critical natural resource identified for protection in PAD 2030.

8.1.2 Relationship of Guidelines to Goal

Development guidelines and regulations have historically played an important role in ensuring that communities had adequate open space. Early English and Spanish land planning laws required the set aside of community open space in the form of commons, plazas, and town squares for the use and enjoyment of citizens. Many cities now require new projects to provide open space to meet the demand for community and neighborhood parks and open space created by residents of these projects. More recently, many development codes in Europe and North America require that development avoid critical environmental areas like coastal wetlands or mitigate any encroachment into these habitats.

8.1.3 General Sources/References

- Duerksen and Snyder, Nature-Friendly Communities: Habitat Protection and Land Use Planning, Island Press (2005)
- Duerksen, et al, Habitat Protection Planning: Where the Wild Things Are, American Planning Association PAS Report No. 470 (1997).
- SUNtool: Site—Environmental Impact Assessment.
- European Directive On Conservation of Natural Habitat and Wild Fauna and Flora (1992 and Amendments).
- Diana Balmori and Gaboury Benoit, Land And Natural Development (LAND) Code: Guidelines For Sustainable Land Development (2007) at p. 75.

Figure 35—Preservation of critical land and marine natural resource areas is a major ecological goal of PAD 2030.

8.1.4 Tier 1 Guidelines (Strongly Encouraged)

i. Natural Area Protection

a. Avoidance: If development is clustered or located on a site to completely avoid encroachment or damage to a critical natural resource area identified by the Environmental Agency or in an environmental assessment, the development may be granted a density or height bonus of 20% above that recommended in PAD 2030 or that specified in applicable UPC development regulations (when adopted). A buffer area of at least 30 meters shall be maintained between the critical natural resource area and any development or disturbance on the site.

Purpose:
To create a significant incentive for developments to avoid critical natural resource areas.

Sources/References:
- Duerksen and Snyder, Nature-Friendly Communities: Habitat Protection and Land Use, (Island Press) at p. 70 discusses the use of conservation and cluster developments to protect sensitive environmental areas.
- Baltimore County, Maryland (USA), has used clustering of development to protect over 2,000 acres of open space.
- Diana Balmori and Gaboury Benoit, Land And Natural Development (LAND) Code: Guidelines For Sustainable Land Development (2007) at p. 75.

b. Mitigation: If a project is located on a site that includes or is adjacent to a critical coastal or desert resources area identified by the Environmental Agency or in an environmental assessment and avoidance of damage is practicable, the development shall limit impacts to less than 10% of the total acreage of such areas. Any encroachment should be mitigated by on- or off-site restoration or preservation of similar areas in an amount of two times the area disturbed or damaged.

Purpose:
Preservation of critical land and marine natural resource areas such as mangroves, aquifer recharge areas, wadis, and wildlife habitat to attain the ecological goals of PAD 2030.

Sources/References:
- Federal law in the United States requires no net loss of wetland areas due to development activities. Any areas that are permitted to be encroached on must be mitigated on a one-for-one basis.
- Salt Lake City, Utah, requires that all development setback at least 50-100 feet from critical environmental areas such as riparian habitat.
- Under the category of Smart Location and Linkage #4, LEED-ND requires mitigation of adverse impacts on wetlands and water bodies caused by a development.

ii. Minimum Open Space Requirement

All major developments shall provide 2 hectares of public open space[6] for every 1,000 residents or fraction thereof. This open

[6] Open space shall be defined as land or water areas used for active or passive recreational uses, natural and cultural resource protection purposes, or agricultural production. It shall not include development setback areas,

space should be located and configured to the Abu Dhabi Open Space and Parks Plan, when adopted. To the maximum extent practicable, the open space shall be contiguous and have a minimum width of 20 meters, except for pathways and trails. In infill areas (to be defined), alternative open space may be provided in the form of improved public gathering places, courtyards, playgrounds, green roofs on parking structures, and ball courts. The minimum size of such alternative open space amenities shall be 3 square meters for every 300 square meters of residential gross floor area. At least 50% of all on-site open space shall be located within 225 meters (3 minutes walking distance) of 50% of the developments residents.

If the Urban Planning Council staff determines that provision of all or a portion of the required open space off-site is preferable to on-site provision, the applicant may provide equivalent land area in a location approved by the UPC or at the option of the UPC, provide a cash-in-lieu payment to the Abu Dhabi municipality for the purpose of open space acquisition. The cash-in-lieu payment shall be based on a professional appraisal acceptable to the UPC of the value of an equivalent amount of land required under this section.

Figure 36—Urban open space may include improved courtyards and gathering places.

Purpose:

As pointed out in PAD 2030, there is a serious shortage of public open space in Abu Dhabi City. This shortage is particularly acute in older, mature portions of the city where there are few parks and public gathering places.

Sources/References:

- The National Recreation and Parks Association (USA) recommends a general guideline of 4 hectares of parks and open space lands for every 1,000 residents of a community. The British Sport and Recreation Council recommends approximately 2.8/1,000.
- Several of the proposed master planned communities in Abu Dhabi have notable open space systems that would meet and surpass this requirement. Motor World, for example, will set aside 16% of the development for an open space network that includes a good hierarchy of parks/open areas and innovative rooftop gardens.

iii. Open Space Provision

Any development that provides a green roof open space for residents of the development on top of a building or parking structure shall be granted a density or height bonus permitting

street rights-of-way, street medians, and utility corridors (unless improved for recreational use).

Figure 37 – Green roof, Chicago (USA), with 50% open space and recreational facility.

one additional floor to be added to the structure beyond that recommended by PAD 2030 or allowed under applicable UPC development regulations (when adopted). The green/ landscaped area of such rooftop open space on a new building shall cover at least 50% of the total area of the floor or 25% for a renovated existing building and shall comply with the water-conserving landscaping guidelines in Section 7.1. If the green roof open space is open to the public, the density/height bonus shall be doubled.

Purpose:
Provide an incentive to provide open space to residents of a development and the public, especially in infill and redevelopment areas.

Sources/References:
- Portland, Oregon, grants a one-floor bonus for green roofs in specified zone districts.
- The City of Chicago (pictured) requires the provision of green roofs in large planned developments.
- Motor World in Abu Dhabi is proposing green roof gardens as part of its open space system.

8.1.5 TIER 2 GUIDELINES (OPTIONAL MENU)

NATURAL RESOURCES/ECOLOGY/OPEN SPACE
Total Points Available: 14
Minimum Recommended Score: 7

i. Natural Area Protection—Imperiled Species

If a development site contains a species (flora or fauna) determined to be imperiled by the Abu Dhabi Environmental Agency or habitat critical to such species, the development should prepare a habitat conservation plan to protect and restore critical habitat and necessary buffer areas. 4 points

Purpose:
Protect threatened or endangered species on a site.

Sources/References:
- PAD 2030, Chapter 8.2 Environmental Framework Policies.
- European Directive On Conservation of Natural Habitat and Wild Fauna and Flora (1992 and Amendments).

ii. Natural Resource Protection--Restoration

Restore any preexisting degraded natural resource area (e.g., wetlands, wadis, desert wildlife habitat, dunes, etc.) on a development site. As an incentive, any restored area shall be

granted double credit (e.g., 2 acres of credit for every acre restored) towards the public open space requirement set forth in Section 8.1.4 above. **2 points**

Purpose:
Create an incentive for restoration of degraded and damaged habitat.

Sources/References:

- Duerksen and Snyder, Nature Friendly Communities, pp. 82-88 discussing local habitat restoration programs and regulations.

iii. Natural Area Protection—Existing Trees/Vegetation

To the maximum extent practicable, preserve existing healthy trees and native vegetation on a development site. Replace any large trees (e.g., with a caliper > 4 inches) on a 2:1 caliper basis (e.g., remove a 4-inch caliper tree and replace with two 4-inch caliper trees totaling 8 caliper inches). Replacement trees should be selected from a list of native and drought-tolerant trees maintained by the Environmental Agency. **2 points**

Purpose: To protect existing large trees that absorb significant amounts of greenhouse gas and enhance open space, or in the alternative to encourage tree replacement if removed.

Sources/References:

- American Planning Association, "*Tree Preservation,*" Zoning Practice, (July 2006).
- Diana Balmori and Gaboury Benoit, Land And Natural Development (LAND) Code: Guidelines For Sustainable Land Development (2007) at p. 59.

iv. Open Space Provision—Public Access

Maintain and enhance public access to existing open space such as beaches and parks. **2 points**

Purpose: Create an incentive to protect existing access to Abu Dhabi's beaches, national parks, and public open space and to enhance such access where possible.

Sources/References:

- The master plan for Sadiyat Island provides for public access to several beaches.

v. Open Space Provision—Additional Open Space

Provide open space, trails, and other amenities as depicted in the Abu Dhabi parks and open space plan beyond that required

by Section 8.1.4 above. **1 point** awarded for every 10% that the acreage requirement is exceeded to a maximum of **4 points.** For infill projects, the UPC shall determine the equivalent point total for provision of additional alternative open space amenities.

Purpose: Create an incentive for providing open space over and above the baseline recommended in these guidelines.

Sources/References:

- See master plans for Masdar City, Al Falah, and Motor World.

9.1 BUILDING DESIGN/FORM

9.1.1 BACKGROUND/GOAL

Sustainable development programs typically address green building engineering and design to ensure such buildings are, for example, as energy efficient as possible and save water through water-conserving features such as low-flow plumbing. However, a truly comprehensive sustainability program focuses also on the relationship of those buildings to their immediate environment (for example, orientation to the street) and their architectural form and design.

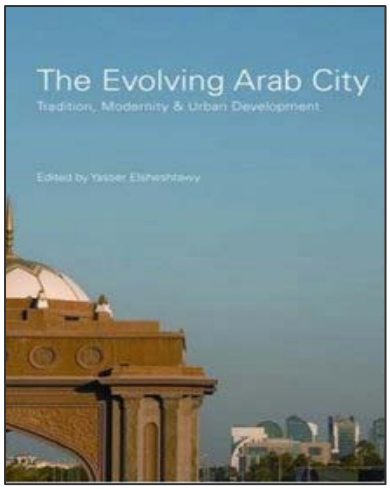

Figure 38 : Design standards can ensure new development is compatible with existing neighborhoods as Abu Dhabi grows.

PAD 2030 recognized the importance of this in recommending that new development address and incorporate building forms and design unique to Arab society and suited for the lifestyle and climate (at pages 37, 151. As pointed out in the Al Ain 2030 plan charrette, this is a challenging task and means more than just grafting on a few traditional Arab architectural features like domes and arches to the facades of western-style modern buildings.

The plan also stressed the importance of height restrictions on private developments in certain locations to pay homage to and reinforce the importance of the Grand Mosque and government buildings and also to preserve important view corridors.

Goal: To encourage the incorporation of traditional Arab architectural features into buildings and to ensure that new buildings are compatible with surrounding neighborhoods in terms of scale and massing.

9.1.2 RELATIONSHIP OF GUIDELINES TO GOAL

Many major cities across Europe and North America have adopted architectural and site planning guidelines to address the design of buildings and their relationship to the public realm and surrounding neighborhoods. These guidelines typically address architectural

styles, height, building materials, relationship to the street, wall penetrations (windows and doors), glazing, and signage among other issues. These guidelines help to ensure that new buildings and developments respect the existing character of a community and provide compatible transitions to surrounding neighborhoods. In the Arab world, the City of Muscat in Oman has adopted building design standards requiring flat roofs and other Arab architectural features.

9.1.3 General Sources/References

- The draft Al Ain Architectural Design Guidelines identify traditional Arab architectural design features.
- PAD 2030 Urban Design Policies (p. 148).
- Duerksen and Goebel, Aesthetics, Community Character, and the Law, American Planning Association Planning Advisory Service Report No. 489/490 (2000).

Figure 39—New development should recognize and incorporate building forms and design unique to Arab society and suited for the lifestyle and climate.

9.1.4 Tier 1 Guidelines (Strongly Encouraged)

i. Traditional Arab Architectural Features

All developments should incorporate a range of traditional Arab architectural features in the design and layout of buildings. Such features include but are not limited to:

- Flat-roofed buildings with high parapets.
- Ornate rooflines.
- Domes and entrance portals.
- Decorative treatment of façade surfaces (e.g., mosaics, painted decorations, tiles)
- Open-air courtyards

Purpose:

To preserve the distinct Arab character of Abu Dhabi through modern expressions of Arab architectural design.

Sources/References:

- The Motor World master plan makes extensive use of open-air courtyards in the layout of its residential component.
- Al Ain Architectural Design Guidelines (when available).

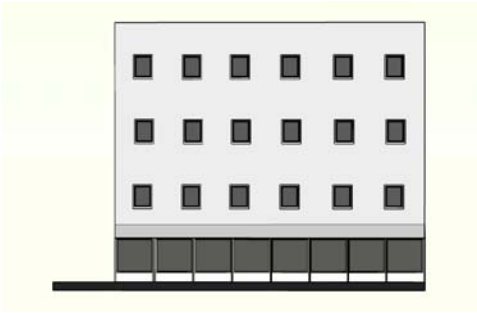

Figure 40—Buildings should incorporate a relatively high degree of solidity with limited penetration by windows and doors (for climactic reasons).

ii. Traditional Arab Architectural Features

At least 50% of the buildings in any development shall incorporate a relatively high degree of wall solidity with a limited degree of wall penetration by windows and doors (for climactic reasons). Window areas should not exceed 45% of the wall surface in non-residential private buildings and 30% in residential buildings. Ground-floors of commercial building may be up to 100% window glass if shaded appropriately. Reflective,

mirrored glass should be avoided unless shaded by awnings or other shade structures.

Purpose:
To preserve the distinct Arab character of Abu Dhabi through modern expressions of Arab architectural design.

Source/References:
- Al Ain Architectural Design Guidelines (draft).

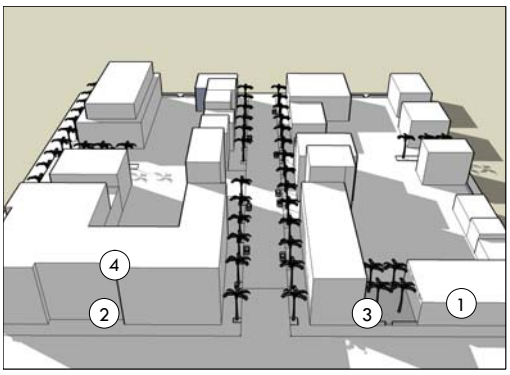

Figure 41—Building orientation designed to create a human scale relationship between a building and its immediate environs.(Numbers correspond to techniques in text.)

iii. Building Orientation/Siting

For all multi-family and non-residential buildings, the development shall satisfy at least 3 of the following requirements:

- A minimum of 75% of the net frontage length along any principal street must consist of a continuous building façade that is built to the property line. (1)
- Primary building entrances shall be oriented to the primary street adjacent to the building (not to parking lots). (2)
- Buildings adjacent to outdoor amenities (plazas, courtyards, parks, etc.) shall contain one of the following on the side of the building next to the amenity: a building entry, windows, arcades, or outdoor seating areas. (3)
- Changes in depth of façade of at least 24 inches horizontally or vertically, color, texture, or material at least every 50 feet on the primary street facing façade. (4)
- Four-sided architecture that provides a similar level of detailing on all sides of a building.

Purpose:
To provide a compatible, human-scale relationship between a building and its immediate environs.

Source/Reference:
- Colorado Springs, Colorado, Mixed-Use Development Design Manual.
- Al Ain Architectural Design Guidelines (draft).

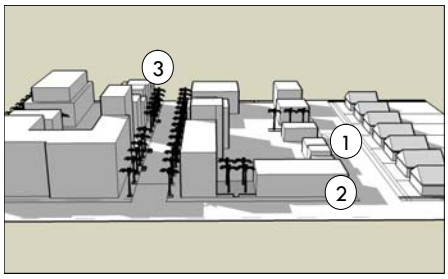

Figure 42 – A variety of techniques may be used to ensure overall compatibility—such as the use of similar building heights, setbacks, and widths along the shared street frontage. (Numbers correspond to techniques in text.)

iv. Building/Development Transitions

New major developments next to low-density existing neighborhoods shall incorporate methods and techniques to ensure overall compatibility. These may include:

- Green/open space transitions including courtyards, squares, parks, and use of natural features such as topography and natural areas.
- Similar building setbacks, heights (stepbacks), widths, and shapes. (1)

- Placement of potentially incompatible land uses (e.g., restaurants, parking lots) away from the edges of new development) and siting of compatible uses (e.g., small-scale offices near existing residential). (2)
- Location of parkways and improved streetscapes to separate the development from existing neighborhoods (but with connections provided as specified elsewhere in this document).
- Installation of landscaped buffers and screen walls (but with through-connections as provided elsewhere in this document).
- Operational compatibility standards that limit the hours of operation, outdoor activities, lighting, and similar features of uses adjacent to existing neighborhoods. (3)

Purpose:
To ensure design and operational compatibility between new and existing developments.

Sources/References:

- The proposed Motor World development in Abu Dhabi recognizes the need to used transitional techniques such as staggered building heights to ensure compatibility with surrounding low-density development.
- The City of Pittsburgh, Pennsylvania, has adopted operational compatibility standards to protect neighborhoods around commercial centers. Colorado Springs, Colorado, has done the same regarding mixed-use developments.

9.1.5 TIER 2 GUIDELINES (OPTIONAL MENU)

BUILDING DESIGN/FORM
Total Points Available: 16
Minimum Recommended Score: 8

i. Building Design—Parking Structures

All parking structures shall incorporate at least 3 of the following features: 4 points

- Commercial space wrapping the ground floor of the structure on at least two sides.
- Architecturally articulated and designed façade to screen the view of parked cars.
- Use of real or false windows with glazing, frames, and sills on the ground floor.
- Buffering of the street edge with landscaping, street trees, and planters.
- Multiple building entrances.
- Green roofs to provide open space to residents/occupants of the development served by the parking structure.

Figure 43—Example of a parking structure that has been "wrapped" with other uses to provide a more attractive and functional street edge.

Purpose: To approve the appearance and functionality of parking structures.

Source/Reference:

- Colorado Springs, Colorado, Mixed-Use Development Design Manual.

ii. Building Design

Facades of buildings should incorporate human-scale detailing through the use of the following techniques: recessed and transparent windows and doors, material changes, shading, reveals, belt courses, and cornices. 2 points

Purpose:
Enourage pedestrian activity by making streetscapes more attractive.

Source/Reference:

- PAD 2030 Urban Design Policies (p. 148).
- Colorado Springs, Colorado, Mixed-Use Development Design Manual.
- Al Ain Architectural Design Guidelines (draft).

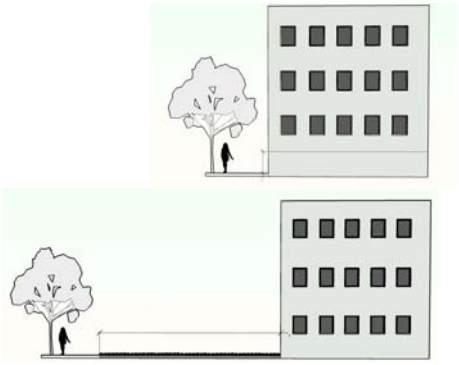

Figure 44—Ground floor residential uses should be elevated above the sidewalk level or set back from the property line to provide privacy.

iii. Building Design

Where residential uses are located on the ground floor of a building, they should be elevated at least 1 meter above grade or setback at least 9 meters from the property line to provide privacy. 2 points

Purpose:
To provide privacy for residential development in active pedestrian environments.

Source/Reference:

- Al Ain Architectural Design Guidelines (draft).

Figure 45– The ground floor of mixed-use buildings should be highlighted through the use of arcades, prominent entries, and other similar features.

iv. Building Design

The ground floor of mixed-use buildings should be highlighted and made prominent through the use of increased floor/ceiling heights, prominent entries, recessed front façade, canopies and other shade devices, and similar features. 2 points

Purpose:
Increase the attractiveness of mixed-use buildings at the street level to encourage pedestrian activity.

Source/Reference: Smart Growth America and ICMA, Getting to Smart Growth: 100 Policies For Implementation (2002).

v. Building Design

Pad (outlying, secondary) site buildings shall incorporate a similar design characteristic of the rest of the commercial area within which it is located, including materials, patterns, and proportions. No drive-through windows shall be allowed. 2 points

Purpose:

Increase the attractiveness of shopping centers and discourage the creation of auto-oriented uses.

Source/Reference:

- Many U.S. cities including Scottsdale, Arizona, Overland Park, Kansas, Westminster, Colorado, and Ocean City, Maryland, require that pad sites be architecturally compatible with the primary buildings of a shopping center.

vi. Building Siting—Service Facilities

All solid waste collection areas, loading docks, and mechanical equipment (including rooftop equipment) should be screened from view of a person standing on the property line on the far side of an adjacent public street. Service functions should be incorporated into the design of the building to enhance visual screening. 2 points

Figure 46: Service functions such as loading docks and mechanical equipment should be screened from view.

Source/Reference:

- Many U.S. cities today including Palm Desert, California, Fort Collins, Colorado, and Minneapolis, Minnesota, require screening of mechanical equipment, loading docks, and refuse collection areas.

vii. Building Signage

Signs should comply with the following guidelines: 2 points

- All wall signage shall be parallel with the façade of the building. Protruding signs are prohibited unless under a canopy or colonnade.
- Roof top signs are prohibited.
- Free-standing signs shall be monument-style and ground-mounted.
- Plastic-faced, interior-lit box signs are discouraged.

Purpose:

Encourage the attractiveness of development and preserve neighborhood character.

Source/Reference

- Daniel Mandelker. Street Graphics and the Law. American Planning Association (1988).

10.0 BALANCED, LIVABLE NEIGHBORHOODS

10.1.1 BACKGROUND/GOAL

Figure 47–Sustainable communities include workforce housing and adequate community facilities such as roads, transit, schools, and mosques.

Complete sustainable communities go beyond issues such as energy conservation and environmental protection to address social issues such as affordable housing, adequate community facilities, safety, and food production. Plan Abu Dhabi 2030 specifically recognizes the need for a range of housing for all income levels and community services and facilities such as schools, child care, and mosques.

Goal: To encourage a diversity of housing, a jobs-to-housing balance, and adequate community facilities in all new developments and existing neighborhoods in Abu Dhabi.

10.1.2 RELATIONSHIP OF GUIDELINES TO GOAL

Increasingly around the world, land use policies and regulations are being formulated to address these social, livable community issues. For example, many high-growth and resort communities require new development to provide a range of affordable housing for the employees generated by the new development. Others are requiring that a diversity of housing units be built to accommodate people of all ages and at all stages of life so that communities and neighborhoods can retain a well-balanced population.

Moreover, it is standard practice in many jurisdictions to require that developments proceed only if adequate public facilities are available or will be provided by the development (e.g., recreation centers, schools, fire stations, etc.).

10.1.3 GENERAL SOURCES/REFERENCES

- Under the category of Smart Location and Linkage, Credit #6 (Housing and jobs proximity) promotes developments that integrate employment and housing options.
- Rocky Mountain Land Use Institute, Model Sustainable Community Development Code, Housing Diversity and Accessibility section.
- SUNtool, Quality of Life—Social Performance (www.suntool.net).
- Smart Growth Network and Arigoni, Danielle. Affordable Housing and Smart Growth: Making the Connection. (2001)
- Jerry Weitz. Jobs- Housing Balance, American Planning Association PAS Report No. 516: (2003).

10.1.4 TIER 1 GUIDELINES (STRONGLY ENCOURAGED)

i. Housing Affordability/Diversity

Based on a housing impact study, major developments should provide on- or off-site housing for at least 25% of the new employees generated by commercial development or provide an in-lieu payment into a local housing fund.

Purpose:

To provide affordable housing for workers in Abu Dhabi.

Source/Reference:

- The Motor World development is planning extensive employee housing on-site and a range of housing for all ages, incomes, and family sizes.
- SUNtool, Quality of Life—Social Performance (www.suntool.net).
- Aspen, Colorado, requires commercial and residential developments to provide affordable housing for workers generated by such projects or pay into an affordable housing fund.

Figure 48– New development should provide a range of housing types and unit sizes.

ii. Housing Affordability/Diversity

All major residential developments and buildings with more than 50 residential units should provide a range of housing types (single-family, multi-family, live-work units) and/or unit sizes (e.g., studio, 1, 2, 3 bedrooms). No single housing/unit type should exceed 80% of the total units in the development or building.

Purpose:

To ensure there is a range of housing types/units to accommodate the wide diversity of family units in Abu Dhabi (single workers/students, small families, large families, elderly, etc.).

Source/Reference:

- SUNtool, Quality of Life—Social Performance (www.suntool.net).
- Senate Select Committee on Housing Affordability in Australia. A Good House is Hard to Find. June 16, 2008. Indicates housing diversity as a key alternative to sprawl for addressing both housing availability and affordability in Chapter 6. Various Australian cities, including Parramatta and Geelong, require a mix of housing types by number of bedrooms.
- An increasing number of U.S. local governments require a mix of housing types in large developments, including Cary,

North Carolina, Chapel Hill, North Carolina, and St. Lucie County Florida.

iii. Jobs-To-Housing Balance

For major developments, to help ensure a jobs/housing balance, include a non-residential component of all projects equaling 25% of the project's total building area.

Purpose:

To provide jobs for people living in the development and to reduce automobile use. Also to insure that the economy of Abu Dhabi does not become unbalanced with excessive speculative housing construction.

Sources/References:

- Urban Land Institute, Growing Cooler: The Evidence On Urban Development And Climate Change (2008). See discussion on p. 153 of advantages of providing workforce housing near jobs such as reducing vehicle miles traveled.
- SUNtool, Quality of Life—Urban Policy/Economic Development. (www.suntool.net)
- Under the category of Housing and Jobs Proximity, LEED-ND SLL Credit #6 recognizes projects where projects include a non-residential component of 25% or are located within walking distance of transit or at least one job for every two new dwelling units.

iv. Preservation of Historic, Cultural, and Archeological Resources

Preserve and restore all significant historical, cultural, and archeological resources on the site as identified by the Abu Dhabi Authority for Culture and Heritage to the maximum extent feasible. Where preservation is not economically feasible as determined by the UPC in consultation with the Abu Dhabi Authority for Culture and Heritage, the resources shall be documented and recorded.

Purpose: To preserve structures and sites with significant historical, cultural, and archeological value or to document them when preservation is not economically feasible.

Source/Reference:

- PAD 2030 calls for the inventory, designation, and protection of historic and archeological sites (at p. 152).

v. Adequate Community Facilities

Demonstrate compliance with the Requirements of Community Facilities For New Residential Areas in Abu Dhabi City and

Environs as applied to mosques, schools, and public safety (police/fire) facilities either through existing facilities or provision of land and construction of new facilities.

Purpose:
To ensure that new developments provide or pay their fair share of new community facilities necessitated by such project and do not overburden existing facilities serving established neighborhoods.

Source/Reference:
- State of Florida infrastructure and transportation concurrency legislation.
- Summit County, Utah, adequate public facilities ordinance.

vi. Minimum Open Space Requirement

All major developments shall provide 2 hectares of public open space[7] for every 1,000 residents or fraction thereof. This open space should be located and configured to the Abu Dhabi Open Space and Parks Plan, when adopted. To the maximum extent practicable, the open space shall be contiguous and have a minimum width of 20 meters, except for pathways and trails. In infill areas (to be defined), alternative open space may be provided in the form of improved public gathering places, courtyards, playgrounds, green roofs on parking structures, and ball courts. The minimum size of such alternative open space amenities shall be 3 square meters for every 300 square meters of residential gross floor area. At least 50% of all on-site open space shall be located within 225 meteres (3 minutes walking distance) of 50% of the developments residents.

If the Urban Planning Council staff determines that provision of all or a portion of the required open space off-site is preferable to on-site provision, the applicant may provide equivalent land area in a location approved by the UPC or at the option of the UPC, provide a cash-in-lieu payment to the Abu Dhabi municipality for the purpose of open space acquisition. The cash-in-lieu payment shall be based on a professional appraisal of the value of an equivalent amount of land required under this section acceptable to the UPC.

[7] Open space shall be defined as land or water areas used for active or passive recreational uses, natural and cultural resource protection purposes, or agricultural production. It shall not include development setback areas, street rights-of-way, street medians, and utility corridors (unless improved for recreational use).

Purpose:
As pointed out in PAD 2030, there is a serious shortage of public open space in Abu Dhabi City. This shortage is particularly acute in older, mature portions of the city where there are few parks and public gathering places.

Sources/References:

- The National Recreation and Parks Association (USA) recommends a general guideline of 4 hectares of parks and open space lands for every 1,000 residents of a community. The British Sport and Recreation Council recommends approximately 2.8/1,000.
- Several of the proposed master planned communities in Abu Dhabi have notable open space systems that would meet and surpass this requirement. Motor World, for example, will set aside 16% of the development for an open space network that includes a good hierarchy of parks/open areas and innovative rooftop gardens.

10.1.5 TIER 2 GUIDELINES (OPTIONAL MENU)

BALANCED/LIVABLE NEIGHBORHOODS
Total Points Available: 16
Minimum Recommended Score: 8

Figure 49—Walking and biking can be dangerous without clearly marked pedestrian crossings.

i. Safety

Provide safe pedestrian and bicycling routes between major residential centers in a development and schools, mosques, and other major community facilities and gathering places. Safe routes should incorporate raised/marked pedestrian crossings, narrow streets or streets with pedestrian medians, and similar features and should avoid erecting obstructions such as signage and utility poles in sidewalks. 2 points

Purpose:
Walking and biking in Abu Dhabi can be an adventure and safety risk because the automobile is given priority in most instances. Planned safe school and other pedestrian routes can begin to turn this situation around.

Source/Reference:

- The U.S. non-profit organization National Center for Safe Routes to School Routes identifies construction of safe routes as one of four key elements to increase the percentage of children who walk or bike to school. www.saferoutesinfo.org

ii. Safety

Incorporate Crime Prevention Through Environmental Design (CPTED) features into major developments, including natural surveillance (locating windows overlooking sidewalks and parking lots, using short fences, transparent vestibules in buildings, etc.), natural access control (single point of entry to buildings, low thorny bushes under windows, substantial solid fencing between a backyard and alley), and natural territorial reinforcement (provide trees in residential areas, avoid cyclone/razor-wire fencing that communicates risk, place amenities in common areas to attract people). **3 points**

Purpose:

As Abu Dhabi grows and more newcomers call it home, CPTED features can help reduce crime rates.

Source/Reference:

- PAD 2030 at p. 152.
- Ray Jeffrey, Crime Prevention Through Environmental Design (1971)
- Washington State University CPTED Annotated Bibliography http://www.thecptedpage.wsu.edu/Resources.html(website)

iii. Community Amenities

To achieve a high degree of comfort in the public realm, all buildings should provide shade at the ground level through design features such as canopies, awnings, screens, and natural shading (e.g., trees). Public plazas, courtyards, and gathering places should also incorporate shade structures and evaporative cooling features. **3 points**

Purpose:

Abundant sunshine and high temperatures make the provision of shade structures an essential feature of buildings and public spaces.

Source/Reference:

- Al Ain Architectural Design Guidelines (draft).

Figure 50—Public plazas, courtyards, and gathering spaces should incorporate shade structures to increase pedestrian comfort.

iv. View Protection

Protect public views from major public rights-of-way, parks, and other public view points of key natural settings, landmarks, mosques, national symbols and monuments, and other special places on site as identified by the UPC. **2 points**

Purpose: To preserve public views of structures that have major cultural and civic significance.

Source/Reference:

- PAD 2030 at p. 149.

v. Education—Sustainability

Provide a continuing series of education workshops on sustainability topics such as water conservation and solid waste recycling for residents of the development and circulate brochures and other publications that discuss practical sustainability measures that can be undertaken by individuals (e.g., ride sharing, using mass transit) and their economic and social benefits. 2 points

Purpose: To establish a firm foundation for sustainability by educating residents about the benefits of adopting a sustainable life style.

Figure 51--Community gardens provide healthy food for residents and may be credited towards open space requirements.

vi. Food Supply

Grant double credit towards required public open space for provision of community garden space (with appropriate fencing, irrigation, etc.) for residents of a development. 2 points

Purpose:

Abu Dhabi imports a huge amount of its foodstuffs at great cost and use of energy. Experience in other communities shows that a significant percentage of local food supply can be homegrown For example, in London, 14% of the population produces 18% of the city's nutritional needs. In Cuba, urban agriculture accounts for 65% of national production of rice, 46% of fresh vegetables, 38% of non-citrus fruits, 13% of roots, tubers, and plantains, and 6% of eggs. In the United States, 60% of all vegetable producers are in urban census tracts.

Figure 52--Souks and farmers markets can provide fresh produce for Abu Dhabi's residents.

Source/Reference:

- Model Sustainable Community Development Code, Food Production and Security Chapter.
- Under the category of Neighborhood Pattern and Design #16, LEED-ND gives credit for provision of land for neighborhood farms and gardens.
- The Canadian organization City Farmer has been promoting and studying urban agriculture for 30 years. The site describes successful urban farms and community garden programs in more than two dozen countries. www.cityfarmerinfo.org
- The City of Sacramento, California, recently changed zoning laws to allow gardening in front yards as a way to increase the potential for local food production.

vii. Food Supply

Include souks and farmers markets in a development to provide access to fresh food and produce. Encourage provision of locally grown produce. 2 points

Purpose:

Cities in Abu Dhabi have a great tradition of lively souks that provide access to fresh food and produce for residents. Several traditional souks have recently been demolished and replaced by large developments. Inclusion of souks and farmers markets in new developments can help reverse this trend.

Source/Reference:

- Rocky Mountain Land Use Institute, Model Sustainable Community Development Code, Food Production and Security Chapter.

- Under the category of Neighborhood Pattern and Design #16, LEED-ND gives credit for provision of land for neighborhood farms and gardens.

11.0 INTEGRATED SOLID WASTE MANAGEMENT: REDUCTION, REUSE, AND RECYCLING

11.1.1 BACKGROUND/GOAL

In a sustainable community, waste is considered as a resource to be used and reused, not a problem to be disposed of. Communities, not just buildings, should be designed to minimize and manage waste. As stated in the Abu Dhabi Green Buildings Manual, comprehensive solid waste management programs should incorporate:

- Reduction of the amount of waste produced,
- Reuse of waste materials where possible, and
- Recycling of wastes.

In Abu Dhabi, recycling of organic wastes takes on particular importance as part of the voluntary initiative by the United Arab Emirates to reduce greenhouse gas emissions. Transportation of wastes uses large amounts of fossil fuel, and wastes in landfills generate significant amounts of methane, a major component of greenhouse gases.

Goal: To incorporate sustainable solid waste management as part of development proposals to reduce the amount of waste generated and to reuse and recycle wastes to the maximum extent practicable.

11.1.2 RELATIONSHIP OF GUIDELINES TO GOAL

Many communities are taking steps through their development review and land use regulatory processes to better manage solid wastes and support reduction, reuse, and recycling. The following are examples of how development guidelines are being used to support integrated solid waste management:

- Reduction of wastes: Providing sites for composting within a development or sites for collecting compost wastes,
- Reuse: Permitting establishment of reuse/resale centers for equipment and supplies.
- Recycling: Requiring recycling receptacles in multi-family residential and commercial buildings; providing centralized drop-off recycling stations.

Note: Because the opportunities to address solid waste management through development guidelines are somewhat limited, only Tier 1 guidelines are recommended here.

11.1.3 GENERAL SOURCES/REFERENCES

- Under the category of Green Construction and Technology #17-19, LEED-ND establishes goals for recycling and solid waste management.
- For a good background discussion of solid waste management methods, see http://www.oznet.ksu.edu/swr/Module3/Waste_Management_Methods.htm.
- Diana Balmori and Gaboury Benoit, Land And Natural Development (LAND) Code: Guidelines For Sustainable Land Development (2007) at p. 103.

11.1.4 TIER 1 GUIDELINES (STRONGLY ENCOURAGED)

i. Integrated Waste Management

All major developments with more than 250 residential units or 50,000 square meters of non-residential building area shall submit a comprehensive plan for management of construction wastes and wastes from operation of the development once complete that emphasizes reduction, reuse, and recycling.

Purpose: To encourage comprehensive and sustainable waste management that emphasizes waste reduction, reuse, and recycling.

Source/Reference:

- Under the category of Green Construction and Technology #18, LEED-ND addresses construction waste management with this guideline.
- BuildingGreen.com website provides references on sustainable building materials such as certified wood or postconsumer waste products.

ii. Waste Reduction—Construction Waste Management

Recycle or salvage at least 50% of non-hazardous construction and demolition debris. Develop a construction waste management plan that identifies the materials to be diverted and whether the materials will be stored on-site or commingled.

Purpose:

To divert construction and demolition debris from landfills thereby reducing greenhouse gases and energy use for transportation.

Source/Reference:

- Under the category of Green Construction and Technology #18, LEED-ND addresses construction waste management with this guideline.
- The U.S. EPA website offers suggestions on how to recycle a variety of construction and demolition materials including concrete, drywall, steel, wood, and asphalt shingles.

iii. Waste Reduction—Composting

For all major developments, provide on-site composting station or location for all project occupants dedicated to the collection and/or composting of food wastes or help establish a centralized off-site composting location. Encourage/require major organic generators like supermarkets and restaurants to use compost station. Encourage on-site composting by major institutional uses with land availability (universities, schools, hospitals, military installations, correctional facilities).

Purpose:

Reduce the amount of waste sent to landfills.

Source/Reference:

- Under the category of Green Construction and Technology #19, LEED-ND creates a credit for on-site compost stations.

Figure 53—Centralized off-site composting location.

iv. Recycling—Recycling/Reuse Station

Provide at least one recycling/reuse station within the development for all residents and businesses that is dedicated to

the collection, separation, and storage of materials for recycling (including paper, glass, plastics and metal).

Purpose:
To reduce waste volumes through recycling and save natural resources and energy by reducing the production of new materials.

Sources/References:

- Under the category of Green Construction and Technology #19, LEED-ND creates a credit for recycling centers.

Figure54--Centralized recycling stations can encourage waste recycling.

v. Recycling—On-site Recycling Bins

In all multi-family and commercial buildings, provide a convenient on-site location for recycling bins to be used by residents and building occupants. The location shall also be convenient and accessible by collection services.

Purpose:
To provide a convenient location for residents/occupants to drop-off materials for recycling and good access for the convenient pick-up of such materials.

Source/Reference:

- Under the category of Green Construction and Technology #18, LEED-ND addresses recycling stations.

vi. Recycling—On-site Recycling Bins

Include at least one drop-off point in the development available to all project occupants for office or household potentially hazardous wastes such as solvents, oils, batteries, and paints or make arrangement for periodic collection of such wastes as part of routine trash removal.

Purpose:
To reduce the potential of disposal of hazardous wastes in non-secure landfills with the attendant risk of environmental pollution.

Sources/References:

- Under the category of Green Construction and Technology #19, LEED-ND creates a credit for provision of household hazardous waste drop-off points.

SUMMARY TABLE OF ESTIDAMA COMMUNITY DEVELOPMENT GUIDELINES		
4.1 Development Patterns—Compact, Mixed-Use Development		
Tier 1 (Strongly Encouraged)		
Compact Development/Sprawl Control	Site new development so that at least 25% of the perimeter is contiguous with existing development served by public infrastructure	
Mandatory Use Mix	Include 3 use types – Incentive: density/height bonus for 4+ use types (Major developments)	
Residential Density	In Abu Dhabi City, develop at a minimum residential density of 30units/hectare, or 75 units/hectare if within 1,500 meters of a transit stop	
Open Space Requirement	Provide at least 2 hectares of public open space for every 1,000 residents, or alternatives for infill as specified (Major developments)	
Building/Development Transitions	Ensure compatibility with adjacent existing low-density neighborhoods (Major developments)	
Tier 2 (Recommended minimum: 9 of 17 possible points)		Points
Appropriate Development Location	Conform to location and density indicated for the site in PAD 2030	2
Jobs/Housing Balance	Include at least 25% non-residential (Major developments)	2
Compact Development	Locate at least 50% of dwelling units within 350 meters of a mosque or school (Major developments)	2
Compact Development	Devote less than 20% of the surface area to surface parking	2
Transit-Supportive Development	Provide transit service within 350 meters walking distance of at least 50% of dwellings and business entrances	3
Adequate Community Facilities	Comply with Requirements of Community Facilities For New Residential Areas in Abu Dhabi City and Environs.	4
Adequate Community Facilities	Improve all public open spaces with public amenities	2
5.1 Alternative Energy Production and Energy Conservation		
Tier 1 (Strongly Encouraged)		
Alternative Energy Production	Produce at least 10% of energy from alternative renewable sources	
Energy Conservation	Orient at least 30% of residential for maximum passive solar or use solar energy/thermal devices, and design at least 50% of non-residential buildings with a longer axis, oriented east-west	
Energy Conservation	Provide shade structures on all buildings	
Energy Conservation	Conduct windflow modeling to optimize street layout for natural cooling (Major developments)	
Energy Conservation	Install a "cool roof" or green vegetated roof on all buildings	
Tier 2 (Recommended minimum: 9 of 17possible points)		Points
Alternative Energy	Utilize a centralized, district cooling system (Major developments)	4
Alternative Energy	Provide preferred parking spaces for hybrid/low-energy vehicles	1
Energy Conservation	Employ natural ventilation systems	2
Energy Conservation	Use paving materials with Solar Reflectance Index of at least 29	2
Energy Conservation	Locate at least 50% of all off-street parking spaces under cover	2
Energy Conservation	Build narrow secondary streets to provide shade	3
Energy Conservation	Align major retail streets north-south and use souk-like roof structures on retail buildings	3
6.1 Mobility/Alternative Transportation Modes		
Tier 1 (Strongly Encouraged)		
Pedestrian Systems	Limit block length to 170 meters	
Pedestrian Systems	Provide detached sidewalks with minimum width of 2 meters on arterial streets, 1.5 meters on non-arterial streets	

SUMMARY TABLE OF ESTIDAMA COMMUNITY DEVELOPMENT GUIDELINES		
Interconnected Street Network	Build to an average street grid density of at least 20 centerline miles per square mile or achieve connectivity index score of 1.65.	
Transit-Supportive Development	Locate at least 50% of all units/square footage within 440 meters of a mass transit station or provide an internal transit system (Major developments)	
Tier 2 (Recommended minimum: 9 of 19 points)		Points
Pedestrian Systems--Connectivity	Depict direct pedestrian routes/connections both on- and off-site on site plans	2
Pedestrian Systems--Shade	Employ shade structures or trees along pedestrian routes	2
Pedestrian Systems—Primary building entrys	Provide pedestrian connections to primary entrances of commercial and institutional uses	1
Pedestrian Systems—Parking lots	Designate pedestrian walkway through parking lots	1
Pedestrian Systems	Encourage pedestrian activity/comfort	5
Bicycle Circulation Systems	Build bicycle circulation systems that provide safe, continuous access	2
Bicycle Circulation Systems	Provide sheltered bicycle parking at multi-family, mixed use, commercial and institutional projects (Major developments)	2
Ride Sharing	Establish a car ride-sharing or bicycle sharing system	4
7.1 Water Conservation		
Tier 1 (Strongly Encouraged)		
Water-Conserving Landscaping	Limit turf grass to 10% of landscaped area at a commercial, multi-family residential, or institutional development, 25% at a single-family residential development	
Water-Conserving Landscaping	Vegetate no more than 50% of the total landscaped area	
Water-Conserving Landscaping	Plant only water-conserving landscaping vegetation	
Water Recycling	Use recycled or grey water for at least 50% of irrigation water in mixed-use, multi-family, commercial, and institutional developments	
Tier 2 (Recommended minimum: 9 of 18 points)		Points
Water Conservation	Install drip or subsurface irrigation systems	2
Water Conservation	Limit artificial water bodies and features to 5% of landscaped area	2
Water Conservation	Limit vegetated landscaped areas to 40% of overall landscaped area	3
Water Conservation	Utilize landscaping film and mulch to reduce evaporation	1
Water Conservation	Reduce per person water usage by at least 20%	4
Water Conservation/Recycling	Irrigate open space/recreation facilities with recycled or gray water	2
Water Recycling	Reuse all on-site gray water in single-family developments	4
8.1 Natural Resources, Ecology, and Open Space		
Tier 1 (Strongly Encouraged)		
Natural Area Protection	Avoid any encroachment or damage to a critical natural resource areas – Incentive: Density/height bonus. If damage, must mitigate and replace.	
Open Space Provision	Provide at least 2 hectares of public open space for every 1,000 residents (Major developments)	
Open Space Provision	Install a vegetated roof for public or private open space. Incentive: density or height bonus.	
Tier 2 (Recommended minimum: 6 of 12 points)		Points
Natural Area Protection	Protect imperiled species and critical habitat	2
Natural Area Protection	Restore on-site degraded natural resource areas	2
Natural Resource Protection	Preserve existing healthy trees and native vegetation as practicable, replace trees removed with native/low-water species	2
Open Space--Access	Maintain and enhance public access to open space	2

SUMMARY TABLE OF ESTIDAMA COMMUNITY DEVELOPMENT GUIDELINES		
Open Space Provision	Provide additional open space beyond the minimum required	4
9.1 Building Design/Form		
Tier 1 (Strongly Encouraged)		
Traditional Arab Architectural Features	Incorporate traditional Arab architectural features	
Traditional Arab Architectural Features	Design with a high degree of wall solidity on at least 50% of the building	
Building Orientation/Siting	Use at least 3 of 5 preferred design elements on multi-family and non-residential buildings	
Building/Development Transitions	Ensure compatibility with adjacent existing low-density neighborhoods (Major developments)	
Tier 2 (Recommended minimum: 8 of 16 points)		Points
Building Design/Orientation	Design parking structures with at least 3 of 6 preferred design elements	4
Building Design	Design facades with human-scale detailing	2
Building Design	Elevate ground-floor residential uses at least 1 m or setback by at least 9 m to provide privacy	2
Building Design	Highlight the ground floor of mixed-use buildings	2
Building Design	Design outlying (pad site) buildings using similar characteristics as the rest of the commercial area, and no drive-though windows	2
Building Design—Services facilities	Screen solid waste collection areas, loading docks, and mechanical equipment from view	2
Building Signage	Design all signs to comply with guidelines	2
10.1 Balanced, Livable Communities		
Tier 1 (Strongly Encouraged)		
Housing Affordability/Diversity	Provide housing for at least 25% of the new employees generated (Major developments)	
Housing Affordability/Diversity	Include a range of housing types in residential developments of 50+ units (Major developments)	
Jobs/Housing Balance	Include at least 25% non-residential square footage (Major developments)	
Historic/Cultural Preservation	Preserve significant historic, cultural, and archeological resources	
Adequate Community Facilities	Comply with Requirements of Community Facilities For New Residential Areas in Abu Dhabi City and Environs	
Alternative Public Facilities – Open Space Provision	Provide at least 2 hectares of public open space for every 1,000 residents, or alternatives as permitted (Major Developments)	
Tier 2 (Recommended minimum: 8 of 16 points)		Points
Safety	Incorporate safety features in pedestrian and bicycle routes (Major developments)	2
Safety	Use Crime Prevention Through Environmental Design features (Major developments)	3
Community Amenities	Provide shade features at the ground level and in public areas	3
View Protection	Protect public views of significant landmarks, monuments, etc.	2
Education--Sustainability	Provide continuing sustainability education program for residents	2
Food Supply	Provide community garden space for residents—Incentive: double credit toward open space requirement	2
Food Supply	Include souks and farmers markets in development	2
11.1 Integrated Solid Waste Management		
Tier 1 (Strongly Encouraged)		
Waste Management	All major developments to submit comprehensive waste management plan	

SUMMARY TABLE OF ESTIDAMA COMMUNITY DEVELOPMENT GUIDELINES		
	emphasizing reduction, reuse, and recycling of wastes.	
Waste Reduction--Construction Waste Management	Recycle/salvage at least 50% of non-hazardous construction and demolition debris	
Waste Reduction--Composting	Provide on-site composting station or location for all occupants	
Recycling	Provide a recycling/re-use station for all residents and businesses that allows for sorting and storage of materials	
Recycling	Provide recycling for potentially hazardous office or household wastes	
Recycling	Provide an on-site recycling bins in multi-family and commercial buildings that are convenient for residents and building occupants and accessible by collection services	
Tier 2 (None)		Points

ATTACHMENT A

INTERIM ESTIDAMA INTERIM GUIDELINES
Summary of Observations And Findings From Consulting Team Trip
Clarion Associates
June 2008

During the week of June 15, the consulting team traveled to Abu Dhabi and, under the direction of the UPC project managers, conducted four focus group meetings with representatives from the municipalities, government agencies (e.g., DOT, ADWEA, Environment Agency), and the development community/consultants. Additionally, the Clarion team interviewed a number of UPC staff and sat in on several urban design review panel meetings. Based on the following observations and findings from these focus groups, interviews, and meetings, the consultants have recommended a framework below for applying sustainable development guidelines:

1. The leaders of Abu Dhabi have indicated their strong support and intent to make the country a model of sustainability in the Arab world and beyond.
2. Plan Abu Dhabi (PAD) 2030 establishes a solid foundation for creation of sustainability guidelines in a wide range of areas (e.g., alternative energy, water conservation, natural resource protection, etc.). However, it was not intended to be used as a regulatory document.
3. There are scores of major development projects either already in the development review pipeline, soon to be proposed, or on the drawing boards. Recent market forecasts estimate that the development boom in Abu Dhabi will continue for at least 5 years.
4. The development boom and housing shortages have led to great pressure to make quick decisions on development proposals. Developers have expressed frustration with the pace of project reviews and what they feel is the uncertainty of that process because of lack of clear standards and procedures and the use of PAD 2030 as a regulatory document.
5. Although their capacity is increasing rapidly, UPC development review staff is stretched thin.
6. The municipalities and other agencies that will in part administer and enforce the Interim Estidama Community Guidelines (IECG) on the ground have limited staff resources and background regarding sustainability concepts
7. There are widely varying land use patterns, development conditions, and cultural realities throughout the Emirate (major urban concentrations, suburban communities, small towns in the Western Region) and within communities (new development, infill).
8. Infill development in Abu Dhabi city pose significant issues (open space, parking, retrofitting for pedestrians) every bit as challenging as major new greenfield projects.
9. The city of Al Ain has undertaken progressive initiatives to make its streets pedestrian friendly and to introduce water-conserving landscaping. These efforts warrant further study and emulation.
10. The IECG system will represent a major shift in the way developments will be assessed.
11. The municipalities and government agencies support the UPC's sustainability initiative and are looking to the UPC for technical guidance, to act as conveners, and to provide overall leadership.