
Chapter 5: Identifying and Evaluating Site Alternatives

Table of Contents

	Page
5.1 Introduction	5-1
5.2 Identifying Suitable Property for Coastal Residential Structures	5-4
5.3 Compiling Information on Coastal Property	5-6
5.3.1 Sources of Information	5-10
5.3.2 Property Disclosure Requirements	5-12
5.4 Evaluating Hazards and Potential Vulnerability	5-15
5.4.1 Define Coastal Hazards Affecting the Property	5-15
5.4.2 Evaluate Hazard Effects on the Property	5-16
5.5 Decision Time	5-17
5.6 References	5-18

Figures

Figure 5-1	Evaluation of coastal property.	5-2
Figure 5-2	Coastal development sometimes involves development of subdivisions or large residential projects from raw land.	5-3
Figure 5-3	Narrowing the search for coastal property suitable for development or redevelopment requires careful consideration of a variety of property and area characteristics, including the nature and success of previous erosion control efforts (e.g., groins and revetments at this Massachusetts community).	5-5
Figure 5-4	Development near tidal inlets requires special attention, as evidenced by earlier shorelines superimposed on this 1974 photograph.	5-9

Figure 5-5 Siting and design should include consideration
of multiple storms or hazards within a short period,
whose cumulative effects can exceed those of a
design-level event. 5-17

Tables

Table 5.1 General Information Checklist 5-7

Table 5.2 Potential Sources of Supporting Information
for Evaluating Coastal Property 5-10

Table 5.3 Selected State Disclosure Requirements and
Ongoing Efforts to Require Hazard Disclosure 5-12

Identifying and Evaluating Site Alternatives

5.1 Introduction

Informed decisions regarding siting, design, and construction begin with a complete and detailed understanding of the advantages and disadvantages of potential sites for coastal residential construction. It is hoped that this knowledge will be gained *prior* to the purchase of coastal property and the initiation of development.

Experience has shown that not all coastal lands are suitable for development, or at least not the type and intensity of development that has occurred on coastal lands in the past. Figures 4-1, 4-2, and 4-3 in the preceding chapter show some of the results of inappropriate site selection and development. Unfortunately, many similar siting and development decisions are made every day based on site conditions at the time of purchase or on an incomplete or inaccurate assessment of future conditions. Too often these decisions leave property owners and local governments struggling in the future with a number of *avoidable* problems:

- damage to or loss of buildings
- damage to attendant infrastructure
- encroachment of buildings onto public beaches
- the need to provide emergency or permanent measures to protect vulnerable buildings and infrastructure
- the need to relocate buildings
- emergency evacuation
- injuries and loss of life

A thorough evaluation of coastal property for development purposes involves four steps (see Figure 5-1):

1. Compile lot/parcel information for one or more candidate properties, and, for each property follow steps 2 through 4:
2. Conduct a hazards analysis and risk assessment.
3. Determine whether the hazards can be mitigated through siting, design, or construction and whether the residual risks to the site and the building are acceptable.
4. Either proceed with the purchase or development of a property, or reject the candidate properties, and find and evaluate other properties.



NOTE

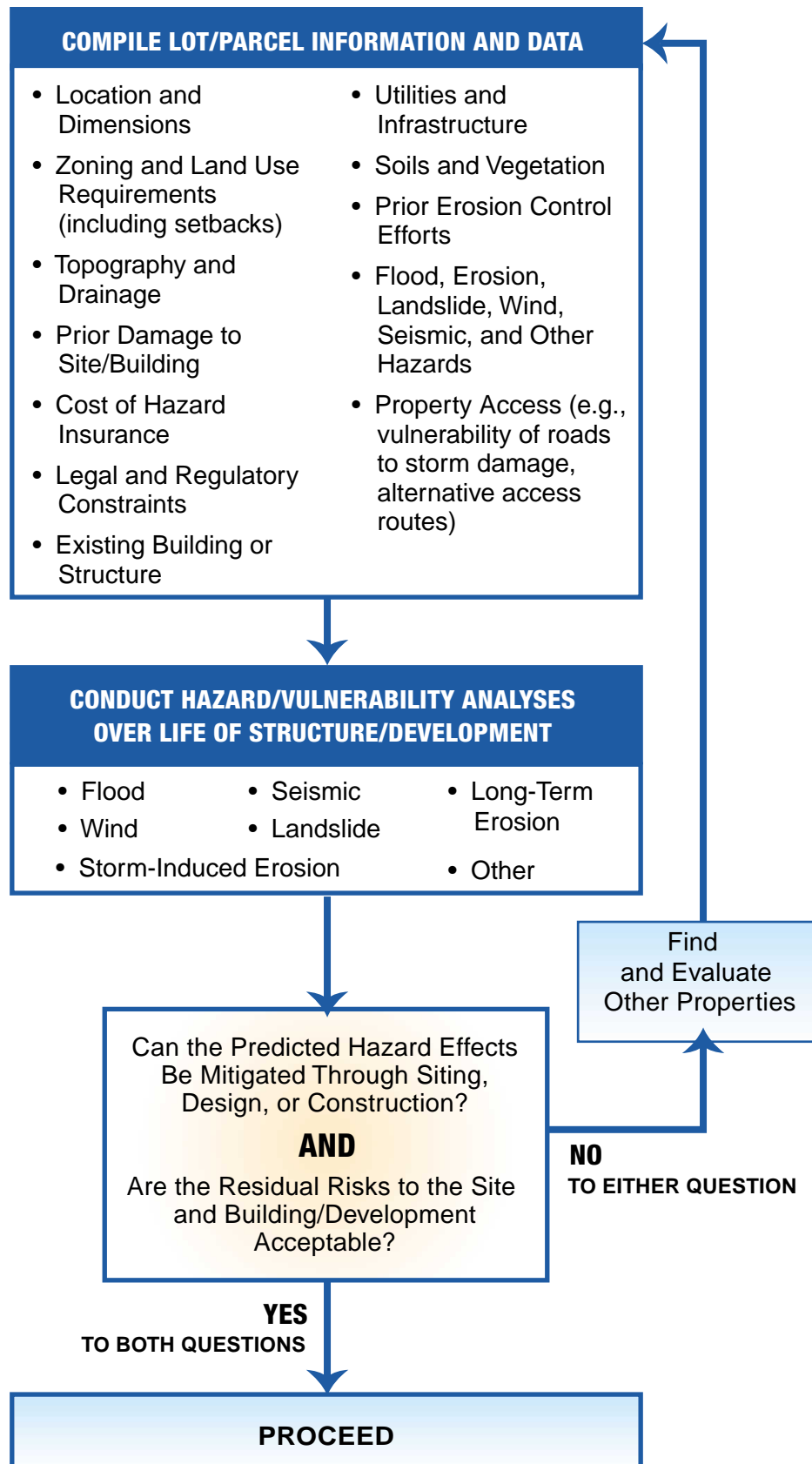
One of the principal objectives of this manual is to improve site selection for coastal residential buildings.



WARNING

Many coastal property buyers fail to investigate potential hazards to their land and buildings. Designers should work with owners to identify and mitigate those hazards.

Figure 5-1
Evaluation of coastal
property.



A building or development site need not be vacant or undeveloped land; indeed, much of the coastal construction occurring today involves redevelopment or replacement of existing buildings. Therefore, this chapter will discuss property evaluation broadly and will apply to the following:

- *Infill development* – development on previously subdivided or platted vacant lots or small parcels, with roads and utilities in place, surrounded by or adjacent to residential structures
- *Redevelopment* – development on previously developed lots or small parcels on which a building currently exists (see Figure 5-2)
- *Development of raw land* – development on large, vacant parcels, usually without on-site access roads and utilities



Figure 5-2

Coastal development sometimes involves development of subdivisions or large residential projects from raw land. However, coastal development increasingly involves infill development between adjacent buildings or redevelopment of previously developed property, such as this post-Hurricane Fran elevation and reconstruction project on Figure Eight Island, North Carolina.

5.2 Identifying Suitable Property for Coastal Residential Structures

The first step in the coastal development or construction process involves the purchase of a vacant or previously developed lot or parcel. It is this step that, in many ways, constrains subsequent siting, design, and construction decisions and determines the long-term vulnerability of coastal residential buildings.

Prospective property buyers who fail to fully investigate properties before acquiring them may subsequently be faced with a variety of problems that are difficult, costly, or essentially impossible to solve.

Although this manual will not address the initial identification of candidate properties in detail, property buyers and design professionals who are assisting them in property evaluations should keep the following in mind as they narrow their search for a building/development site:

- Before any purchase, each property buyer should, **in consultation with experts**, determine the acceptable level of residual risk and decide how to manage the actual risks expected over the life of the building or development. Note that risk assessment, risk tolerance, and risk management issues are not simple — **property acquisition and development decisions must often be made with inadequate or imprecise information.**
- The geographic region or area a purchaser is interested in will determine the **types of hazards** to which the property will be exposed.
- In the absence of better information, **historical records** can be used to predict future hazard conditions, impacts, and frequencies. However, natural and manmade changes at a site may render simple extrapolation of historical patterns inaccurate.
- Any given lot or parcel may or may not be suitable for the purchaser's **intended use** of the property.
- Land use, zoning, setbacks, health, floodplain management, building code, and related requirements will, in large part, determine development densities, building size and location limitations, minimum design and construction practices, and allowable responses to erosion hazards; however, **compliance with these requirements does not ensure the future safety of the building or development.**
- Likewise, development **practices that perpetuate or duplicate historical siting, design, or construction practices will not ensure the future safety** of a new building or development. Many historical practices are inadequate by today's standards; further, **changing shoreline conditions** may render inadequate historical practices that were at one time adequate.

- An **existing erosion control structure** on a lot or parcel is an indication of prior erosion, but the structure **may or may not be adequate to protect** a building or development in the future; moreover, many states and communities limit or prohibit construction or reconstruction of erosion control devices (see Figure 5-3).
- The **vulnerability of a coastal building will probably increase with time**, as a result of one or more of the following: a gradual weakening or deterioration of the building itself, sea-level or lake-level rise, or erosion-induced shoreline recession, which affects the majority of coastal areas.
- **Future development activities** and patterns on adjacent and nearby properties may affect the vulnerability of buildings or development on any given property.
- **Property selection, along with subsequent siting, design, construction, and maintenance decisions**, will determine the actual vulnerability of and risk to any building or improvements.

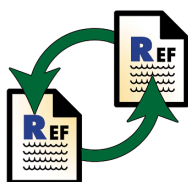


Figure 5-3

Narrowing the search for coastal property suitable for development or redevelopment requires careful consideration of a variety of property and area characteristics, including the nature and success of previous erosion control efforts (e.g., groins and revetments at this Massachusetts community). Note that some communities and states restrict or prohibit the construction or reconstruction of revetment, seawall, and groin structures such as those shown in the photograph.

**NOTE**

Owners or prospective buyers of coastal property should contact their community or state officials for publications that will help them evaluate the property.

**CROSS-REFERENCE**

Chapter 6 of this manual provides more information about regulatory requirements that should be considered in the evaluation of potential building or development sites.

5.3 Compiling Information on Coastal Property

After candidate properties are identified, the next step is to compile a wide range of information for each property. This is no trivial matter; completing this step may require considerable time and effort. The box at the top of Figure 5-1 lists the types of information that should be compiled. Table 5.1 is a checklist of general information that should be compiled. More detail is provided in Chapter 7 in the form of checklists for hazard and vulnerability evaluations.

Many states and communities have produced brochures or publications that will help property owners and prospective buyers evaluate coastal property. The publications listed below are offered as examples of the types of information available.

Purchasing Paradise: Things to know and questions to ask when buying coastal property in Florida (Florida Coastal Management Program 1997). This brochure briefly summarizes coastal ecosystems, coastal processes, the impacts humans have on coastal environments, and important considerations regarding the purchase of coastal property.

Coastal Processes Manual: How to Estimate the Conditions of Risk to Coastal Property from Extreme Lake Levels, Storms, and Erosion in the Great Lakes Basin, 2nd edition (Keillor 1998). Although this manual contains information specific to the Great Lakes shorelines of Wisconsin, it also provides a technical framework for evaluating coastal processes and erosion control measures in other areas. A videotape was produced in conjunction with the first edition (1987) of the manual. The following web site complements, supplements, and updates the current manual: http://www.seagrant.wisc.edu/advisory/coastal_engr/index.html (see Appendix F).

A Manual for Researching Historical Coastal Erosion (Fulton 1981). This manual describes in detail how one might use historical weather data, local government records, and historical maps and photos to understand and quantify shoreline, sea bluff, and cliff retreat. Two communities in San Diego County, California, are used as case studies to illustrate the research methods presented.

Questions and Answers on Purchasing Coastal Real Estate in North Carolina (North Carolina Real Estate Commission 1996). This brochure provides prospective property owners with basic information on a variety of topics: shoreline erosion, erosion control, siting, storm-resistant construction techniques, flood and wind insurance, and building repair regulations.

Table 5.1 General Information Checklist*

PROPERTY LOCATION	
<ul style="list-style-type: none"> • Municipal, township, county, or other local jurisdiction • Street address • Parcel designation (e.g., tax map ID) • Subdivision information 	<ul style="list-style-type: none"> • Special zoning or land use districts • Other hazard area designation • Natural resource protection area designation
PROPERTY DIMENSIONS	
<ul style="list-style-type: none"> • Total acreage • Seaward or waterward property boundary (platted or fixed line; moving line [e.g., Mean High Water line, Mean Low Water line, or other datum, elevation, feature]) • Property shape • Property elevations and topography • Location relative to adjacent properties; configuration of adjacent properties 	<ul style="list-style-type: none"> • Shoreline frontage (i.e., dimension parallel to shoreline) • Property depth (i.e., dimension perpendicular to shoreline) • Acreage landward/outside of natural, physical, or regulatory construction or development limits (i.e., usable acreage)
LEGAL AND REGULATORY INFORMATION	
<ul style="list-style-type: none"> • Land use designation at property and adjacent properties • Zoning classification and resulting restrictions on use • Building code and local amendments • Flood hazard area: elevation and construction requirements • Erosion hazard area: construction setbacks and regulations • Natural resource protection area: siting, construction, or use restrictions • Easements and rights-of-way on property (including beach access locations for nearby properties or the general public) • Local/state siting and construction regulations 	<ul style="list-style-type: none"> • Regulatory front, back, and side setbacks • Local/state permitting procedures and requirements • Local/state regulations regarding use, construction, and repair of erosion control measures • Riparian rights • Local/state restrictions on cumulative repairs or improvements • Conditions or other requirements attached to building or zoning permits • Subdivision plat covenants and other restrictions imposed by developers and homeowner's associations • Hazard disclosure requirements for property transfer, including geologic hazard reports

* This checklist outlines the types of information that should be obtained in order to evaluate coastal property. Information listed in this table is usually available from local, regional, state, or Federal governments, from universities, or from knowledgeable professionals. However, the availability and quality of the information will vary by state and community.

Table 5.1 General Information Checklist (continued)*

PHYSICAL AND NATURAL CHARACTERISTICS	
<ul style="list-style-type: none"> • Soils, geology, and vegetation – site and region • Topography of nearshore (including nearshore slope), beach, dune, bluff, uplands • Site drainage – surface water and groundwater • Littoral sediment supply and sediment budget • Storm, erosion, and hazard history of property 	<ul style="list-style-type: none"> • Erodibility of the nearshore bottom • Erosion control structure on site: type, age, condition, and history • Proximity to inlets and navigation structures • Previous or planned community/regional beach/dune restoration projects • Relative sea-level/water-level changes – land subsidence or uplift
INFRASTRUCTURE AND SUPPORTING DEVELOPMENT	
<ul style="list-style-type: none"> • Access road(s) • Emergency evacuation route(s) • Electric, gas, water, telephone, and other utilities – onsite or offsite lines and hookups 	<ul style="list-style-type: none"> • Sewer or septic • Limitations imposed by utility/infrastructure locations on property use
FINANCIAL CONSIDERATIONS	
<ul style="list-style-type: none"> • Intended use: owner-occupied or rental property • Real estate taxes • Development impact fees • Permit fees • Hazard insurance: availability, premiums, deductibles, and exclusions • Property management fees 	<ul style="list-style-type: none"> • Special assessments for community/association projects (e.g., private roads and facilities, dune preservation) • Maintenance and repair of private erosion control structures • Increased building maintenance and repairs in areas subject to high winds, wind-driven rain, and/or salt spray • Building damage costs (insured and uninsured) from previous storms

* This checklist outlines the types of information that should be obtained in order to evaluate coastal property. Information listed in this table is usually available from local, regional, state, or Federal governments, from universities, or from knowledgeable professionals. However, the availability and quality of the information will vary by state and community.

The Citizen's Guide to North Carolina's Shifting Inlets (Baker 1977). This publication illustrates the dynamic nature of tidal inlets by superimposing historical shorelines onto more recent aerial photographs (see Figure 5-4). This method of presentation is excellent and could serve as a model for other states to follow.

A Pictorial Atlas of North Carolina Inlets (Cleary and Marden 1999). This is North Carolina Sea Grant's replacement for *The Citizen's Guide to North Carolina's Shifting Inlets* (see above).

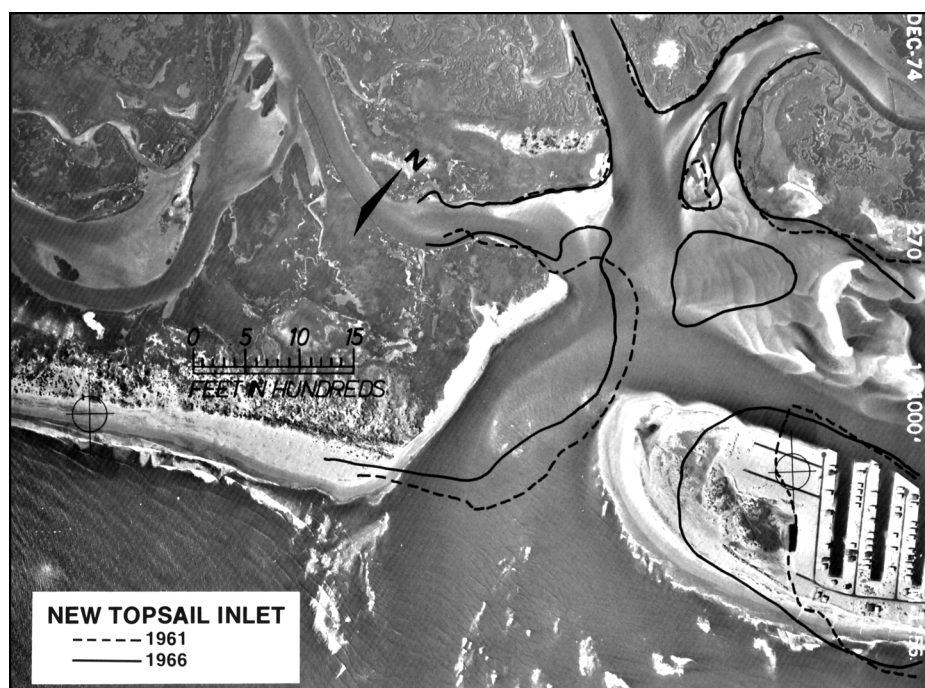
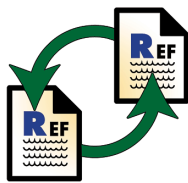


Figure 5-4
Development near tidal inlets requires special attention, as evidenced by earlier shorelines superimposed on this 1974 photograph (Baker 1977). Photograph courtesy of North Carolina Sea Grant.



CROSS-REFERENCE

Appendix F, in Volume III of this manual, lists additional sources of information.

5.3.1 Sources of Information

Prospective property buyers and designers can contact agencies and organizations listed in Table 5.2. These sources may be able to provide information that will support an evaluation of the suitability of coastal property for residential construction or development. (See Appendix F for other sources of information.)

Table 5.2 Potential Sources of Supporting Information for Evaluating Coastal Property

Local Regional, and State Agencies with the Following Responsibilities:		
LOCAL	<ul style="list-style-type: none"> • Environmental • Planning • Zoning • Floodplain Management • Land Use • Health • Building Permits 	<ul style="list-style-type: none"> • Soils and Geology • Municipal Engineering • Utilities • Deeds and Property Records • Assessments and Taxes • Emergency Management
REGIONAL	<ul style="list-style-type: none"> • Health • Planning • Utilities • Water/Waste Management • Soils and Geology • Beach or Shore Management/ Erosion Control 	<ul style="list-style-type: none"> • Navigation and Ports • Natural Resource Conservation and Management • Geographic Information Systems • Photogrammetry and Remote Sensing
STATE	<ul style="list-style-type: none"> • Coastal Zone Management • Planning • Building Codes and Standards • Soils and Geology • Floodplain Management • Natural Resource Management • Beach or Shore Management / Erosion Control 	<ul style="list-style-type: none"> • Department of Insurance • Navigation and Ports • Emergency Management • Transportation • Natural Resource Conservation and Management • Geographic Information Systems • Photogrammetry and Remote Sensing

Table 5.2 Potential Sources of Supporting Information for Evaluating Coastal Property (continued)**Federal Agencies, Including the Following:**

- Federal Emergency Management Agency (FEMA)
- U.S. Army Corps of Engineers (USACE)
- U.S. Geological Survey (USGS)
- National Ocean Service, Office of Ocean and Coastal Resource Management (OCRM)
- U.S. Natural Resources Conservation Service (NRCS)
- National Weather Service (NWS)
- International Joint Commission (Great Lakes)

University Departments, Including the Following:

- Coastal or Ocean Engineering
- Geology, Civil Engineering, or Soils
- Architecture and Building Construction
- Planning
- Atmospheric Sciences
- Botany, Biology, or Marine Biology
- Coastal or Ocean Law
- Sea Grant Programs (Research and Advisory Components)

Professional Organizations, Including the Following:

- American Society of Civil Engineers (ASCE)
- National Society of Professional Engineers (NSPE)
- American Institute of Architects (AIA)
- American Planning Association (APA)
- Model Building Code Organizations
 - Building Officials & Code Administrators International, Inc. (BOCA)
 - International Conference of Building Officials (ICBO)
 - Southern Building Code Congress International, Inc. (SBCCI)
- American Society of Landscape Architects (ASLA)
- Geological Society of America (GSA)
- Association of State Flood Plain Managers (ASFPM)
- National Association of Home Builders (NAHB)



WARNING

Even in states that require hazard disclosures in residential real estate transactions, property buyers should conduct their own investigations of prospective sites rather than rely solely on information provided by sellers and real estate agents.

5.3.2 Property Disclosure Requirements

A number of states require that residential real estate transactions be accompanied by a disclosure of information pertaining to flood hazards and/or other hazards (if the seller or agent knows of such hazards). However, the requirements concerning the form and timing of disclosures differ from state to state. Therefore, the type and amount of information that must be disclosed varies widely. Table 5.3 summarizes disclosure requirements for selected states. The list in Table 5.3 is based on information presented in *Coastal Hazard Mitigation 309 State Enhancement Grants, Assessment & Strategy Summary*, by the National Ocean Survey, Office of Ocean and Coastal Resource Management (OCRM 1998), and a review of selected state statutes and regulations. Taken collectively, the disclosure requirements (in force and as proposed) provide a good indication of the types of information that prospective property buyers and designers should seek, whether or not their state requires such a disclosure.

Table 5.3 Selected State Disclosure Requirements and Ongoing Efforts to Require Hazard Disclosure

STATE	COMMENTS
CALIFORNIA	Section 8589.3 of the California Codes requires disclosure if a property is within a Special Flood Hazard Area (A zone or V zone). Section 1102.6c of the California Codes requires sellers or agents to complete a Natural Hazard Disclosure Statement (disclosing whether property lies within any of the following: a Special Flood Hazard Area; an Area of Potential Flooding [in the event of dam failure]; a Very High Fire Hazard Severity Zone; a Wildland Area That May Contain Substantial Forest Fire Risks and Hazards; an Earthquake Fault Zone; a Seismic Hazard Zone).
FLORIDA	Chapter 161, "Beach and Shore Preservation," and Chapter 498, "Land Sales Practices," of the Florida Statute address property disclosure statements. Section 161.57, "Coastal properties disclosure statements," sets forth specific requirements. Section 498.037 requires that any public offering statement for subdivided lands disclose fully and accurately the physical characteristics of the lands and make known to prospective buyers all unusual and material circumstances of features that affect those lands.
HAWAII	Hawaii has adopted procedures, as part of its NFIP ordinances, requiring disclosure of flood zone information.
ILLINOIS	Illinois requires that sellers sign a form that states whether they know if the property has even been flooded.

Table 5.3 Selected State Disclosure Requirements and Ongoing Efforts to Require Hazard Disclosure (continued)

STATE	COMMENTS
MAINE	The Maine Coastal Management Program is working with real estate agents to develop a mechanism for disclosing the risks of coastal hazards.
MASSACHUSETTS	Massachusetts Coastal Zone Management has generated shoreline change maps depicting long-term average annual shoreline change rates at 50-meter intervals along the shore. A Coastal Hazards Notification bill (disclosing erosion rate and flood zone information) has been submitted to the legislature.
NEW JERSEY	Amendments to the Coastal Area Facility Review Act (CAFRA) include a provision that permits issued for properties in the coastal zone, and conditions that must be met to receive the permit, must be recorded with the deed to the property.
NEW YORK	A Coastal Erosion Task Force report recommended notification if a property lies within a designated State Coastal Erosion Hazard Area. Draft disclosure legislation was developed by the Department of State, but has not been enacted by the legislature.
NORTH CAROLINA	The Division of Coastal Management is working to develop disclosure mechanisms, in response to recommendations from the Governor's Task Force on Hurricane Mitigation.
OHIO	Section 1506.06(F) of the Ohio Administrative Code requires disclosure if a property is included in a Lake Erie Coastal Erosion Area. Section 5302.30(D) of the Ohio Revised Code requires completion of a disclosure form developed by the Director of Commerce.
OREGON	A Coastal Natural Hazards Policy working group (Oregon Sea Grant 1994) concluded that Oregon law requires only minimal disclosure of natural hazards information. The Working Group recommended creation of a new category of information (Geotechnical) to be included in the disclosure form required under Oregon Revised Statute 696. The legislature has not yet acted on the recommendation.

Table 5.3 Selected State Disclosure Requirements and Ongoing Efforts to Require Hazard Disclosure (continued)

STATE	COMMENTS
SOUTH CAROLINA	Section 48-39-330 of the Code of Laws of South Carolina requires a disclosure statement for the transfer of property extending seaward of the 40-year setback line. The statement must include language that states the property is or may be affected by setback requirements, must include the local erosion rate, and must include the state plane coordinates of the seaward corners of habitable structures.
TEXAS	Section 61.025 of the Texas Statutes, Natural Resources Code, requires disclosure of the following to purchasers of property in close proximity to Gulf of Mexico beaches: that the public has acquired a right of use or easement over the area seaward of the vegetation line; that state law prohibits any obstruction of, barrier to, restraint of, or interference with use of the public easement; and that structures erected seaward of the vegetation line, or that become seaward of the vegetation line as a result of natural processes, are subject to a lawsuit by the state seeking removal.
WASHINGTON	Section 64.06.020 of the Revised Code of Washington requires, among other things, that sellers complete a disclosure form that lists the following information (if known by the seller): if the property is in a designated floodplain; if the property or structure is damaged as a result of fire, wind, flood, beach movements, earthquake, expansive soils, or landslides; if rights-of-way, easements, and access limitations affect the property; or if settling, slippage, or sliding of the house or improvements has occurred.

5.4 Evaluating Hazards and Potential Vulnerability

This step is perhaps the most crucial in evaluating the suitability of coastal lands for development or redevelopment. Basing hazard and vulnerability analyses solely on building code requirements, the demarcation of hazard zones or construction setback lines, and the location and design of nearby buildings is clearly an inadequate approach. A recommended procedure is outlined below.

5.4.1 Define Coastal Hazards Affecting the Property

1. Use all available information to characterize the type, severity, and frequency of hazards (e.g., flood, storm-induced and long-term erosion, accretion or burial, wind, seismic, tsunami, landslide, wildfire, and other natural hazards) that have affected or could affect the property
2. Examine the record for long-term trends (> 50-100 years), short-term trends (< 10-20 years), and periodic or cyclic variations (both spatial and temporal) in hazard events. Determine whether particularly severe storms are included in the short-term or long-term records and what effects those storms had on the overall trends. If cyclic variations are observed, determine the periods and magnitudes of the variations.
3. Determine whether or not extrapolation of historical trends and hazard occurrences is reasonable. Examine the record for significant changes to the coastal system or upland areas that will reduce, intensify, or modify the type, severity, and frequency of hazard occurrence at the property.

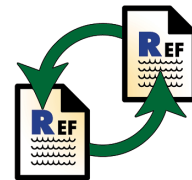
The following are examples of events or processes that will preclude simple extrapolation of historical trends:

- Loss of a historically present protective dune or bluff feature may lead to increased incidence and severity of flood or erosion damage.
- Significant increases in sea, bay, or lake levels will probably increase vulnerability to flooding and coastal storm events.
- Erosion or storms may create weak points along the shoreline that will be predisposed to future breaching, inlet formation, and accelerated erosion, or may expose geologic formations that are more resistant to future erosion.
- Recent or historical modifications to an inlet (e.g., construction or modification of jetties, creation or deepening of a dredged channel) may alter the supply of littoral sediments and modify historic shoreline change trends.
- Formation or closure of an inlet during a storm will alter local tide, wave, current, and sediment transport patterns and may expose previously sheltered areas to damaging waves (see Figures 7-34 and 7-45, in Chapter 7).



NOTE

This manual is intended primarily for design professionals, coastal specialists, and others with the expertise to evaluate coastal hazards and the vulnerability of sites and buildings to those hazards. Readers who are not familiar with hazard and vulnerability evaluations are encouraged to seek the services of qualified professionals.



CROSS-REFERENCE

Chapter 7 of this manual presents additional information about natural hazards in coastal areas and the effects of those hazards.

- Widespread construction of erosion control devices may reduce the input of sediments to the littoral system and cause or increase local erosion.
 - Recent seismic events may have caused uplift, settlement, submergence, or fracturing of a region, altering its hazard vulnerability to flood and other hazards.
 - Changes in surface water flows, drainage patterns, or groundwater movements, and reduction in vegetative cover may increase an area's susceptibility to landslides.
 - Topographic changes resulting from the retreat of a sea cliff or coastal bluff may increase wind speeds at a site.
4. Forecast the type, severity, and frequency of future hazard events likely to affect the property over a suitably long period of time, say over at least 50-70 years.

This forecast should be based on either (1) extrapolation of observed historical trends, modified to take into account those factors that will cause deviations from historical trends, or (2) detailed statistical and modeling studies calibrated to reflect basic physical and meteorological processes, and local conditions. The first procedure should be attainable for most any coastal site and project. The second procedure will be beyond the scope and capabilities of all but a few coastal development projects.

5.4.2 Evaluate Hazard Effects on the Property

Once the type, severity, and frequency of future hazard events have been forecast, designers should use past events as an indication of the nature and severity of effects likely to occur during those forecast events. Information about past events at the site of interest and at similar sites should be considered. This historical information should be combined with knowledge about the site and local conditions to estimate future hazard effects on the site and any improvements.

Designers should consider the effects of low-frequency, rare events (e.g., major storms, extreme water levels, tsunamis, earthquakes) and multiple, closely spaced lesser events (see Figure 5-5). For example, many of the post-storm damage assessments summarized in Chapter 2 show that the cumulative erosion and damage caused by a series of minor coastal storms can be as severe as the effects of a single, major storm.

**Figure 5-5**

Siting and design should include consideration of multiple storms or hazards within a short period, whose cumulative effects can exceed those of a design-level event. Photograph by John Althouse, Jacksonville, North Carolina.

5.5 Decision Time

The final step in evaluating a lot or parcel for potential development or redevelopment is to answer two questions:

Can the Predicted Hazard Effects
Be Mitigated Through Siting,
Design, or Construction?

AND

Are the Residual Risks to the Site
and Building/Development
Acceptable?



WARNING

Remember, buildings near the shoreline are at a far greater risk of being damaged by natural causes than buildings farther inland.

Unless both questions can be answered affirmatively, the property should be rejected (at least for its intended use) and other properties should be identified and evaluated. Alternatively, the intended use of the property might be modified so that it is consistent with predicted hazard effects and other constraints. Ultimately, however, reducing the long-term risks to coastal residential buildings requires an approach to site evaluation such as that described in this chapter.

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