

DEVELOPER'S GUIDE

TO SUSTAINABLE COASTAL DEVELOPMENT IN BAJA CALIFORNIA SUR

2009

COMPILED BY
DIRECCIÓN DE PLANAECIÓN DE URBANA Y ECOLOGIA
BAJA CALIFORNIA SUR,
THE LORETO BAY FOUNDATION HOSTED BY THE OCEAN FOUNDATION,
AND SHERWOOD DESIGN ENGINEERS



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INTRODUCTION

Sustainable practices meet the needs of the present without compromising the potential for future generations to meet their needs. The four fundamental components of sustainable development are the environment, social equity, aesthetic beauty and economics. Central to integrating these components is establishing a balance in the relationship between populations and the environment they live in. Finding stability in this relationship is potentially the most significant challenge facing global society at present and it will become an even larger challenge in the future as population increases with economic growth. By following the guidelines put forth in this document, development in Baja California Sur can even out these imbalances on a local level. In addition to pursuing the general culture of sustainability, compliance with these guidelines ensures goals specific to the communities' needs are met. By accomplishing these goals, the resulting Baja California Sur communities will have a competitive advantage in tourism-based development and may inspire other government agencies around the world to develop in a similar sustainable manner.

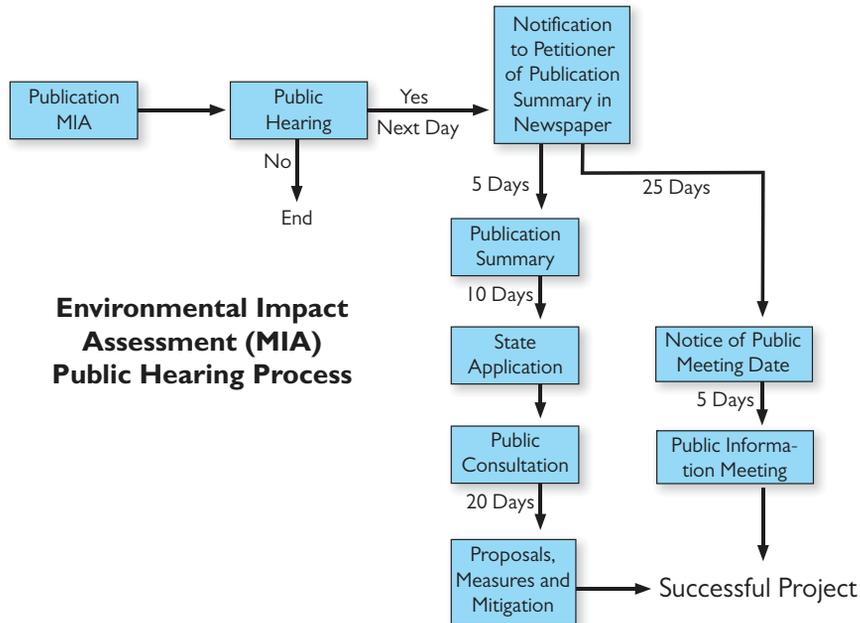
This guide is meant to inform Developers, Banks and Financial Institutions, Architects, Landscape Architects, Engineers and Construction Managers about sustainable building practices and the existing legal development framework in Baja California Sur. By incorporating the tools provided in this guide into the design and construction process, developers can expedite the approval process through understanding of the legal requirements for the development and by demonstrating their commitment to build a healthy and sustainable future for the State of Baja California Sur.

Therefore, this Guide is intended to give an overview regarding development policy in BCS, assist developers comply with applicable laws, and offer opportunities to develop in such a way that minimizes long-term impacts on local environment and livelihoods. The Guide addresses twelve development issues, and clearly describes each issue in terms of the following: 1) **Basic Principals of Development** to clearly understand the motive behind each issue, 2) **Applicable Laws** to help navigate the legal process, 3) a suggested **Development Framework** as a roadmap to design projects and meet sustainability expectations, and 4) **Examples of Practice** that demonstrate how Sustainable Coastal Standards can relate to each issue practically.

After consulting this Guide, the next steps to creating an executable plan to meet sustainability needs should be attained by consulting the “Summary of Current Development Law in BCS” and the “Sustainable Coastal Development Standards,” which can be attained through the **Contact List** on the last page of this Guide.

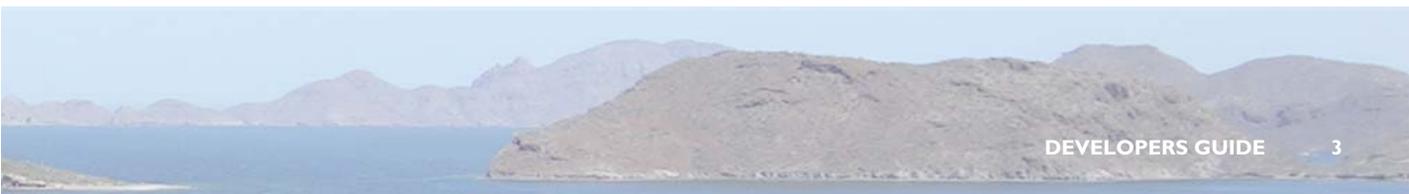
ENVIRONMENTAL IMPACT ASSESSMENT PROCESS (MANIFESTO DEL IMPACTO AMBIENTAL, MIA)

The following flow chart explains the public hearing process of an environmental impact assessment, which is required for the construction of golf courses and marinas and may be required for many other categories within this guide.



The environmental impact evaluation procedure concludes with a resolution that provides for one of the following:

- authorizes the project pursuant to the terms and conditions presented in the MIA,
- authorizes the project under certain conditions, or
- denies the project approval because the project does not comply with the law, regulations or standards; the works or the determined activity may affect species subject to special protection; or the information provided is false.



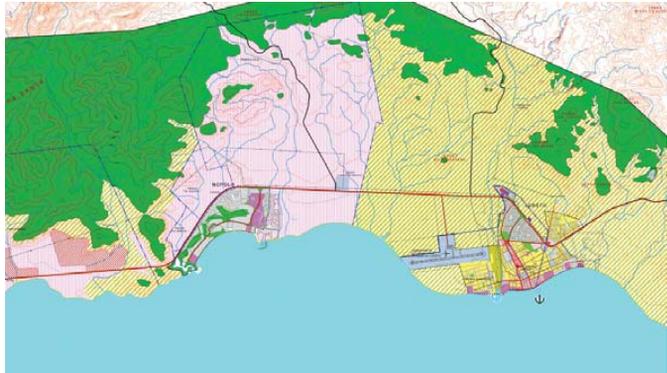
1 PROJECT SITING AND PROGRAM

BASIC PRINCIPLES

It is the goal of these guidelines to build functional, lasting communities that will better the lives of the local people while minimally impacting the natural environment. Throughout the design process, developers of new projects should evaluate the project's location, plan, and program to determine near and long term impacts on the community and on the environment. It is recommended that before the process of development begins that a biological survey be completed and an evaluation of the surrounding community and services. Projects must conform to stated local and regional goals, such as economic development, environmental restoration/protection, quality of life enhancement, and/or cultural and historic preservation.



Walkable Neighborhood



Loreto Area Planning Zones

APPLICABLE LAWS

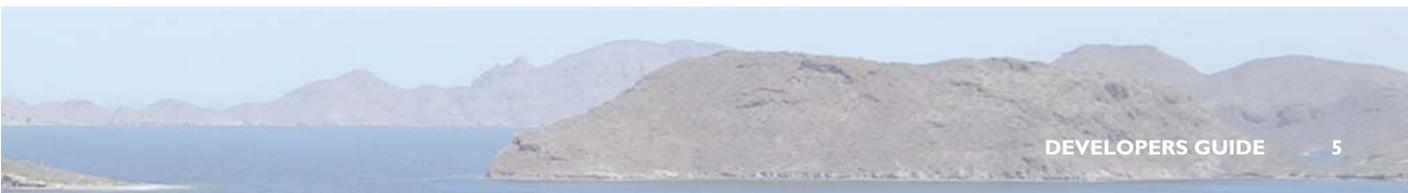
- **National Commission for the Knowledge and Use of Biodiversity (CONABIO)**
 - Biological and ecological importance
 - Conservation areas and natural protected areas
- **Article 35 of General Law of Ecological Equilibrium and Environmental Protection (LGEEPA)**
 - Declaration of complete phasing plan
- **Local development plans**
 - Ordenamiento Ecológico
 - Programa General de Desarrollo Urbano
 - Other local plans

DEVELOPMENT FRAMEWORK

- Applicants must demonstrate that no **previously developed** site can serve as a suitable location for a proposed project before receiving approval to develop a previously undisturbed site.
- Applicants must create a **catalog of species** and numbers of individual fauna kept on file to help expedite environmental review processes.
- Irreplaceable **agricultural resources** shall be preserved by protecting prime and unique farmland from development. New residential and commercial development shall be located on sites with no more than 25% prime soils, unique soils, or soils of state significance.
- Proposed developments greater than 2 hectares in size must acquire title or **conservation easements** on off-site lands equal to at least 50% of the total project area to protect it from development in perpetuity.
- To achieve a minimum 50-year lifecycle, all projects shall be constructed of durable building materials and shall be designed in accordance with anticipated **long term** community growth patterns.
- In order to create a **diversity** of land uses, resident age, income levels, and unit types within developing communities, projects may be permitted to incorporate mixed uses to introduce non-conforming (excepting industrial) uses into areas with existing, single-use, residential zoning designations.
- Projects with year-round residential components must be located within 0.75 kilometers of a number of **jobs** equal to or greater than 25% of the number of dwelling units in the project.

EXAMPLES OF PRACTICE

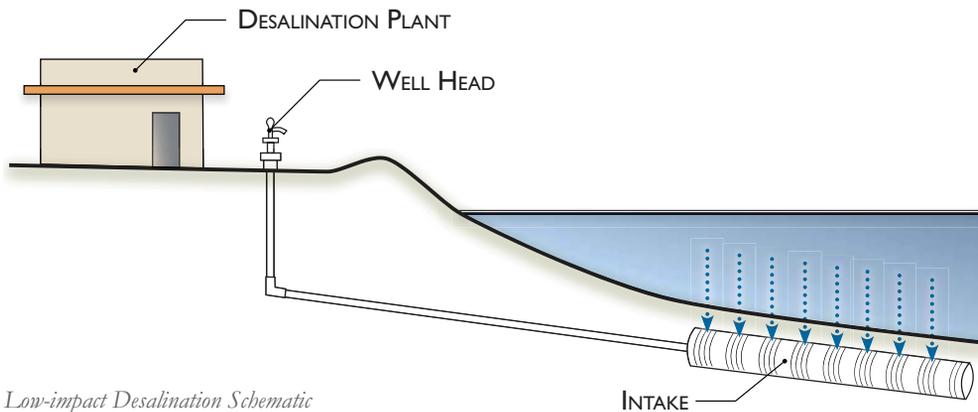
- Project applicants shall estimate the total short term (construction workers) and long term (service employees) populations, including families, expected to be associated with the project.
- Projects with a density equal to or greater than 35 units per hectare shall leave a minimum of 5% of the original buildable area undisturbed. Projects with a density of less than 35 units per hectare shall leave a minimum of 40% of the original buildable area undisturbed.
- A minimum of 50% of all existing trees with a diameter exceeding 30 cm and cacti with a diameter exceeding 25 cm must be preserved during project development.
- See SCDS for additional specific guidelines (refer to pages 5 to 6).



2 POTABLE WATER

BASIC PRINCIPLES

In Baja California Sur, water is the most valuable resource for development. Water resources must be conserved to protect the environment and to maintain access to clean water for future generations. Potable water supplies shall be acquired using as little energy as possible while preserving the ecosystems which those water resources support. Importing or desalinating water must be avoided until all water conservation and water management measures are exhausted.



Low-impact Desalination Schematic

APPLICABLE LAWS

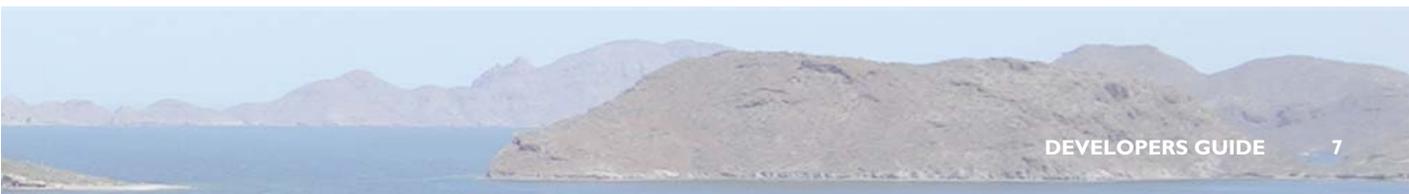
- **Municipal Government**
 - Water access and management
 - Permitting of service and administration
- **Federal Ocean Law (LFM), Article 2**
 - Regulation of the marine zones (desalination)
- **National Commission of Water (CNA)**
 - Constructing wells
 - Evaluation of environmental review documents
- **NOM-059-SEMARNAT-2001**
 - Conservation
- **NOM-022-SEMARNAT-2003**
 - Protection of mangrove areas
- **Article 63 of the General Wildlife Law**
 - Protection of mangrove areas

DEVELOPMENT FRAMEWORK

- Prior to development, developers must provide a **water balance** analysis that includes all present and future water demands.
- Developers must demonstrate that an **adequate supply** is and will be available for use at a rate that is sustainable for the contributing source.
- Applicants must identify and implement water **conservation** measures that will mitigate additional water demands created by the development.
- Water purveyors must develop a water **management plan** that establishes stringent water conservation goals and regular system maintenance schedules.
- Because desalination damages fragile marine ecosystems and is energy-intensive, this strategy should only be explored only as a **last resort**--after conservation and water recycling efforts do not meet project demands.
- Water shall not be transferred from any **watershed** to be used within another watershed exceeding 20 hectares in size.
- All projects must capture at least 65% by volume of the average annual **roof runoff** for use within the project. This calculation shall be based on total project roof area and local average annual rainfall.

EXAMPLES OF PRACTICE

- Water purveyors shall incorporate financial incentives for water conservation. At a minimum, the following incentives shall be used:
 - A graduated rate system in which water rates increase with increased volume of use,
 - Credits on water bills for customer repairs of domestic leaks,
 - Rebates for improving water efficiency of appliances, and
 - Rebates for ultra-low flow toilet retrofits.
- Damming or diversion may not be utilized if the total volume of downstream seasonally adjusted flow would be reduced by more than 25%.
- The design of desalination facilities shall incorporate the limits of the existing potable water infrastructure and shall provide for compatibility and connectivity to such infrastructure.
- See SCDS for additional specific guidelines (refer to pages 8 to 10).



3 BUILT ENVIRONMENT ENERGY SPECIFICATIONS

BASIC PRINCIPLES

Energy consumption by all new structures, renovated buildings, and infrastructure facilities shall be minimized to protect the environment and support the local economy. Carbon dioxide emissions shall serve as a reliable metric for the amount of environmental harm caused by the production and consumption of various energies.



Large-scale Wind Farm



Photovoltaic panel installation on a residence

APPLICABLE LAWS

- **Kyoto Protocol – UNFCCC**
 - Article 12 – conditions of compliance
 - Carbon bonds
- **Federal Energy Regulatory Commission (FERC)**
 - General regulations
- **Federal Commission of Electricity (CFE)**
 - General regulations

DEVELOPMENT FRAMEWORK

- All projects must include preparation of a comprehensive **carbon budget** analysis that accounts for preconstruction material inputs, construction process, and post construction occupancy.
- The amount of carbon released and sequestered over all phases of the project must **sum to zero** within 15 years and achieve a net carbon negative thereafter.
- All designs for residential dwellings shall utilize solar, wind, geothermal and other available **renewable energy** sources.
- **Conservation** shall be best accomplished by penalizing heavy users of electricity with higher rates applied in a tier-based rate structure that increases rates exponentially relative to a per person use of kilowatt hours of electricity.
- New buildings shall maximize the use of natural, ambient **light** to reduce the use of energy for lighting.
- Distribution systems must incorporate **two-way designs** that allow individuals to produce their own energy on-site and contribute back to the grid.
- Special features, such as telecommunications **antennas**, shall be installed only after consultation with the Direccion de Planeacion Urbana y Ecologia BCS.

EXAMPLES OF PRACTICE

- New structures greater than 200 square meters in size must be designed to reduce the cooling load by 40% as compared to a “typical” building. A “typical” building cooling requirement shall be calculated to be 7.0 kW of cooling equipment per 100 square meters of air conditioned space.
- Individual air conditioning systems shall not be installed unless the developer first demonstrates that the installation of individual systems results in efficiency gains. Installed units must have a minimum rating of 13 Seasonal Energy Efficiency Ratio (SEER) and 11 Energy Efficiency Ratio (EER), and must be outfitted with a Thermostatic Expansion Valve (TXV).
- See SCDS for additional specific guidelines (refer to pages 13 to 16).



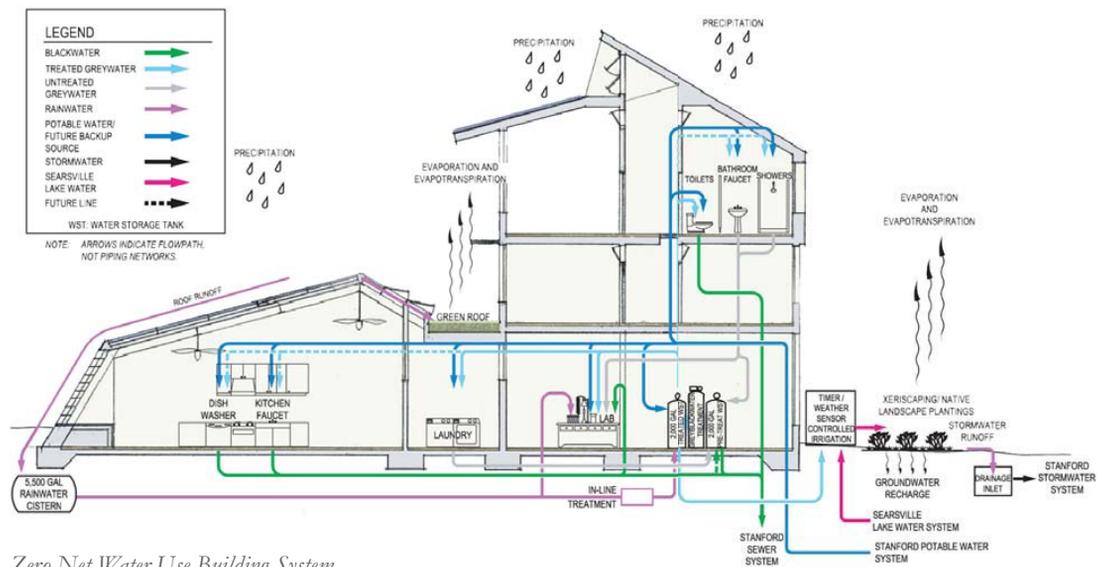
4 WASTEWATER

BASIC PRINCIPLES

Wastewater is a resource that shall be collected, treated, and utilized to offset demand for other resources such as potable water, energy, and fertilizer.

APPLICABLE LAWS

- **National Water Commission (CNA)**
 - Permits for the treatment and discharge of sewage
- **NOM-001-ECOL/NOM-002-ECOL**
 - Maximum allowable levels of sewage to be discharged

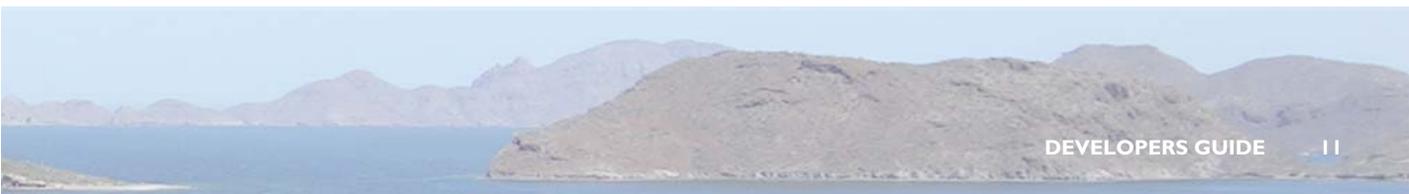


DEVELOPMENT FRAMEWORK

- Untreated wastewater may not be discharged to any open water bodies, spread over land, or injected into the groundwater via wells.
- Wastewater shall be treated to a tertiary level for reuse or disposal.
- Greywater shall be collected, treated as appropriate and, prior to becoming part of the waste stream, be used for non-potable applications.
- Greywater must be collected, plumbed, and conveyed in pipes separate from those used for blackwater in all internal plumbing applications.
- Minimization of energy use and the sustainable use of chemicals shall be primary considerations in the selection of appropriate water treatment methods.
- A minimum of 75% of all greywater must be reused in place of potable water. Strategies may include interior reuse, landscape use or off-site reuse.
- No sewage shall be allowed to enter any storm drain system or discharge onto the ground or into receiving streams without first being treated.
- No wastewater treatment facilities may be located within 100m of the ocean at recorded high tide level or within 50m of the edge of a riparian buffer.

EXAMPLES OF PRACTICE

- All new buildings shall maximize the use of naturalized treatment technologies for treating greywater and blackwater. In all developments with a density lower than 5 development units per acre, plant-based wastewater treatment, or alternative natural treatment methods that achieve an equal or higher level of water quality than tertiary treated water, shall be used for 100% of blackwater and greywater. This shall be achieved on-site or in community systems.
- See SCDS for additional specific guidelines (refer to pages 18 to 20)



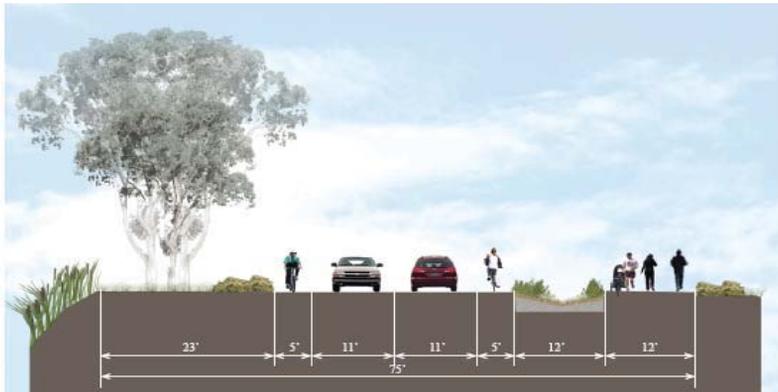
5 ACCESS AND TRANSPORTATION

BASIC PRINCIPLES

Designs shall be developed to reduce air pollution, energy consumption, and greenhouse gas emissions generated from transportation by planning new construction in locations that reduce automobile dependence. Transportation facilities shall be designed to emphasize connectivity and establish the following hierarchy of use:

- 1st : Pedestrian
- 2nd : Non-motorized vehicle
- 3rd : Public transit
- 4th : Personal motorized vehicle

Transportation shall be optimized for efficiency and convenience within the context of protecting the natural environment.



Multi-modal Transportation and Green Street Cross-section

APPLICABLE LAWS

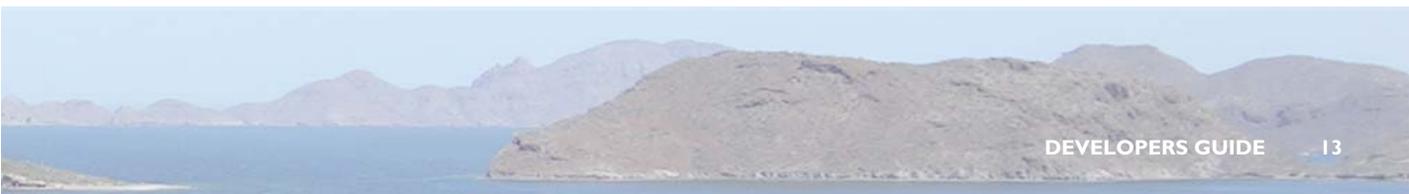
- **The Law of Terrestrial Transit of the State and Municipalities of Baja California Sur (LTTBCS)**
 - Planning of facilities and pathways
- **Development Law for State of Baja California Sur (LFBCS)**
 - Road types for different flow
- **Law of Urban Development of Baja California Sur (LDUBCS)**
- **Law of Public Transportation of Baja California Sur**

DEVELOPMENT FRAMEWORK

- Designs at all scales for the project shall provide extensive **pedestrian** networks to promote walking as a priority for transportation.
- All walkways, paths, and roads shall be designed to minimize **impact** to the natural environment, and shall follow existing contours while avoiding sensitive slopes, habitats and scenic vistas.
- Proposed **wildlife** migration corridors shall be included in all plans to maintain pre-development wildlife connectivity and movement.
- Designs shall promote easy access within and between neighborhoods to provide **connectivity** and to enhance the overall community experience.
- All residential and commercial designs shall provide safe bicycle and pedestrian **access** to any existing or planned regional network of walking trails and bicycle lanes.
- Benches or other **seating** shall be placed on either side of the street at a minimum of every 200 meters on secondary streets and every 100 meters on tertiary or local streets.
- Roads, bike paths, and walkways shall use **aggregate** material found locally or comprised of recycled construction/demolition waste.

EXAMPLES OF PRACTICE

- Of the project land devoted to residential and/or commercial uses, no more than 20% may be used for surface parking facilities. On-street parallel parking spaces are exempt from this calculation.
- All streets within the project, whether new or existing, shall be designed and constructed to allow a maximum speed of 30 km/h for primarily residential streets, or 40 km/h for primarily commercial streets.
- All public transportation design must demonstrate that 80% of employees and 60% of residents and guests are served by adequate public transportation that is available within 400 meters of the project's dwelling units and business entrances, providing a minimum of 10 rides per day.
- See SCDS for additional specific guidelines (refer to pages 22 to 23)



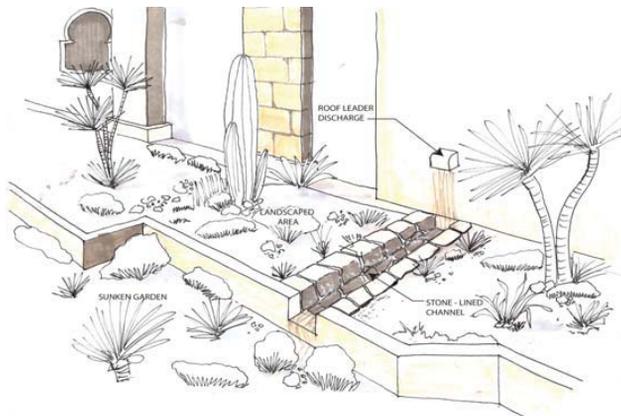
6 LANDSCAPE, IRRIGATION, AND NON-BUILDING STRUCTURES

BASIC PRINCIPLES

When designing non-building structures (walls, fences, lighting utility structures, etc.), landscape and irrigation systems, the impact to the local environmental and regional resources must be considered. Non-building structures must be designed to minimize energy use and visual impact on the surrounding environment. It is vitally important that landscaping be integrated into the natural surroundings and can share the resource demands of the surrounding ecosystem.



Native Plant Nursery



Stormwater Management in a Dry Garden

APPLICABLE LAWS

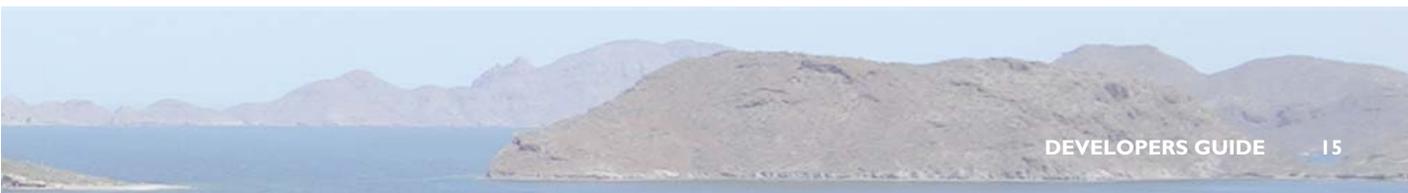
- **Law of Water of Baja California Sur (LABCS) Article 104**
 - Irrigation practices
- **LCBCS Article 139**
 - Required lighting levels
- **LCBCS Articles 42 and 43**
 - Mitigation requirements for the disturbance of conservation areas

DEVELOPMENT FRAMEWORK

- Landscape designs must minimize ground **disturbance** and must utilize native plants.
- Landscape plans shall minimize the disturbance and maximize the **preservation** of existing natural landscapes and wildlife areas by providing a 100m buffer around all significant habitat areas.
- Landscape plans shall incorporate a minimum of 50% **native plants**.
- Irrigation of recreational fields and golf courses shall utilize less than 20% **potable water**.
- Non-building structures and landscape plantings shall be located so as to avoid disturbance of **wildlife** movement corridors and sensitive breeding grounds.
- Potable water use is prohibited for the irrigation of ornamental **lawns**. All other irrigation demands shall be minimized through drought tolerant plant selection and appropriately timed application schedules.

EXAMPLES OF PRACTICE

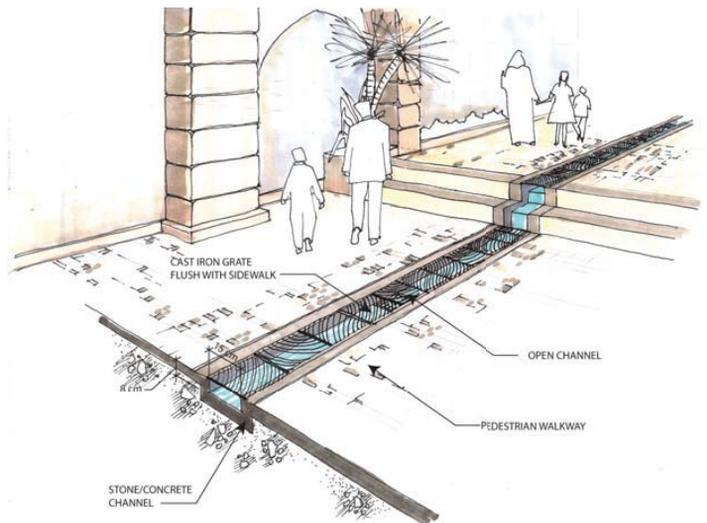
- Flood lighting of beaches shall be prohibited. Exterior lighting within the coastal Zona Federal or within 30 meters measured horizontally of recorded high tide level shall consist of pole-mounted lights no greater than 1.5 meters in height.
- Drip irrigation shall be used for all single-planted landscaping, with emitters rated for no more than 15 LPH (liters per hour).
- Microsprinklers rated for no more than 170 LPH may be used for large carpeted plantings.
- See SCDS for additional specific guidelines (refer to pages 24 to 25)



7 GRADING AND DRAINAGE

BASIC PRINCIPLES

New development and construction in support of new development shall preserve existing drainage patterns and significant topographical features, reduce runoff water quantity and quality impacts and shall prevent manmade erosion. Designs shall promote the use of natural drainage systems and detain drainage onsite to retain natural, predeveloped conditions.



Stormwater as an Aesthetic Feature in the Pedestrian Environment

APPLICABLE LAWS

- **Federal Zones, as described in Article 13 of LAN**
 - Jurisdiction areas of the federal government
- **General Law of National Property (LGBN)**
 - Regulations of waterways
 - Purchase of lands draining to federal water bodies
- **National Commission of Natural Protected Areas (CONANP)**
 - Formulation and execution of conservation and restoration projects
 - Interface with community groups and local government

DEVELOPMENT FRAMEWORK

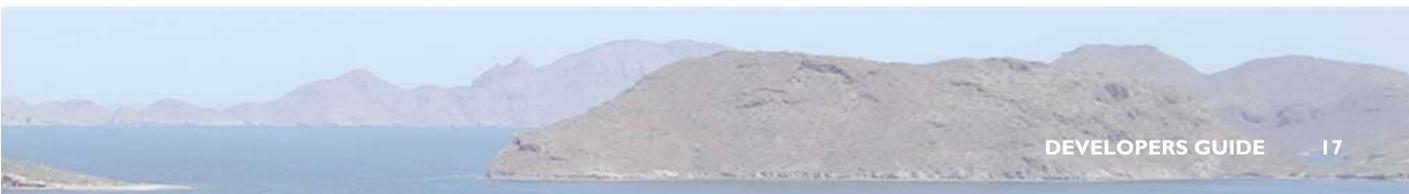
- Drainage systems shall be designed to diffuse energy, reduce scour, and replicate **natural runoff** patterns.
- Natural systems and plants shall be used in drainage designs to enhance infiltration where appropriate, increase green space, and **decrease runoff** rates to promote groundwater recharge and reduce erosion.
- Stormwater runoff from impervious surfaces shall be considered a resource, **captured** and stored on-site.
- **Impervious surfaces** shall be limited to less than 35% of developed land, unless rainwater capture devices can account for additional runoff produced under a 25-year storm event.
- Cut and fill quantities shall be **balanced** on-site unless special permission is granted from the Dirección de Planeación Urbana y Ecología to import or remove material from a site.



Raingarden Strategy using Native Species to Manage Stormwater

EXAMPLES OF PRACTICE

- Retaining walls shall be a maximum of 1.5 meters in height and shall utilize local materials such as indigenous, dry stacked stone. Engineered cut and fill slopes between lots shall not exceed 3:1.
- No road or building development shall be allowed on slopes steeper than 15%. No infrastructure (utilities, pipelines, utility structures, etc.) shall be allowed on slopes steeper than 25%.
- Naturalized detention and infiltration basins shall be designed with side slopes no greater than 4:1.
- A minimum 20 cm layer of amended topsoil composed of nearly 20% clay, 10% organic material and 60% sand shall be used to maximize infiltration capacity and protect groundwater quality.
- See SCDS for additional specific guidelines (refer to pages 27 to 28).



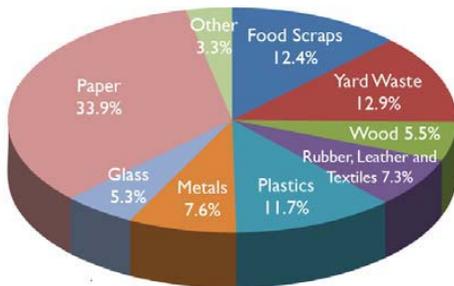
8 SOLID WASTE MANAGEMENT

BASIC PRINCIPLES

Solid waste generation shall be managed by conformance with the following practices:

- 1st : Reduce material consumption,
- 2nd : Reuse and recycle materials (on-site whenever possible),
- 3rd : Compost bio-degradable materials, and
- 4th : Transport excess solid waste to processing facilities.

Understanding the waste stream source, separation potential, and final destination is essential in developing a sustainable integrated solid waste solution. Landfills are often the centerpiece of solid waste management and can have significant adverse impacts to the environment.



General Waste Composition



Compost Waste Composition

APPLICABLE LAWS

- **General Law of Ecological Equilibrium and Environmental Protection, Article 28**
 - Generation of waste for planning purposes
 - Industrial waste facility
- **Article 26 of the Cleaning Regulation**
 - Municipal and private responsibility
- **Mexican Official Standard NOM-002-SCT2**
 - Hazardous waste
- **Reference municipal laws of La Paz for framework**

DEVELOPMENT FRAMEWORK

- Developers are required to estimate volumes of **waste generation** for the proposed development, including estimates of anticipated seasonal fluxes, based on known quantities or comparable developments in the area.
- The estimate provided shall be used as a baseline for anticipating solid waste generation and to develop an overall **reduction goal** over the course of first 10 years of operation.
- **Demolition** of existing site structures or features shall be quantified and a percentage of materials shall be recycled according to the “Construction Procedures” section of the SCDS.
- The development of a landfill or composting facility onsite must include a feasibility study demonstrating the viability of producing **energy** resources from such activities.
- Individual and multi-family housing facilities must be designed to ensure on-going **recycling and separation** of cardboard, glass, aluminum, plastics, and other household waste, as appropriate.
- The resulting waste stream from landscape and planting must be source separated and **composted**, and may not enter the general solid waste stream.
- Provide an easily accessible area that serves the entire building and is dedicated to the **collection, separation and storage** of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics and metals.

EXAMPLES OF PRACTICE

- All biodegradable waste shall be source separated, and adequate storage shall be provided for biodegradable waste from all dining facilities and landscape maintenance facilities.
- Drainage around the landfill shall be provided by ditches designed to divert surface runoff, as well as to provide a cover grading of 3-6% to reduce ponding.
- See SCDS for additional specific guidelines (refer to pages 31 to 34).



Traditional Landfill

9 CONSTRUCTION PROCEDURES

BASIC PRINCIPLES

All construction shall be completed without:

1. Damaging the subsoils or natural landscape of the region
2. Disrupting residents, or
3. Disrupting sensitive habitats.

Construction techniques and practices shall minimize the use of energy, water and material resources. Construction sponsors shall provide for the health, safety of all workers, and amenities for all laborers imported for construction, including provision of transportation, food and living facilities.



Protection of Natural Landscape and Native Species



Innovative Building Practices

APPLICABLE LAWS

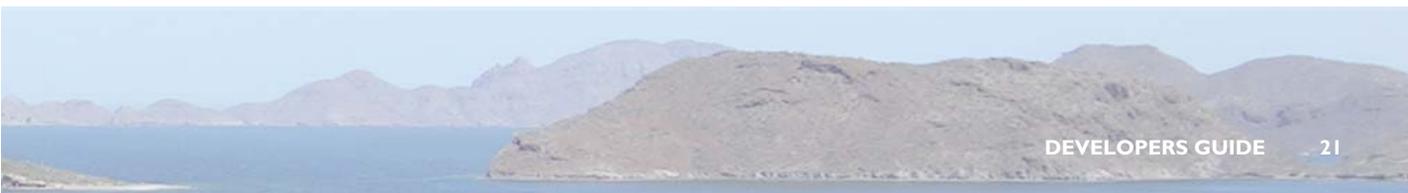
- **Protected areas for construction are denoted by:**
 - Ecologic Regulation Plan (POET)
 - Urban Development Plan (PDU)
 - National Commission for the Knowledge and Use of Biodiversity (CONABIO)
 - National Commission of Natural Protected Areas (CONANP)

DEVELOPMENT FRAMEWORK

- Contractors must submit a detailed **Construction Area Plan**, showing the area in which all construction activities will be confined, and how the remaining portions of the property will be protected and remain undisturbed.
- Materials directed to **landfill** disposal may not exceed 50% of total generated waste materials.
- The developer must specifically provide estimates of the number of all necessary short-term (laborers remaining two years or less) and long-term (laborers remaining until full build-out is completed) **labor populations** required to complete construction of the development.
- Throughout all construction, **erosion** must be minimized on exposed cut and/or fill slopes through proper soil stabilization, water control and revegetation.
- All **worker housing** must be located no further than 15 km from the project site. Alternatively, the developer must provide access to free, efficient transportation that can easily accommodate delivery of all workers to the work site.
- All construction must finish without **subsoil damage**. Furthermore, if archeological sites, water wells, mangroves or dunes are encountered during the construction process, construction should stop and the Dirección de Planificación Urbana y Ecología BCS should be contacted immediately.

EXAMPLES OF PRACTICE

- A shovel and fire extinguisher must be mounted in plain view within any facility housing more than 25 liters of flammable liquid.
- Silt fencing must be placed around the down-slope perimeter of any areas that will be graded, including adequate space for performance of all construction activities. Soil may not be placed against the fence. Silt must be cleared out after every rain event.
- Disturbed areas must be watered, using non-potable water sources such as seawater or brackish water, as appropriate to prevent dirt or dust from leaving the construction area.
- Sleeping density must be less than 4 bed spaces per 20 square meters of housing.
- See SCDS for additional specific guidelines (refer to pages 35 to 39).



10 WATERSHED RESTORATION

BASIC PRINCIPLES

The related watershed for the proposed development shall be maintained, enhanced, and restored to protect, preserve and ensure the water quality downstream. Restoration and maintenance work on the watershed shall serve to reestablish or improve natural, pre-development hydrologic conditions. Watershed restoration should be sensitive not only to the local hydrologic conditions, but also to the habitat and ecological considerations of flora and fauna.



Natural Arroyo outside of Loreto



Newly Restored and Naturalized Stream Bed

APPLICABLE LAWS

- **General Law of National Property (LGBN)**
 - Regulations of waterways
 - Purchase of lands draining to federal water bodies
- **Federal Zones, as described in Article 13 of LAN**
 - Jurisdiction areas of the federal government

DEVELOPMENT FRAMEWORK

- Pre-existing, existing and anticipated post development conditions need to be documented prior to construction to identify **restoration** goals for the watershed.
- Protection **buffers** for arroyos shall be at least 25% the width of the arroyo, offset from the top of bank on either side. A maximum buffer width of 10m may be used.
- Riparian buffers shall be vegetated with **native** plants found in the pre-development condition, in areas including:
 - The full extent of the 100 year floodplain,
 - All steep slopes (greater than 25%), and
 - Any adjacent delineated wetland or critical habitat
- Replace **invasive** species with natural flora and fauna.
- Develop a long-term (10-year) operation and **maintenance plan** for the watershed.
- Riparian buffers shall be used to provide **water quality** treatment for no more than 10% of stormwater generated within a watershed
- Any modification of the arroyo or disposal of waste that **alters the watershed** should be avoided.

EXAMPLES OF PRACTICE

- The physical aspects of the watershed shall be detailed and the hydrologic response shall be characterized for 2-year, 50-year, and 100-year events.
- Stream banks should be constructed using the following criteria:
 - Constructed at a 1H to 1V (Horizontal to Vertical) slope or flatter or shall be stepped or benched with vegetated berm at the bottom of slope.
 - Covered in geotextile material and secured until vegetation growth occurs.



Disturbed Drainage Culvert outside of Loreto

- Planted with a variety of vegetation or trees on the bank, in the bed or on the bottom.
- See SCDS for additional specific guidelines (refer to page 50).

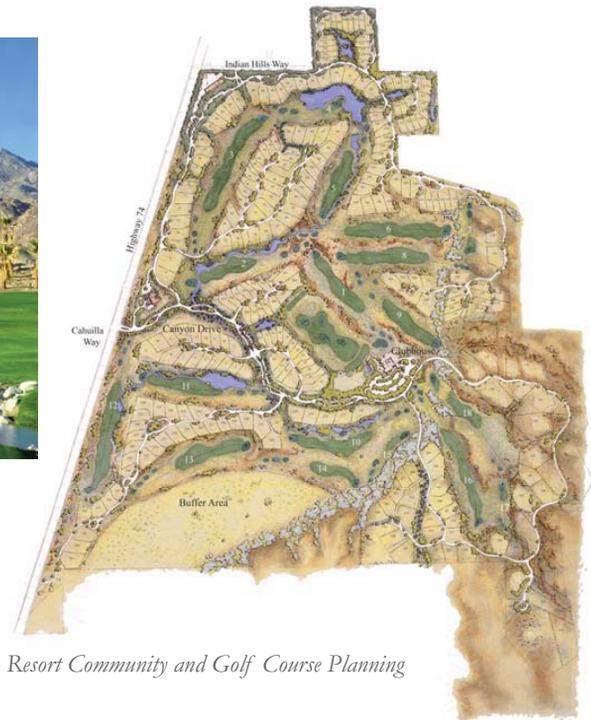
11 GOLF COURSE DESIGN

BASIC PRINCIPLES

To maintain a healthy balance between recreational uses and the area's natural environment, golf courses shall be designed in harmony with the existing coastal ecosystem. To the greatest extent possible, they shall be designed to avoid disruption of existing wildlife corridors and to minimize the potentially damaging pollution caused by irrigation systems, stormwater runoff, and normal maintenance operations. In addition, golf courses must limit their use of potable water, toxic chemicals and pesticides, fertilizers, and invasive plant species.



Golf in a Rural Desert Landscape



Resort Community and Golf Course Planning

APPLICABLE LAWS

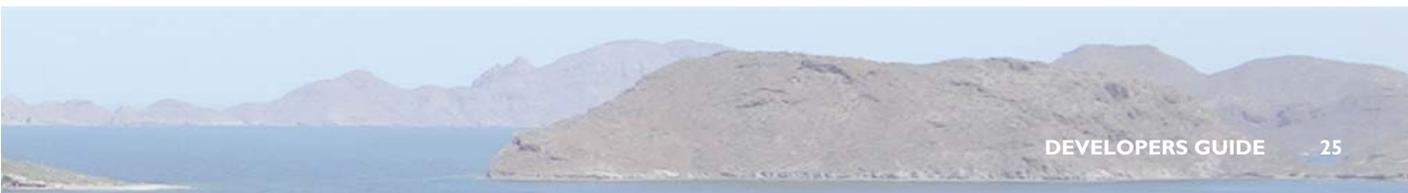
- **Environmental Protection Law (LGEEPA)**
 - Environmental Impact Assessment
- **NOM-022-SEMARNAT-2003**
 - Protection of mangrove areas
- **Article 63 of the General Wildlife Law**
 - Protection of mangrove areas

DEVELOPMENT FRAMEWORK

- Golf courses shall not exceed a maximum use of 20% **potable water** to meet all irrigation demands. Eighty percent or more should therefore be greywater, sewer water or saltwater.
- **Irrigation** on all unused or minimally used portions of the property shall be eliminated.
- Natural wildlife **habitat** must be maintained on at least 75% of all out of bounds portions of the property.
- Trees, shrubs and flowers (excluding turf grass) **native** to the local ecological region shall be utilized, at minimum, for 80% of plantings within all landscaped areas.
- Golf courses shall be designed to minimize to the greatest extent possible their **impact** on existing cultural resources, wildlife habitats and the natural environment.

EXAMPLES OF PRACTICE

- Because wildlife is most abundant when shallow water includes emergent aquatic vegetation, emergent aquatic and shoreline plants shall be maintained along at least 50% of all out-of-play shorelines, and particularly along shallow water areas that are less than 2 ft deep.
- Baseline studies and monitoring efforts shall include, at minimum:
 - Creeks, streams and rivers shall be sampled where they enter and leave the golf course property.
 - Testing shall include the measurement or assessment of:
 - Physical characteristics, such as dissolved oxygen, pH, temperature, and specific conductivity;
 - Nutrient concentrations, including nitrogen (both nitrate and ammonia) and total phosphorous; and
 - The presence of aquatic organisms (macro-invertebrates).
- See SCDS for additional specific guidelines (refer to pages 53 to 55).



12 MARINA CONSTRUCTION AND DESIGN

BASIC PRINCIPLES

The marina shall be designed in an environmentally responsible manner, incorporating elements that merge with the natural environment to minimize impacts associated with development. The marina shall be constructed so as to minimize impacts to habitat and water quality both in freshwater and oceanic water bodies. All users, employees and management shall be educated on the daily operation and maintenance of the marina.



Resort with Marina in Baja California Sur

APPLICABLE LAWS

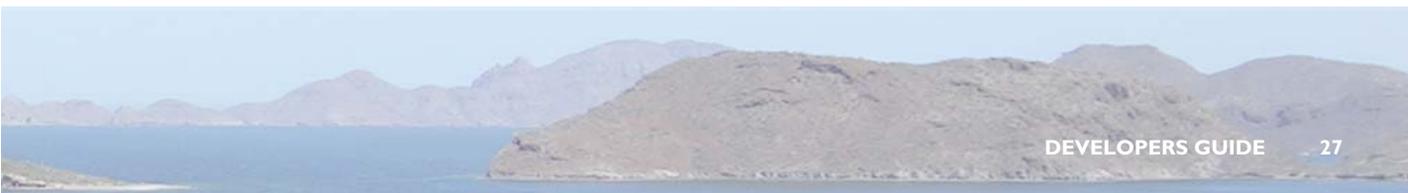
- **Environmental Protection Law (LGEEPA)**
 - Environmental Impact Assessment
- **NOM-022-SEMARNAT-2003**
 - Protection of mangrove areas
- **Article 60 of the General Wildlife Law**
 - Protection of mangrove area in the development of Marinas

DEVELOPMENT FRAMEWORK

- Marina **outlets** shall not be placed within 2000 meters of coral structures, 1000 meters of mangroves, or 500 meters existing non-mangrove estuaries. If a coral structure or mangrove is encountered during construction, immediately contact the Direccion de Planeacion Urbana y Ecologia BCS.
- Prior to development on the marina site a geotechnical engineer contracted by the developer shall make an assessment of existing **geologic conditions** and prepare a detailed report documenting these conditions.
- All **boat launching** facilities shall be located in areas away from sensitive benthic habitat with a minimum 20 m buffer.
- Marina structures shall be sited such that natural **water exchange** is not impeded.
- Wherever feasible, new marinas and their associated development shall be located in areas of existing marina uses, to **avoid disturbance** of pristine habitats.
- **Dredging** activities shall be prohibited during breeding periods for sensitive or protected wildlife, which will be determined by the required Environmental Impact Assessment (EIA).
- There shall be no direct discharge from live-aboards or emptying of onboard waste storage tanks in the marina vicinity or open water. **Pump-out facilities** shall be provided at all fuel docks, with proper maintenance and disposal under the responsibility of the marina operator.

EXAMPLES OF PRACTICE

- Design of the marina and facilities must consider use of the most recent accepted data to predict future water level elevation increases associated with climate change.
- The marina shall have two openings positioned on opposite ends of the proposed development to establish flow-through currents.
- Only “grade I” creosote or better will be permitted for use on piers and pilings.
- Place all septic systems, if applicable, a minimum of 35 meters from surface water.
- See SCDS for additional specific guidelines (refer to pages 56 to 63).



GLOSSARY

- Biological Survey:** consists of collecting, processing, and analyzing representative portions of a resident organic community to determine the community structure and makeup.
- Blackwater:** wastewater from toilets, kitchen sinks, or dishwashers.
- Buildable Area:** Portion of project site that is ideal for construction because it does not contain steep slopes, critical habitat, wetlands, mangroves, or other constraints.
- Carbon Budget:** Sum of exchanges (inflows and outflows) of carbon compounds
- Conservation Easement:** A legal agreement between a landowner and a conservation organization or government agency that permanently limits a property's uses in order to protect the property's pre-existing natural value.
- Graywater:** untreated household wastewater which has not come in contact with toilet waste, including water from bathtubs, showers, and laundry. It does not include water from toilets, kitchen sinks, or dishwashers.
- Impervious Surfaces:** Surfaces and materials that promote runoff of precipitation, instead of infiltration into the subsurface.
- Invasive Species:** Species of plants that are characteristically adaptable, aggressive, highly reproductive, and tend to overrun the ecosystems in which they inhabit. Collectively they are a threat to biodiversity and ecosystem stability.
- Native Plants:** Plants that are adapted to a given area and are not invasive. In Mexico, these plants should have been naturally occurring before settlement of people of Spanish descent.
- Potable Water:** Water suitable for drinking supplied by municipal water systems.
- Renewable Energy:** Energy derived from sources that are naturally replenished; such as wind, solar, tidal and biomass.
- Riparian Buffer:** Land next to a stream or river that is vegetated, usually with trees and shrubs, that serves as a protective filter for streams.
- Secondary/Tertiary Streets:** Smaller streets which are descended from a major street or thoroughfare.
- Sensitive Habitat:** Land that is inhabited by species that generally respond poorly to development and ecosystem disturbance.
- Solid Waste:** Non-liquid, non-soluble materials ranging from municipal garbage to excess construction material to industrial wastes that contain complex and sometimes hazardous substances.
- Wastewater:** The spent or used water from a home, community, farm, or industry that contains dissolved or suspended matter.
- Water Balance:** The accounting of water input and output and change in storage of the various components of the hydrologic cycle.
- Wildlife Migration Corridor:** a length of preserved natural land that allows migrating wildlife to maintain their pre-development geographical movements, especially between larger sensitive areas.

CONTACT LIST

GOVERNANCE AND LAW

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PARTNERSHIP

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oceanfdn.org

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sherwoodengineers.com

LEGAL REFERENCING

CEMDA

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DIRECCIÓN DE PLANEACIÓN URBANA
Y ECOLOGÍA