

GUIDELINES FOR THE DEVELOPMENT OF ENVIRONMENTALLY RESPONSIBLE COMMUNITIES

Canadian Home Builders' Association

December 2007

ACKNOWLEDGEMENTS

The ideas expressed in these Guidelines are largely based on the contents of documents cited in Appendix A, References. The Canadian Home Builders' Association (CHBA) acknowledges the contribution of ideas from these documents and from individuals who have provided comments. In particular, CHBA acknowledges the extensive documentation produced and made available by Canada Mortgage and Housing Corporation.

LIMITATIONS AND DISCLAIMER

The Guidelines presented in this document represent CHBA's initial initiative in the field of environmentally responsible development at the community scale. The Guidelines are not intended to be exhaustive and CHBA reserves the right to modify them based on experience and feedback.

While CHBA believes that the ideas contained in this document have merit, neither CHBA nor the authors of this document assumes any responsibility for the performance of projects in which they have been applied

If any of the Guidelines conflict with local codes or bylaws in effect, local codes and bylaws shall prevail, or developers who wish to adopt them must obtain approval from the jurisdictions having authority.

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EXECUTIVE SUMMARY

The Canadian Home Builders' Association (CHBA) acknowledges that the development of communities has a range of impacts on the environment. In response to CHBA's commitment to protect the environment, the Association has developed the Guidelines for the Development of Environmentally Responsible Communities. The Guidelines are based on the following principles, context, scope and focus:

- Community developments should minimize impact on the environment.
- Communities include whole neighbourhoods, partial neighbourhoods, subdivisions, large projects with mixed uses and multiple-unit projects.
- The Guidelines are targeted primarily at project developers. However, the Guidelines acknowledge that many parties have a role in determining what gets built at the community level, including municipal politicians and officials, community leaders, professionals and the public.
- The Guidelines focus on the project development phase. However, some measures applicable in project operations are also included.

The Guidelines derive primarily from a literature review. The documents reviewed are listed in Appendix A. The Guidelines also consider comments made by presenters and attendees at selected conferences and selected developers. Draft work was circulated to selected developers for their review and the Guidelines take their comments into account.

Because the range of projects within the scope of communities is broad, not all of the Guidelines apply to all projects.

Community form

- Develop compact communities; intensify land use.
- Develop mixed use, compact projects/communities.

Site location and type

- Develop projects proximate to existing communities, and planned water and wastewater infrastructure; also within the service areas of public transportation systems.
- Develop infill sites.
- Develop brownfield sites.
- Avoid developments in floodplains.

Protection and Restoration of Natural Areas

- Choose a site to avoid environmentally sensitive areas.
- Protect and/or restore natural areas.

Infrastructure

- Develop transportation systems that reduce car dependence and use, and make alternative modes of transport more feasible and attractive.
- Manage stormwater.
- Minimize the use of fresh water and maximize the reuse or recycling of water.

Site development

- Minimize soil and vegetation disturbance, and soil erosion during project development.
- Plan for the shared use of some functions and facilities.
- Use surfaces that allow stormwater infiltration and avoid heat build-up.
- Orient buildings to maximize solar heating and cooling.
- Use recycled materials in site surfaces.

Buildings

The Guidelines include buildings within their scope but do not focus on details of environmental measures for the construction of dwellings. Such measures are documented extensively and are well established. Therefore, this section provides an overview of energy-conserving design measures, energy-conserving construction measures, resource-efficient and resource-conserving construction measures, waste-reduction construction measures, water-conserving construction measures, waste/pollution-reducing operating measures and measures to maintain good indoor air quality. Many of these measures are based on the “house-as-a system” principle.

Landscaping

- Use indigenous and drought-resistant plants.
- Use landscaping to affect micro-climates around and in buildings.
- Use operating procedures that conserve water.
- Use organic pest controls, fertilizers and de-icers.

INTRODUCTION

This report presents **Guidelines for the development of environmentally responsible communities**.

The report is presented in two parts. Part 1 explains the context in which the Guidelines have been developed, develops a rationale for their scope and outlines the approach taken to develop the Guidelines. Part 2 presents the Guidelines and a rationale for them.

PART 1: CONTEXT, SCOPE, FOCUS AND APPROACH

CONTEXT

At the Annual Meeting of Members in February 2006, the Canadian Home Builders' Association (CHBA) approved the CHBA Member Builder's Statement of Business Values and Commitments. That statement includes the following commitments to protecting the environment:

- “We acknowledge that the development of new communities, and the construction and renovation of homes, has a range of impacts on the environment, both today and in the future. We work with governments and others to develop environmentally responsible housing solutions.
- We are committed to developing communities, and to building and renovating homes, in an environmentally responsible manner through utilizing appropriate technologies, materials, building practices and techniques.
- We pursue continuous improvement and innovation in our processes, practices and products, in order to meet our environmental responsibilities.”

These commitments provide the underpinning and rationale for the Guidelines presented in this document.

SCOPE AND FOCUS

Environmental Focus

Given the priority that society is placing on the environment and the growing importance of responding to threats of pollution of many kinds, including land, water and air pollution, the focus of Guidelines in this document is the environment. Of course, guidelines must take into account their economic viability, cost-effectiveness and implications on affordability.

Rationale of the Guidelines

The Guidelines are based on the following principles and rationale:

- Core principle: community developments should minimize impact on the environment.
- Subsidiary principles:

- Community developments should protect and/or restore natural systems (land, air, water, plants and animals). Natural systems include ecosystems which have a role in maintaining the quality of land, water and air.
- Community developments should not degrade or pollute resources (land, water and air).
- Community developments should conserve resources. This means the efficient use of energy, water, land and material resources, and waste reduction.

These principles encourage a wide range of environmental objectives, such as the following¹:

- Reduce emissions of atmospheric pollutants.
- Preserve and/or restore natural areas.
- Reduce CO₂ production and support CO₂ absorption.
- Implement measures to achieve high water quality for both surface water and groundwater.
- Allow for groundwater recharge.
- Reduce water consumption.
- Manage waste water and stormwater to avoid natural system contamination and degradation.
- Reduce use of and reliance on non-renewable energy and other resources.
- Minimize energy demand.
- Reduce waste production and increase the reuse and recycling of waste.

Physical Scope and Focus

The Guidelines apply to communities. The term, “community” is ambiguous and therefore needs clarification. In these Guidelines, “community” includes the following:

- In terms of size of elements, it includes whole neighbourhoods, partial neighbourhoods, subdivisions, large projects with mixed uses and multiple-unit projects.
- In terms of types of elements, it includes buildings, infrastructure and natural systems. Detailed categories of the Guidelines are as follows:
 - Community form: This category deals with land use intensification and the development of mixed use projects.
 - Site location and type: This category refers to site location and the development of infill and brownfield sites.
 - Protection and restoration of natural systems: This category covers site selection to avoid environmentally sensitive areas, the protection and/or restoration of natural areas.
 - Infrastructure: This category deals with transportation systems/elements, stormwater management, and water and waste water management.
 - Site development: This category deals with soil and vegetation disturbance and site erosion, shared use of some functions and facilities, site surface treatment, building orientation and the use of recycled materials in site development.
 - Buildings: The Guidelines include buildings within their scope but do not focus on details of environmental measures for the construction of dwellings because such measures are documented extensively and are well established. Therefore, this section provides an overview of energy-conserving design measures, energy-conserving construction measures, resource-efficient and resource-conserving construction measures, waste-reduction

- construction measures, water-conserving construction measures, waste/pollution-reducing operating measures and measures to maintain good indoor air quality.
- Landscaping: This section deals with plant selection, landscaping to affect micro-climates around and in buildings, and maintenance procedures that conserve water.
- The Guidelines focus on developments that include a residential component.

Stage of Development

The Guidelines focus on the project development phase. However, some measures applicable in project operations are also included.

Target Audience

The Guidelines are targeted primarily at project developers. However, the Guidelines acknowledge that many parties have a role in determining what gets built at the community level, including municipal politicians and officials, community leaders, professionals and the public. For example, a developer must meet requirements of municipal master plans, infrastructure plans, land use plans, zoning bylaws, subdivision development controls, site design guidelines and engineering standards. This means that while the Guidelines are targeted at developers, they are developed with the recognition that developers do not have total control of the project, and that project approval depends on consultations, negotiations, partnerships and cooperation among influencing parties.

As a consequence of the main target of the Guidelines, their scope does not include municipal initiatives targeted at their own operations.

APPROACH

Sources of Ideas

The Guidelines proposed in this document derive primarily from a literature review. The documents reviewed are listed in Appendix A. The Guidelines also consider comments made by presenters and attendees at selected conferences and selected developers. Draft work was circulated to selected developers for their review and the Guidelines take their comments into account.

Criteria for Inclusion

The Guidelines reflect consideration of the following criteria:

- Potential positive environmental impact.
- Technical feasibility and ease of implementation.
- Cost-effectiveness.
- Manageable degree of risk.

In all cases, developers should carry out their own assessment of the Guidelines against these criteria and be satisfied with the results before implementing them. Also, developers must obtain approvals from authorities having jurisdiction.

Most of the Guidelines have a direct environmental basis. However, some are intended to create conditions or actions that yield environmental benefits; in that sense, they have an indirect environmental benefit. For example, the provision of amenities may not have an environmental benefit but when they are added to a form of development that is environmentally friendly, they create demand for such developments and yield positive or reduce negative environmental impacts.

PART 2: GUIDELINES

EXPLANATORY COMMENTS

Format of the Guidelines

The Guidelines are expressed in terms of prescriptive statements. Those statements are generally followed by a comment that explains the Guidelines and/or outlines measures which can be used to implement them. Where appropriate, the Guidelines include comments on factors that a developer should consider in deciding whether and/or how to implement them. Each Guideline is accompanied by an environmental rationale.

Exclusions from the Scope of the Guidelines

The Guidelines do not include the following attributes:

- Detailed technical implementation techniques.
- Developers' planning processes.
- Quantifiable goals.
- Actions to verify achievements.

Implementation of the Guidelines

As noted previously, environmental measures at the community scale will likely involve municipalities to a significant extent because of the approvals required. For this reason and because some environmental measures will be considered new or innovative, implementing the Guidelines may involve 1) regulatory changes or allowances, 2) rezoning, 3) supporting tax or other policies and 4) developer-municipality collaboration. For the same reasons, implementing the Guidelines may require a more complex and extended planning and development process than normal.

Organization

The Guidelines are organized in accordance with the categories of the physical elements outlined in the section, "Physical Scope and Focus" above, i.e.:

- Community form

- Site location and type
- Protection and restoration of natural systems
- Infrastructure
- Site development
- Buildings
- Landscaping

Application of the Guidelines

Because the range of projects within the scope of communities is broad, not all of the Guidelines apply to all projects.

COMMUNITY FORM²

Guideline: Develop compact communities; intensify land use.

Explanation

- General land intensification techniques include suburban densification, area redevelopment, infill development, brownfield development, building conversions, alternate development standards and transit-oriented developments.
- Urban design options include higher density traditional development forms and neo-traditional neighbourhood design.
- Because of the wide diversity of contexts, density guidelines are not provided here.

Factors to Consider

These types of developments may face the following challenges³:

- Higher development costs.
- Public/neighbourhood opposition.
- Regulatory issues.

As a result of these factors, developers may choose to request regulatory changes (re-zonings or land use relaxations). They should collaborate with supportive municipalities and provide positive responses to open public consultation to obtain project approval. Such responses may generate public support. These factors may also result in a more complex and extended planning and development process.

Environmental Rationale

- Reduces the loss of farmland and natural areas.
- Supports the use of modes of transportation other than private automobiles, e.g., public transportation, cycling and walking, thereby reducing car dependence, energy consumption, greenhouse gas (GHG) emissions and air pollution.
- Conserves material resources as a result of reduced requirements for new infrastructure, e.g., roads and walkways, sewerage and stormwater pipes, water pipes, etc.; also as a result of building reuse.

- Conserves energy because increased density buildings require less energy.
- May make co-generation and district heating systems environmentally and economically viable in the short and long term⁴. One of the factors in a decision on these systems is the prospect of switching energy source in district heating systems in the future if that will reduce energy consumption.

Guideline: Develop mixed use, compact projects/communities.

Explanation

This refers to the inclusion of a number of uses, including retail services, commercial uses, centres of employment, etc., as well as a residential component.

Factors to Consider

The factors listed for compact communities (above) apply.

Environmental Rationale

The environmental rationales listed for compact communities (above) apply. In addition, the wider range of uses and services in the development can reduce transportation requirements because more employment opportunities and services may be nearer residences.

SITE LOCATION AND TYPE⁵

Guideline: Develop projects proximate to existing communities, and planned water and wastewater infrastructure; also within the service areas of public transportation systems⁶.

Environmental Rationale

- Reduces high land-consumptive practices and its associated environmental impacts, e.g., reduces vehicle trips and miles travelled.
- Conserves natural resources for the construction of infrastructure.

Guideline: Develop infill sites.

Explanation

This refers to developments in existing urban areas where the infrastructure and other services such as transit already exist. This could include the redevelopment of greyfield sites⁷.

Factors to Consider

These types of developments may face challenges similar to land intensification projects, i.e., higher development costs, public/neighbourhood opposition and regulatory issues. As a result, developers may adopt measures similar to those mentioned for land intensification projects to obtain project approval: collaborate with supportive municipalities and provide positive responses to open public consultation. Such responses may generate public support. These factors may also result in a more complex and extended planning and development process.

Environmental Rationale⁸

- Reduces the loss of farmland, with resulting environmental benefits, e.g., preservation of wildlife habitat.

- Reduces requirements for private automobile use because of the site's location nearer existing uses and services (including public transit), thereby reducing energy consumption, greenhouse gas (GHG) emissions and air pollution.
- Conserves material resources as a result of reduced requirements for new infrastructure, e.g., roads and walkways, sewerage and stormwater pipes, water pipes, etc.

Guideline: Develop brownfield sites.

Explanation

Brownfield sites refer to abandoned or underused industrial or commercial sites where development is stymied by environmental contamination⁹.

The technical and economic feasibility of brownfield development depends on the remediation techniques available. Developers should attempt to use approved methods that reduce contaminant volume or toxicity¹⁰, and remediation costs.

Factors to Consider¹¹

- **Regulations:** Developers must be certain of the legislative and regulatory requirements in their jurisdiction. They should also be aware of the steps in and length of the approval process.
- **Liability:** Developers should ensure that their site remediation agreements, and governing legislation and regulations limit their liability, specifically to the rules in place at the time of the remediation work.
- **Cost and financing:** Developers should be confident of the costs of remediation, and the practices of lenders and insurers with respect to financing site remediation. They should also be aware of financial assistance programs available from municipalities and/or provinces for this type of work, such as waiving of development charges, etc.

Environmental Rationale

The environmental rationale for brownfield site development typically includes the rationale for infill projects, i.e., reduces the loss of farmland and natural areas; reduces requirements for private automobile use because of the site's location nearer existing uses and services, thereby reducing energy consumption, greenhouse gas (GHG) emissions and air pollution; conserves material resources as a result of reduced requirements for new infrastructure, e.g., roads and walkways, sewerage and stormwater pipes, water pipes, etc. An additional environmental benefit of brownfield development is remediation of a polluted site.

Guideline: Avoid developments in floodplains¹².

Environmental Rationale

- Preserve habitat conservation.
- Enhance natural hydrological systems.

PROTECTION AND/OR RESTORATION OF NATURAL AREAS¹³

Overview

Natural areas include ecosystems which have value in maintaining the quality of land, water, air and living organisms, as explained below, and this value provides an environmental rationale for protecting and maintaining natural areas.

Ecosystems are groups of living organisms that interact with each other and with their physical environment. They serve hydrological and biological functions. Hydrological or water-related functions include ground and surface water storage, and transporting surface water. Biological functions include providing plant and animal habitats. Natural environment protection focuses on maintaining ecosystem characteristics, including natural ecological processes and biological diversity.¹⁴

Guidelines to preserve natural environments focus on actions on the physical environment which are intended not only to preserve it but also protect living organisms, including plants and animals.

Guideline: Choose a site to avoid environmentally sensitive areas.

Explanation

Environmentally sensitive areas include waterways, wetlands, nesting sites, natural habitats for plant and animal species, including imperilled species, etc. In addition, it could include soils that are of prime agricultural quality or unique forest lands.

Factors to Consider

The feasibility and/or economic implications of avoiding sensitive areas, prime agricultural land and/or unique forest lands must be taken into account.

Environmental Rationale

The rationale is preserving natural areas because of their value in maintaining the quality of land, water, air, and protecting living organisms, as explained above.

Guideline: Protect and/or restore natural areas.

Explanation

Natural areas include the physical environment, and flora and fauna, i.e., living organisms.

Protection and/or restoration measures include the following:

- Provide buffers between natural areas and built environment. Buffers consist of a strip of vegetation of various species that protect natural areas from development. The sensitivity and significance of the sensitive area determines the width and composition of the buffer.
- Preserve open space for wildlife corridors and habitat.
- Implement stream enhancement measures, e.g., use bioengineering techniques to stabilize shorelines of streams, replace native material on erosion-prone banks, use various techniques to slow water flows to reduce erosion and recharge groundwater; and use these and other measures to protect fish and bird habitats.
- Use native vegetation to restore natural areas; remove invasive species.

- Develop and execute conservation covenants to ensure ongoing preservation of natural areas.

Environmental Rationale

The rationale for preserving and/or restoring natural areas is their value in maintaining the quality of land, water, air, and protecting living organisms, as explained above.

Other guidelines: The guideline for managing stormwater in the section on Infrastructure and the guideline for minimizing soil and vegetable disturbance in the section, Site Development, also contribute to preserving natural areas.

INFRASTRUCTURE

Overview

This section includes the following topics:

- Transportation systems: In this context, transportation systems include public corridors, public transit, roads and pathways. The relevant transport modes are private cars, buses, bicycles and walking.
- Stormwater management.
- Water and wastewater management.

An obvious and critical attribute of these topics, particularly transportation systems, is that they are not solely under the control of the developer; much of the control rests with the municipality, particularly control of public transit. Some elements are governed by provincial standards. However, since developers have an opportunity to introduce new environmentally friendly ideas in community projects in their negotiations with municipalities, these topics are included in this section. Further, experience shows that more municipalities are supportive of many ideas discussed in this section.

Guideline: Develop transportation systems that reduce car dependence and use, and make alternative modes of transport more feasible and attractive.¹⁵

Explanation

Compact, higher density and mixed-use developments have a synergistic relationship with public transportation systems. For example, higher density settlement patterns generate more passengers, mixed use projects foster day-long ridership, more passengers generate more revenue, and more revenue allows lower fares and higher levels of service. Higher density developments enable public transportation systems to function well; well-functioning public transportation systems increase the functional attractiveness of higher density developments. A “node and corridor” settlement pattern also improves the accessibility, convenience and use of a public transit system.

Various types of measures can be used to achieve the goals of this Guideline and increase the functional attractiveness of higher density developments, including land use planning and design measures, pricing measures, promotional measures and operational measures. The measures listed below do not necessarily have a direct environmental benefit or rationale, but

they are supportive of other conditions that can have an environmental benefit. Those over which a developer has or may have some control or influence are listed below.

Land Use Planning and Design Measures

- Prepare transportation demand management (TDM) plan to reduce car use by encouraging behavioural change.
- Design “pedestrian-friendly” streets. This refers to the inclusion of measures such as traffic calming measures, measures to reduce car-pedestrian conflict, reduced street widths (as permitted by authorities), the provision of amenities such as trees and other vegetation, rest areas, art, lighting (with energy-efficient luminaires), etc.).
- Design “pedestrian-friendly” public areas.
- Provide bus shelters that are safe and convenient.
- Provide bicycle paths/lanes and facilities/conveniences (e.g., storage).
- Provide pedestrian paths, walkways and through connections in projects.
- Reduce parking requirements.

Pricing, Operational and Promotional Measures

- Provide transit passes.
- Provide access to and/or subsidize car-pooling/car-sharing cooperatives.
- Establish a shared parking arrangement with residential and commercial users in mixed use projects.
- Provide information programs to residents.
- Provide/utilize electric vehicles where this is economically viable and saves energy.

Factors to Consider

- The position of a municipality and its main departments (e.g., transportation) is a major factor in the ability and willingness of a developer to implement many of the measures listed.
- Some of the measures suggested above raise regulatory and trade-off issues. For example, some factors may support reducing street widths but others, such as safety, may favour wider streets and/or turn-arounds for fire trucks. Municipalities and provincial authorities where relevant should resolve these issues.

Environmental Rationale

Part of the rationale is stated in the Guideline. The following additional rationales apply:

- Reduces car use, GHG emissions and air pollution.
- Supports settlement patterns that use land and resources efficiently, as explained in previous sections on the rationale for land intensification and mixed-use projects.
- Shared parking arrangements reduce the requirements for parking and thereby conserve resources.

Guideline: Manage stormwater¹⁶.

Explanation

Stormwater is water flow from wet weather. The measures for managing stormwater are outlined below:

Measures to Detain Stormwater at Source

- Disconnect roof leaders and/or foundation drains.
- Store water, including rainwater, in catch basins, in or on buildings and/or in detention ponds.
- Use bio-retention areas that store and help to infiltrate storm water run-off.

Measures to Control Stormwater Run-off

- Use pervious surfaces to encourage water infiltration through the soil. These surfaces can include natural water drainage features, grassed swales, pervious pipe systems, pervious catch basins and infiltration basins. They can also include pervious paved surface areas such as parking areas, walkways, driveways and patios.
- Reduce street widths to reduce stormwater run-off.
- Reduce lot grading.
- Develop green roofs and living walls.
- Add vegetation to natural stormwater drainage features to help infiltrate or evapotranspire stormwater run-off.

Measures to Control Stormwater at the End of its Flow

This can be accomplished by constructing artificial wetlands.

Factors to Consider

The measures outlined above must be designed by qualified professionals to perform properly, achieve the intended results and comply with applicable standards. They must also be approved by authorities having jurisdiction.

Environmental Rationale for Managing Stormwater

- On-site retention increases infiltration into the ground which allows groundwater recharge and improves water quality as a result of percolation through soil.
- Reducing stormwater run-off reduces flooding and erosion, controls sediment deposits and increases infiltration.
- Constructing artificial wetlands can help remove pollutants, enhance water quality and create habitats for various plants and animals.

Guideline: Minimize the use of fresh water and maximize the reuse or recycling of water¹⁷.

Explanation

Water used in buildings can be categorized into two categories: grey water and black water. Grey water refers to water consumed within buildings, except in toilets, that is stored and reused for other purposes, such as garden irrigation. Black water refers to non-potable water and sewage from toilets.

The reuse of grey water reduces the use of fresh water. It requires changes to conventional plumbing practices to allow the separation, storage and reuse of grey water indoors or outdoors.

On-site black water treatment is technically feasible. Different technologies have been developed and use natural organisms, sunlight and/or vegetation, depending on the system.

Another measure to minimize the use of water is rainwater storage and use. Rainwater can be used for external uses, such as garden irrigation, and for internal uses, such as flushing toilets. The pumping and other equipment used for water treatment should be energy efficient.

Factors to Consider

Systems for the recycling of water, especially for treating black water on site, must be technically sound, cost-effective and approved by authorities having jurisdiction.

Environmental Rationale for Managing Wastewater

- Water conservation.
- Reduced infrastructure requirements when black water is treated on site.
- Potential for reduced use of chemicals for treating black water, and lower environmental impact.

SITE DEVELOPMENT

Overview

This section includes the following topics:

- Minimizing soil disturbance.
- Shared use of spaces
- Site surface treatments
- Orientation of buildings
- Use of recycled materials

Guideline: Minimize soil and vegetation disturbance, and soil erosion during project development¹⁸.

Explanation

The following measures can be considered:

- Conserve existing on-site vegetation.
- Restore natural vegetation that was cleared during development.
- Do not develop on steep slopes and preserve or restore vegetation on slopes.
- Align roads with natural topography to minimize cut and fill requirements.
- Limit grading.
- Use terracing, retaining walls and other stabilizing techniques to minimize erosion.
- Locate roads, buildings and services to minimize impacts on trees, other vegetation and the soil by using methods such as maximizing the separation of development from trees and other natural areas, providing protective barriers, minimizing trenching by combining utilities or by tunnelling instead of trenching, using small equipment to minimize soil compaction, etc.
- Limit erosion during construction due to stormwater run-off and wind, and sedimentation in receiving streams by using silt fences, sediment traps, vegetated buffer areas, etc.
- Stockpile topsoil.

- Use mulch on disturbed areas to re-establish natural vegetation (trimmings from regionally appropriate trees can be considered).
- Avoid grinding and scattering invasive species.

Factors to Consider

The degree to which soil disturbance, vegetation protection and erosion can be avoided will be affected by site conditions and project economics.

Environmental Rationale for Minimizing Soil Disturbance, Vegetation and Erosion

- Reduces erosion.
- Avoids damage to a site's natural drainage and reduces sediments in downstream water bodies.
- Reduces damage to or preserves natural vegetation and ecological habitat.

Guideline: Plan for the shared use of some functions and facilities¹⁹.

Explanation

This Guideline refers primarily to the shared use of elements, such as community parks, greenways and school sites/playgrounds. It can be extended to the shared use of other elements, such as driveways and cars in a car-share program.

Factors to Consider

Plans for shared uses must be examined to determine potentials for conflict and must be approved by authorities having jurisdiction.

Environmental Rationale for Shared Use of Some Functions and Facilities

- Uses land efficiently.
- Reduces resource use.
- In the case of shared driveways, reduces the quantity of impervious surfaces and stormwater run-off.

Guideline: Use surfaces that allow stormwater infiltration and avoid heat build-up²⁰.

Explanation

Pervious surfaces allow storm water to seep into the soil. Open-grid pavement is an example of a pervious surface that can allow stormwater infiltration. Reduced street widths and parking areas also allow increased infiltration.

Reduced surface parking and the use of surfaces with a high solar reflectance or trees help to prevent heat build-up in areas such as parking lots.

Environmental Rationale

- Reduces stormwater run-off and recharges the groundwater.
- Saves energy due to reduced heat build-up.

Guideline: Orient buildings to maximize solar heating and cooling²¹.

Explanation

The main factors in implementing this Guideline are directions and slope. The main measures are as follows:

- Orient streets in an east-west direction to allow southern exposures of buildings to absorb solar heat and avoid prevailing winter winds.
- Make the east-west axis of buildings longer than the north-south axis to enable solar heat to be captured.
- Consider other building layouts that reduce overshadowing.
- Consider the impact of building on north-facing slopes on the potential for achieving solar heating in project buildings because of shadow lengths on north-facing slopes.

Factors to Consider

Meeting this Guideline may require trade-offs because of other design requirements. A decision on building orientation should take other considerations, including environmental considerations and their impact, into account.

Environmental Rationale

- Reduces energy consumption.

Guideline: Use recycled materials in site surfaces²².

Explanation

Parking lots, walkways and roadbeds offer opportunities to use recycled materials. Some potential options are crushed concrete as an aggregate, recycled pavement as a base for an asphalt surface, the use of crumb rubber or asphalt shingles in asphalt, the use of fly ash in concrete, etc.

Factors to Consider

A developer should ensure the sufficient performance of recycled materials and ensure that they are approved for the intended use.

Environmental Rationale

- Uses resources efficiently.

BUILDINGS²³

Buildings are within the scope of the Guidelines since buildings are part of community developments. However, as noted previously, specifying measures for the provision of environmentally responsible buildings is not the focus of the Guidelines. Measures to develop environmentally responsible buildings are well developed, well known and comprehensively documented. For this reason, this section presents only an overview of measures to develop environmentally responsible buildings. Many of these measures are based on the “house-as-a system” principle.

Design Measures to Conserve Energy

- Utilize multiple housing forms which are typically more energy efficient than detached housing.
- Design projects to accommodate home-based employment which reduces transportation. This includes providing office space in dwellings and electronic wiring to accommodate electronic communications.
- Employ adaptive reuse approaches to existing buildings.

- Design rooms to capture solar energy.

Construction Measures to Conserve Non-Renewable Forms of Energy

- Construct energy-efficient building envelopes (includes energy efficient windows and doors).
- Use energy-efficient mechanical equipment, appliances and fixtures for heating, cooling and lighting.
- Incorporate building system controls designed to minimize energy consumption in building functions, e.g., lighting, heating, cooling, ventilation, irrigation, etc.
- Use local, indigenous materials which may reduce transportation costs.
- Consider embodied energy in the selection of materials if data are available.
- Utilize renewable and/or alternate forms of energy generation, including biomass, geothermal, photovoltaic and solar.
- Utilize district heating and cooling systems if they are technically sound, cost-effective and environmentally responsible, e.g., energy efficient relative to alternative systems. One of the factors in a decision on these systems is the prospect of switching energy source in district heating systems in the future if that will reduce energy consumption.
- Recover heat from waste water.

Resource-Efficient and Resource-Conserving Construction Measures

- Use durable design and construction building techniques which reduce material usage over the long term.
- Use materials and construction methods selected on the basis of environmental life-cycle assessment (LCA) techniques to the extent information is available.
- Use materials and products manufactured from renewable resources or agricultural by-products.
- Use products made from recycled materials when justified using an LCA approach, to the extent information is available. Additional considerations can be used to select similar and dissimilar materials, as follows: when contemplating the use of products made of similar materials, consider using recycled products instead of virgin-material products; when contemplating the use of dissimilar materials, select products that have been identified as environmentally preferable using LCA tools, to the extent information is available.

Waste-Reduction Construction Measures

- Use building designs that reduce material waste.
- Reuse materials.
- Participate in material recycling programs.

Water-Conserving Construction Measures

- Utilize water-conserving fixtures.
- Incorporate plumbing that allows the use of grey water and treated blackwater as permitted.
- Use rainwater.

Waste/Pollution-Reducing Operating Measures

- Provide drop-off terminals for household and/or office waste, including hazardous products.
- Provide composting facilities.

Measures to Provide Good Indoor Air Quality (IAQ)

- Use techniques to limit emissions of contaminants, e.g., choose non-emitting materials and encapsulate off-gassing materials.
- Use filters.
- Ventilate buildings adequately.
- Use eco-friendly cleaning products.
- Protect absorptive construction materials from moisture damage on site.
- Provide operable openings in external rooms.
- Use an IAQ management program during construction.

Factors to Consider

Adopting the measures outlines above depends at least on the following conditions:

- The measures must be approved by the authority having jurisdiction.
- The adoption of some measures depends on data availability to allow an assessment of environmental impact, technical feasibility, ease of implementation, risk, and cost-effectiveness.

LANDSCAPING²⁴

Overview

The scope of landscaping in this context includes parks, recreational open spaces and project landscaping at a large and small scale. It includes development and maintenance issues.

The general environmental rationale for landscaping is to enhance or continue the ecological function of an area. Landscaping can be designed to retain surface water and recharge the groundwater needed for the survival of vegetation. Vegetation serves many environmental purposes, including providing wildlife habitat, absorbing carbon dioxide, intercepting rainwater and reducing demand for green space outside the city.

Guideline: Use indigenous and drought-resistant plants.

Explanation

This form of landscaping is referred to as xeriscaping. The following measures are also typically included in this approach:

- Eliminate or limit the amount of turf (grass).
- Grade the land to promote water seepage into the ground.
- Add organic matter/mulch to sandy and clay soils to improve its moisture and nutrient-holding capacity. Consider using on-site trimmings.
- Group plants with similar watering requirements together.
- Maintain plants properly to reduce their water requirements.

Environmental Rationale

- Reduces water use.
- Reduces maintenance requirements and resulting emissions and energy consumption from equipment.

Guideline: Use landscaping to affect micro-climates around and in buildings.

Explanation

The selection of plants can affect the heat and cooling load on buildings, as outlined below:

- Use coniferous trees to provide wind buffers to protect buildings and reduce heat loss.
- Select plants that provide shade and cooling in the summer, as desired, but allow sunlight in the winter for heating purposes.

Environmental Rationale

- Reduces energy use.

Guideline: Use operating procedures that conserve water.

Explanation

The following procedures can be used:

- Use drip irrigation or soaker hoses.
- Use irrigation systems that respond to soil-moisture conditions.
- Use zoned irrigation to provide water as needed by specific plants.
- Use rainwater and greywater, as permitted.

Environmental Rationale

- Reduces water use.

Guideline: Use organic pest controls, fertilizers and de-icers

Environmental Rationale

- Reduces pollution.

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