<u>NATURAL FEATURES</u>

Introduction:

Various sections of Newport's Comprehensive Plan have anticipated a demand for additional land to accommodate growth. Sometimes that growth encroaches into areas that are environmentally sensitive or geologically hazardous. Unfortunately, not all developers or other users of the land are aware that several environmental factors exist restricting the development potential of much of the land in the Newport area. Many areas have limitations for development, so special care must be taken prior to and during construction. If care is not taken in those areas, major financial and property losses and possible loss of life may occur.

The prevention of loss of property and/or life is a goal unto itself and should be a major consideration when identifying environmental constraints. But there are also properties that are the site of significant natural features. To protect those features, care must also be taken in nearby development.

This section of the plan will discuss the various environmental issues that face the City of Newport. Where possible, sensitive or hazardous lands will be identified and policies will be developed to protect them. Where not known, procedures must be established to identify and protect these areas.

Geology:

The underlying geology of an area dictates the land forms created by erosive forces. Wind and rain sculpt the land into hills and valleys, wave action builds beaches, streams and rivers flatten mountains, and the earth's internal forces push the land upward to start the process over again.

People, too, shape the land to serve their needs. Houses and shopping centers are built, roads are cut, land is cleared, all to facilitate the needs and desires of a greater number of people. But how do all these forces interact and how do we avoid situations that are in conflict? To answer these questions, we must first examine the underlying geology and then identify inherent problems created because of that geology.

The Newport area is predominantly composed of five geologic units: the Nye mudstone, the Astoria formation, the Yaquina formation, the Cape Foulweather basalt, and the Quaternary marine deposits. A bulletin describing the characteristics of the five units and mapping the general location of each is the <u>Environmental Geology of Lincoln</u>

County, Oregon, prepared by the State of Oregon Department of Geology and Mineral Industries.[1] The map of the Newport area also shows a geologic cross section that bisects the heart of Newport.

The Environmental Geology bulletin contains an appendix that summarizes planning concerns in the Newport area:

"Coastal erosion and landslides are extensive from Otter Rock southward to Yaquina Head. Here the abundance of landslides is due to the steep seaward dip of the underlying bedrock. Problems are especially apparent where highway fills have been placed across canyons or small valleys. Repairs are required annually in these areas. Sliding extends east of the highway, and in some areas the power lines require frequent repair and realignment.

"There are large landslides on both the north and south sides of Yaquina Head. The landslide on the south side has made several buildings unusable. In Agate Beach, subsurface drainage is restricted and a public sewerage system is necessary before additional developments are made.

"In the vicinity of Jumpoff Joe [sic] in Newport, the sea coast has retreated as much as several hundred feet since the turn of the century. A number of homes have been destroyed or badly damaged in recent years [the 1940's] as a result of landslides in this area. Before any additional shoreline areas are developed, the stability of the slope should be studied by soil engineers and geologists. Often an apparently stable slope can be reactivated by the addition of houses and streets.

"From Nye Beach southward to Yaquina Bay the shoreline is being eroded by storm waves. People considering building structures on these cliffs should be aware that the cliffs are eroding back about one foot per year, and erosion could be much more severe if landslides occur. The practice of placing embankments over steep vegetated slopes is extremely hazardous because the vegetation will decompose to produce a slip plain at the interface between the embankment and the original ground.

"East of the shoreline in Newport from about Nye Beach south to the bay, the marine terraces are overlain by loose dune sand. These sands are stabilized where covered by vegetation; however, where the vegetation has been removed or none has grown, the sand is exposed to erosion or transport by wind. Frequently during high winds, the sand can be observed drifting across streets and into properties adjacent to the street.

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[1] State of Oregon Department of Geology and Mineral Industries, Bulletin 81: Environmental Geology of Lincoln County, Oregon, 1973.

"Just east of Newport, in the vicinity of McLean Point, much of the slope has been affected by landslides. Development in this area should proceed with great caution. The making of steep cuts, removal of toe support, the additional weight of embankments on the upper slopes, and the addition of moisture from the developments, including subsurface sewage disposal, all add to the instability of the slope. Serious problems can arise, especially following periods of extremely heavy rainfall. Developments in this area could suffer serious slope problems unless the slopes and embankments are properly constructed and a public sewerage system is installed.

"The area south of Yaquina Bay from Highway 101 eastward as far south as Henderson Creek is subject to a seasonal high water table. Before development reaches a greater density, a public sewerage system should be installed. A high water table creates problems for foundations of structures, and in some areas the water will stand at the surface after a heavy rainfall."[2]

The geologic and climatic environment of Newport is attended by a variety of natural hazards that have the potential for creating serious problems involving property. On the other hand, an understanding of these conditions and a sensible approach to coping with them in the planning stages of development can eliminate much of the grief that might otherwise occur.

In order for planning and development to go forward in such a way as to lessen the damage brought on by these conditions, the data and suggestions in this section are introduced as policies for the City of Newport. Local sites shall be evaluated by qualified geologists in order to protect the individual land owners, investors, and developers from problem areas in Newport that are subject to geologic hazards. The geologists shall also make suggestions as to how these problems can be avoided or corrected.

Areas Subject to Geologic Hazards

Marine Terraces

A significant portion of Newport is situated on a marine terrace. These elevated platforms, representing former strand- lines of the sea, extend the full length of the city, interrupted only by headlands and the Yaquina Bay. The terrace materials consist of weakly cemented sand, silt, and pebbly sand overlain in many areas by old, fairly stable dunes. Bedrock beneath the terrace and dune sediments tilts seaward and is exposed in sea cliffs in some places.

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2 Ibid, pgs. 168-169.

"The margins of these terrace areas adjacent to the ocean are attractive places to build, and many small beach cottages, permanent homes, condominiums, and motels occupy these locations. Unfortunately, the sea cliffs at the terrace margins are slowly but continually receding. Wave erosion during storms and high tides undermines the cliffs, while rain, wind, and frost loosen the upper portions; as a result, masses of terrace material slip seaward at unpredictable rates and in unexpected places.

"In general, marine terrace margins can be expected to retreat from 6 inches to 1 foot per year; however, in certain areas, recession can average more than 10 feet per year. In some locations, erosion may not be evident for a decade and then 10 or 15 feet of the cliff may drop off in a single season. Occasionally, very large areas involving a number of acres of land may slide seaward, such as in the Jump-Off [sic] Joe area of Newport.

"Excessive slippage along terrace margins is due to the sliding of weakened, water-saturated bedrock along its seawardtilted bedding planes. Of course, the overlying terrace sediments move with it. Particularly vulnerable to bedding-plane failure is the Nye Mudstone. This type of movement may have vertical and horizontal components of only 2 feet to as much as 50 feet. At first the surface of the slide block is not disrupted, but it is generally back-tilted, or rotated down, on the landward side. Water often accumulates in a sag pond at the back of the slide.

"The surface of these slump areas may range from 50 to 100 feet wide and from 200 to 1,000 feet long. To the untrained eye, such apparently level areas of ocean frontage might appear to be desirable building sites. Unfortunately, however, these areas are extremely unstable since the ground surface must adjust to constant wave erosion at the toe of the slide. In a short time, the entire slump block can be eroded away. During the limited life of the slump block, home owners will be plagued with continual problems of settlement, such as cracks in walls, jammed doors and windows, and water- and sewer-line difficulties."[3]

Old Dune Areas

In certain areas, such as South Beach and Nye Beach, large old sand dunes have developed a thick soil profile and have remained stable for many years. "However, the need for easily excavated fill material and the preparation of ground for building sites has led to the removal of the stabilizing soil layer and has exposed loose sand. If these exposed areas are not immediately stabilized, the wind will soon erode basins and troughs, causing the sand to migrate to adjacent housing areas where it can cover driveways, sidewalks, streets, and lawns."[4]

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[3] Ibid, p. 127.

[4] Ibid, p. 132.

Sandspits and Active Dunes

"Sandspits and their active dunes are of recent origin and should be regarded as relatively temporary features. Some parts of the spits and dunes are built up quickly by water and wind and destroyed by the same agents a few years later. Their instability results from the interplay of numerous environmental factors, including ocean currents, size and number of storms, volume of stream sediment entering the ocean, and variations in tides and wind patterns."[5]

Sandspits and active dunes are found mostly at the mouth of Yaquina Bay and in South Beach. "Preservation of vegetation on the dunes south of Yaquina Bay is recommended since excavation into loose sand could initiate further dune migration....It is essential that the foredune be preserved. Construction in this dune area could be hazardous."[6]

Hillside Development Areas

"Nearly all aspects of hillside land development combine to create slope instability unless the entire construction project is properly engineered. It should be emphasized that slope failure may occur 5 [sic] to 10 [sic] years after the start of the development, by which time the developer may have divested himself of interest and responsibility.

"Development of hillside properties[7] has a considerable adverse effect on slope stability. Whenever material is excavated from a side hill, it results in a steeper than natural slope. Material excavated from the cut is usually placed immediately downslope to provide a nearly horizontal area for a yard or garden. Both operations create instability by oversteepening and adding weight to the slope.

"Most hillside housing developments progress gradually....By the time the development is complete, nearly half of the ground surface is covered by buildings, streets, driveways, and sidewalks, preventing normal infiltration of precipitation. Not only will the total rainfall be concentrated in small areas, but additional water will build up from septic-tank drainage, roof drains, and lawn sprinkling, causing possible oversaturation of downslope soils and eventual slope failure involving large sections of the total hillside area."[8]

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5 Ibid, p. 132.

6 Ibid, p. 132.

7 Properties with a slope greater than 12%.

8 State of Oregon, Bulletin 81: Environmental Geology of Lincoln County, Oregon, p. 135.

Inland Mountainous Areas

"Construction inland from the coast...usually involves steep topography along the valleys of the major rivers and smaller streams. (Flood-plain development and its associated hazards are discussed under 'Flood-prone Areas,' below.) Since the early days of settlement...these valleys have provided the best access inland from the ocean. As a result, farms, small towns, roads, and highways have followed them. Logging roads have penetrated far into the mountainous areas along the steep walls of the smaller tributary streams, and some of these roads have come into permanent use.

"The valleys were excavated by streams to great depth during the ice ages of the Pleistocene when sea levels were considerably lowered. Melting of the ice during interglacial episodes caused a rise in sea level and gradual drowning and silting up of the lower reaches of the valleys. Meandering streams now impinge on the steep walls, removing support of the weathered rock and soil mantle, causing new landslides and renewed movement of old slide masses. Man-made cuts for road construction, basement excavations, and other purposes have the same effect on the potentially unstable soil and rock."[9]

Summary

The Newport area has many places that are subject to geologic hazards. As the city grows, those areas are being encroached upon more and more. Another conflict is that those areas with the worst geologic problems are also the areas most desirable for development and, therefore, command the highest prices.

The different geologic units pose different problems that cannot be summarized in a general section of any report. Consequently, it is necessary to generally identify hazardous areas and require site specific studies prior to development. All possible geologic hazards should be explored and satisfactory solutions determined prior to any construction. If correction will be uneconomical, the project should be abandoned. To ignore a geologic hazard is to invite disaster.

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[9] Ibid, p. 135.

Earthquakes:

The Pacific Northwest experienced a subduction zone earthquake estimated at magnitude 9 on January 26, 1700. The earthquake generated a tsunami that caused damage as far away as Japan. Cascadia subduction zone earthquakes and associated tsunamis have occurred on average every 500 years over the last 3,500 years in the Pacific Northwest. The time between events has been as short as 100 to 200 years and as long as 1000 years. The geologic record indicates that over the last 10,000 years approximately 42 tsunamis have been generated off the Oregon Coast in connection to ruptures of the CSZ (19 of the events were full-margin ruptures and arrived approximately 15-20 minutes after the earthquake).[10]

Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building and soil characteristics. Presently it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. The Department of Geology and Mineral Industries (DOGAMI) has developed maps for the City of Newport that show areas of higher risk (relative to other areas) during a damaging earthquake. Specifically, the maps display relative amplification hazards, relative liquefaction hazards, areas subject to earthquake-induced landslides, and hazards attributed to the combined effects of ground shaking. The maps are referenced as Figures NA-4 to NA-7 in the Newport Addendum to the Lincoln County Natural Hazard Mitigation Plan, dated July 2015.

Newport's concentrated population and resources, as well as the soil characteristics and relative earthquake hazards, as depicted on the referenced maps, are cause for further study and significant effort toward mitigating the earthquake hazards, including seismically upgrading essential facilities and ensuring new development adheres to modern, earthquake---resistant building codes.

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10 Oregon Natural Hazard Mitigation Plan. Department of Land Conservation and Development, 2015.

Tsunami's:

The Oregon coast is well known for its spectacular scenery and natural resources. However, because the coast lies at the interface between land and the Pacific Ocean, it also is a zone of great instability and vulnerability. Over time, we have gained a greater awareness of our coast's geologic hazards and its risks to people and property.

Coastal Oregon is not only vulnerable to chronic coastal hazards such as coast erosion from winter storms and sea level rise, but it is also subject to the potentially catastrophic effects of a Cascadia earthquake event and related tsunami. These types of powerful and devastating earthquakes of magnitude 9+ are generated at the Cascadia Subduction Zone (CSZ) where the eastward-moving Juan de Fuca tectonic plate dives under the westward-moving North American plate just off the Oregon coast. These large earthquakes will occur under the ocean just offshore of our coast and will produce extremely destructive tsunamis that can strike the coast 15 and 20 minutes after the earthquake, leaving devastation in their path. It is likely that in most Oregon coast communities, including [insert jurisdiction name], the only warning of an approaching tsunami will be the earthquake itself.

The geologic record shows that the largest of these large CSZ earthquakes and accompanying tsunamis occur about every 500 years, plus or minus 200 years. The last such earthquake and tsunami occurred over 300 years ago, on the evening of January 26th, 1700. This means that we are in the time window where a destructive CSZ earthquake and tsunami could occur and the probability of that occurrence will continue to increase over time. This time the stakes are much higher as the great earthquake and catastrophic tsunami could occur when tens of thousands of Oregonians and visitors are enjoying coastal beaches and towns. To address this increasing risk and substantially increase resilience within our community, the City of Newport is proactively addressing tsunami preparedness and mitigation within its land use program. Land use planning that addresses tsunami risk is an essential tool to help increase resilience to a potentially catastrophic tsunami event within Newport.

The Department of Geology and Mineral Industries (DOGAMI) have developed Tsunami Inundation Maps (TIMs) which provide the essential information for defining tsunami risk along the Oregon coast.[11A] The City of Newport, by this reference, has adopted the TIM's applicable to its corporate limits and urban growth boundary, as a part of its comprehensive plan hazard inventory. The TIMs are referenced in the tsunami related plan policies and land use regulations for purposes of differentiating between areas of higher versus lower risk, which inform the placement of essential and certain special occupancy facilities, evacuation route planning and the application of tsunami resistant building codes.

DOGAMI has further completed a study to provide local government with a quantitative assessment of the time, speed, and challenges affecting tsunami evacuation in Newport

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[11A] DOGAMI Tsunami Inundation Map Linc-06 and Linc-07, Tsunami Inundation Maps for Newport North-South, Lincoln County, Oregon, Plate 1 and nearby coastal communities for the worst case scenario identified with the TIM mapping.[11B] This “Beat the Wave” analysis and mapping is a resource the City may use to refine its tsunami resiliency planning efforts.

Flood-prone Areas:

"Stream flooding: Flooding of the coastal lowlands in Lincoln County is an annual menace, occurring several times in some years. Major floods causing extensive damage have occurred at least ten times since 1921, generally in December or January, but some have been as early as November 20 or as late as March 31. The interval between major floods has been from 1 year to as long as 15 years, with the average just over 5 years.

"Floods are always associated with periods of heavy rainfall, especially after the ground has been soaked to near capacity or after the ground has been deeply frozen. Snow melt can add considerably to the flood intensity. Near the mouths of streams, flooding can be markedly increased by high tides resulting from strong onshore winds during severe winter storms.

"Destructive flooding by streams occurred in Lincoln County during the winters of 1921, 1931, 1964-65, and 1972. Summarized briefly here, the high water inundated the flood plains of all the major streams. Houses, barns, and livestock were lost; bridges, sections of railroad, and boat docks were swept away; logs and debris from inland were carried out to sea and lodged on distant beaches; residential and business areas of some communities were under water, as were also some resorts; highways throughout the County were blocked by floodwaters and landslides. During the 1964-65 floods, the entire County was isolated.

"Control of flooding in Lincoln County by construction of flood-control dams appears to be extremely unlikely due to the configuration of the stream valleys relative to the cost and effectiveness of a reservoir. Levees and dikes can offer some protection from floods in the lower reaches of the streams where the tidal effect is pronounced.

"The severity of floods in Lincoln County and Newport together with the infeasibility [sic] of adequate flood control structures points out that flood control measures must be in the form of flood-plain zoning regulations."[12]

[11B] DOGAMI Open File Report O-19-05, Tsunami Evacuation Analysis of Newport, Lincoln County, Oregon

[12] Ibid, p. 125.

The outline of flood-prone areas on the Flood Insurance Rate Maps (FIRM) prepared by the Federal Emergency Management Agency (FEMA) should be adequate for determining flood prone areas. "Flood-plain zoning and strict construction criteria are imperative if the annual flood loss is to be reduced....It is essential that local government, the land developer, real estate agent, builder, and prospective lot-buyer become aware of areas of potential flooding before committing themselves to developing the property."[13]

"Ocean Flooding: Ocean flooding is unpredictable and can occur any time of the year. Its causes include storms at sea, strong westerly winds, tidal forces, and large unusual waves. Large unusual waves, although of short duration, can be very destructive. They include tsunamis caused by earthquakes on the sea floor and additive waves created when the crests of several in-phase waves are superimposed and reach the shore simultaneously.

"In the past 33 years [1940-1973], wind and high tides have twice caused excessive flood damage along Oregon's coast. A third destructive wave was a tsunami resulting from the Alaska 'Good Friday' earthquake of 1964; smaller seismic waves have occurred since that time. Although there is no accurate method of predicting the frequency and magnitude of ocean flooding, the occurrence of three damaging floods in 33 years suggests an average of about once every 10 years. Similar waves in the future will probably be even more destructive because of the greatly increased construction of residences, motels, and condominiums at or just above the normal high-tide line. The presence of logs above normal high-tide level is clear evidence of the elevations the sea can reach."[14]

Again, the Flood Insurance Rate Maps have determined from past experience the maximum wave elevations for velocity flooding (V Zones) and areas of shallow marine flooding (AO Zones). The siting of future structures should be based on these maps.

Ocean Shorelands:

This section summarizes inventory information about the shorelands adjacent to the Pacific Ocean. Policy statements follow the inventory information. Identification of the shorelands boundary was based upon the consideration of several characteristics of the land. Resources and hazard areas within the ocean-related portion of the shorelands boundary are mapped on the Ocean Shorelands Map on page 50 (that map can be used by property owners and developers to help determine the level of review required before issuance of development permits). These include:

1.) Beaches, as identified in the Oregon Beach Law.

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13 Ibid, 140.

14 Ibid, p. 141.

2.) Dunes, as identified in the 1980 Newport Comprehensive Plan by RNKR Associates.[15]

3.) Younger, stabilized dunes and open sand and wet interdunes as identified in the Soil Conservation Service (SCS) study Beaches and Dunes of the Oregon Coast (for areas not identified in the RNKR study).[16]

4.) Areas of 100-year coastal flood with wave action as identified on the Flood Insurance Rate Maps.

5.) Shoreland protection measures as mapped by RNKR Associates.[17]

6.) Significant shoreland and wetland biological habitat identified by Dr. D.W. Thomas and the U.S. Fish and Wildlife Service.[18]

7.) Coastal headlands.

8.) Areas necessary for water-dependent and water-related uses, specifically recreational uses and navigation facilities.

9.) Landslide areas as identified by RNKR Associates in 1979 (map numbers 13:25 through 16:25).

10.) Features of exceptional scenic quality.

11.) Riparian vegetation along streams is included within significant wildlife habitat areas.

12.) The conditionally stable dunes landward of the foredune.

13.) The older, stabilized dunes of the South Beach dune sheet.

14.) The deflation plain east of the foredune and the stabilized dunes.

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15 RNKR Associates, Environmental Hazard Inventory: Coastal Lincoln County, Oregon, 1979.

16 U.S. Soil Conservation Service, Beaches and Dunes of the Oregon Coast, 1975.

17 RNKR Associates, Environmental Hazard Inventory: Coastal Lincoln County, Oregon, 1979.

18 D.W. Thomas, Significant Shoreland and Wetland Biological Habitats and Riparian Vegetation, 1981.

Beaches and Dunes

Ocean Beaches

Formations: There are four stretches of ocean beach within the Newport urban growth boundary (UGB):

1.) Beverly Beach: The area from Yaquina Head to north of Schooner Creek.

2.) Agate Beach: The area from Yaquina Head south to Jump-Off Joe Rock.

3.) Nye Beach: The area from Jump-Off Joe Rock south to the north jetty.

4.) South Beach: The area south of the south jetty to the southern urban growth boundary.

The sand of the Newport beaches is similar to other Oregon beaches. Sea cliff erosion and marine deposition or erosion are the major factors affecting the supply of sand on the beach. The stability and movement of sand on the beach varies seasonally. The sand is generally eroded from beaches during winter storms. Gentler waves in summer deposit sand on the beach.

This on-and-off shore movement of sand is in addition to the transport of sand along the beach (littoral drift). There appears to be a seasonal reversal in the direction of sand transport along the beach. Waves from the south-west accompany the prevailing winds in the winter months and wind and waves from the northwest predominate during the summer. Sand movement appears to be essentially in balance when averaged over several years. This condition is known as "zero net littoral drift."

The impact of this zero net littoral drift and the extension of the jetties at the entrance to Yaquina Bay has been accretion of sand adjacent to the north and south jetties. The accumulation of sand by the jetties has resulted in some further erosion at greater distances from the jetty. The accumulation of sand on either side of the jetties at the mouth of Yaquina Bay led to dune formation when much of that sand blew inland.

Recreational Uses: The recreational values of the beaches have long been recognized by Oregonians. These beaches are important resources that have long held an attraction for residents and visitors. As the name implies, many agates have been found at Agate Beach. Agate Beach, Nye Beach, and South Beach have razor clams. The beaches, especially during the summer, are populated with beachcombers, surfers, sailboarders, runners, kite fliers, and many other recreation enthusiasts.

Oregon Beach Law: The 1967 Legislature passed the Oregon Beach Law (ORS 390.605-390.700) to codify the public's right to use the dry sand areas of the beaches.

The Shoreland Boundary Line was established by that legislation to resolve the question of ownership and the right of the public to use the dry sand areas of the Oregon beaches. In the landmark court case of State Ex Rel Thronton v. Hay, the Oregon Supreme Court said that the state had effectively proven the public's right to use the land seaward of the shoreland boundary line even though the ownership may rest with a private land owner. (It should be noted that the wet sand areas are property of the state as determined by the 1899 Oregon legislature except where sold before 1947.)

The area between the mean high water and the vegetation line is an area where the public's right is paramount but where private ownership is recognized. The state legislature grappled with the question of erosion and the receding nature of the coast line in creating this in between area and in 1969 exempted these lands from taxation.

The Oregon Beach Law also regulates improvements, motor vehicle and aircraft use, pipelines, cable or conduit crossings, and removal of natural products on the ocean shore (ORS 390.635- 390.725). Implementation requirements of the Land Conservation and Development Commission's Beaches and Dunes Goal further restricted permits for beach front protective structures to where development existed before January 1, 1977. Pursuant to this requirement, the Oregon Transportation Commission adopted new Beach Improvement Standards on March 28, 1978.

In addition to the above law, Goal 18/"Beaches and Dunes" limits the issuance of permits for beach front protective structures to those areas where development existed on January 1, 1977. Development means houses, commercial and industrial buildings, and vacant subdivision lots that are physically improved through the construction of streets and the provision of utilities to the lot. Also included are areas where an exception to (2) of the implementation requirements of Goal 18 has been approved.

Dune Areas

The material underlying much of the area within the Newport UGB is sand. Most of this is marine terrace deposits, although these are sometimes difficult to distinguish from older sandstone bedrock or older stabilized dunes. Once the old town area of the city between Nye Beach and the bayfront had dunes, but the area is now largely developed and little remains of these dunes.

All of these areas have sandy soils of either the Netarts, Warrenton, or Yaquina series wherever the soil profile has begun to develop. These series have been mapped by the SCS, and the maps are on file at the Newport Planning Department. It is important to protect these lands from erosion that would create open sand area.

There is a small area with active hummock dunes between Yaquina Bay State Park and the north jetty that is not shown separately on the Ocean Shorelands map because it lies seaward of the beach zone line. The most significant dune area is in South Beach, which is discussed below.

South Beach Dune Complex

The information about dune forms summarized below is drawn from the Beaches and Dunes Handbook for the Oregon Coast[19] and the report and mapping of RNKR Associates in Environmental Hazard Inventory: Coastal Lincoln County, Oregon.[20] These are the most recent sources of information concerning the South Beach dunes.

The South Beach dune complex is the largest dune area in Newport. It was built up from the sand supply on the accretion beach next to the south jetty. RNKR Associates described several types of dune landforms within this South Beach dune sheet, which is the only dune complex identified within the Newport UGB. These dunes are shown on Sheet 4 of the Ocean Shorelands Map (beginning on page 50). The dune complex is located primarily within South Beach State Park, although it extends a short way north and south of the park.

The four dune landforms identified in this area are:

1.) Active foredunes: a ridge of sand adjacent to the swash zone of the beach extending south from the mouth of Yaquina Bay.

2.) Conditionally stable dunes: present on the landward side of the active foredunes.

3.) Older stabilized dunes: present in approximately the center of South Beach State Park.

4.) Deflation plain: present on the landward side of the other dune types.

Each of these dune types has different resource values, hazards, and development limitations.

The active foredune collects sand blown from the open beach. The foredune develops where European beach grass causes wind-blown sand to accumulate in a long ridge. These dunes need protection if they are to remain effective barriers to wind erosion and ocean storms. Foredunes are dynamic landforms subject to substantial growth in height and width on accretion beaches, and are vulnerable to rapid removal on eroding beaches. Therefore, buildings are not appropriate on active foredunes.

The conditionally stable dunes landward of the foredune have developed a denser vegetative cover, including more plant species. Although no longer subjected to wind

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19 U.S. Soil Conservation Service, Beaches and Dunes of the Oregon Coast, 1975.

20 RNKR Associates, Environmental Hazard Inventory: Coastal Lincoln County, Oregon, 1979.

erosion like foredunes, conditionally stable dunes have not had time for significant soil development. Conditionally stable dunes may be appropriate for development with special precautions in places that are not subject to hazards such as ocean flooding.

The older, stabilized dunes of the South Beach dune sheet exhibit soil development and tree cover. Since this dune area is entirely within a state park, no development is anticipated.

To the east of the foredune and the stabilized dunes is an extensive deflation plain. A deflation plain is created when the wind removes dry sand particles from areas landward of the foredune. The summer water table limits the depth of sand removal because groundwater moisture binds the sand together. Standing water is common during the winter when the water table is higher. Some deflation plains are subject to ocean flooding.

All of South Beach is known to have a groundwater aquifer, these dunes deposits are generally thin, and they cannot (as in other places on the Oregon coast) be relied on to supply large volumes of ground water. The dune sands rarely exceed 15 feet in thickness (except in a small area of South Beach) and are deposited directly on marine terrace material. The dune aquifer is not subject to significant development pressures because much of the aquifer is within South Beach State Park. Areas outside the park slated for development are or will be served by municipal water and sewer systems.

The primary value of the South Beach dune complex is recreational. Two deflation plain wetlands south of the old jetty railroad and open sand areas have been identified as significant habitat, as discussed below. The parcel of land between South Beach State Park and Yaquina Bay has been identified as being suited for tourist commercial uses subject to compliance with zoning regulations.

In addition to the dune forms in the South Beach Dune Complex described above, the following additional dune landforms are located within the Newport UGB:

1.) <u>Open sand dunes areas</u>, in the absence of vegetation, operate only in response to sand supply and wind. Open dune sand areas are defined as wind-drifted sand in the form of dunes and ridges which are essentially devoid of vegetation.

    Active open dune sand areas are highly dynamic and may advance onto forest land, pasture land, crop land, roads, railroads, lakes, and stream channels, thereby endangering residential, commercial, and industrial property. Yet, at the same time, many open sand dunes have tremendous aesthetic and recreational importance.

2.) <u>Interdunes</u> include a broad range of geomorphic landforms varying from wet open dune sand forms to wet areas in recent and older stabilized dunes.

    In general, broad areas that are both stable and wet were mapped as wet interdune, and the stabilized area was shown as being secondary. This arrangement points out the major unit to be managed. Most wet interdunes are principally wildlife habitat areas. However, many areas mapped as wet interdunes are old deflation plains or reexposed coastal terraces. A primary development limitation is the inability of some wet interdune areas to accommodate subsurface sewage disposal.

3.) Younger stabilized dunes are youthful, cross-bedded, windstable dune landforms that have weakly-developed sandy soils with little or no development of cemented nodules, lenses, or horizons. Vegetation on these dunes ranges from native grasses, European beachgrass, and shrubs such as scotch broom and tree lupine to woody species. The dominant tree is shore pine, but Sitka spruce, western hemlock, Douglas Fir, western red cedar, Oregon crabapple, and red alder also occur.

The younger stabilized dunes are differentiated from older stabilized dunes by differences in soil profile characteristics and the predominance of shore pine and other woody species. Texture and cementation are the primary criteria use for differentiation, although organic matter, depth, and distribution are also considered.

The younger stabilized dune mapping unit includes the stabilized dunes and transition forests. These areas contain many species of birds, mammals, amphibians, and reptiles. Occasional snags serve as nesting areas for a variety of birds.

Younger stabilized dunes offer opportunities for the placement of man-made facilities. Established vegetation provides shelter from the wind and a location from which to venture out into the open sand. However, on-site investigation is needed because building sites may be limited by slope, depth of water table, and horizontal and vertical permeability if septic- tanks are used. Some septic drain field failures have been reported in areas mapped as younger stabilized dunes. Surface or subsurface drainage that significantly reduces soil moisture in stable areas might result in the killing of low shrubs and should be avoided. Excavation and vegetation removal in stabilized dune areas needs to be well managed to prevent exposure of open sand to wind erosion and subsequent blow-outs.

Shoreland Hazards

Ocean Flooding

Ocean flooding is the inundation of lowland areas along the coast by salt water due to tidal action, storm surge, or tsunamis (seismic sea waves). Landforms in Newport subject to ocean flooding include beaches, the bases of sea cliffs, marshes and low-lying interdune areas. All areas shown on the Flood Insurance Rate Map in Zone V and areas below the 10 foot elevation south of and adjacent to the south jetty are considered to be areas subject to ocean flooding.

The National Flood Insurance Program (FIA) requires that all living areas or residences built or rebuilt within the floodplain be built so that the lowest habitable floor is at least one foot above the base flood level. In addition, buildings, foundations, and other structures must be built so that flood problems are not worsened in other areas. The City of Newport flood plain management regulations for coastal high hazard zones have been recognized as appropriate by FEMA.[21]

Shoreline Protection Measures

Ocean wave undercutting and consequent sea cliff erosion has been identified as a major source of beach sand. The following description of landslide areas also notes the role of ocean wave action. In an effort to protect property from cliff retreat, sand movement, and ocean flooding, several shoreline protection features have been built.

RNKR Associates mapped riprap armor along the shoreline in order to inventory these features. These are shown on the Ocean Shorelands map beginning on page 50. Control of shoreline protection features by local authorities is needed to prevent unexpected changes in beach equilibrium or aggravated erosion of adjacent lands. RNKR suggested several questions to be answered in the review of new shoreline protection structures which have been incorporated into ordinances controlling development along the shoreland.

In addition to city policies and regulations, beach areas within the vegetation line established by ORS 390 are under the jurisdiction of the Oregon State Parks and the Division of State Lands. A permit is required from those agencies prior to the construction of any beach front protective structures.

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[21] Federal Emergency Management Agency, letter to the City of Newport, 1987.

Landslide and Coastal Erosion Areas

Landslide and Coastal Erosion areas were mapped within the Newport urban growth boundary in the 2004 document titled Evaluation of Coastal Erosion Hazard Zones Along Dune and Bluff Backed Shorelines In Lincoln County, Oregon: Cascade Head to Seal Rock, by the Oregon Department of Geology and Mineral Industries (OFR O-04-09). The document and maps are included here by reference. The report describes several types of mass movement (mud flow, slump, soil creep, and debris avalanche) and defines the mapped landslide areas:

Prehistoric Mass Movements: Generally speaking, these are very large landslide and slide blocks that predate historical observations on the Oregon coast (about 150 years) and are deeply eroded with no evidence of recent slide activity.

Potentially Active Mass Movements: These are areas of mass movements that are currently stable (no bowed trees or cracked soil and pavement) but with evidence of recurrent movement in the last 150 years. Unlike the prehistoric slides, these features are generally not extensively eroded and have well-preserved topography indicative of recent movement. Many show no evidence of movement since 1939 or 1967 aerial photography but are probably more likely to have movements than the prehistoric slide areas.

Active Mass Movements: These areas have evidence such as bowed trees and cracked soil or pavement that indicate ongoing down slope movement of large masses of soil or rock.

Quaternary Landslides: Quaternary landslides were mapped by Snavely and others (1976 and 1996). These landslides are shown in inland portions of the City and were not investigated in the 2004 DOGAMI report.

Landslide Terrain: Areas identified as landslide terrain were interpreted by Schlicker and others (1973) from aerial photos and reconnaissance-level fieldwork. The terrain may be landslide or just rolling topography similar to that produced by landslide processes and needs to be field checked.

Bluff and Dune-Backed Shoreline Hazard Areas: Coastal bluff and dune-backed shoreline areas characterized by existing, active erosion processes and three zones of potential future erosion (high, moderate, and low) that respectively depict decreasing risk of becoming active in the future as modeled in the DOGAMI report. The respective hazard zones are more particularly described as follows:

> *Active Erosion Hazard Zones* – For dune-backed shorelines, the active hazard zone encompasses the active beach to the top of the first vegetated foredune, and includes those areas subject to large morphological changes adjacent to the mouths of bays due to inlet migration. On bluff-backed shorelines the active hazard zone

includes actively eroding coastal bluff escarpments and active or potentially active coastal landslides.

High Risk Erosion Hazard Zones – For dune backed shorelines, the high risk scenario is based on a large storm wave event (wave heights 47.6 ft high) occurring over the cycle of an above average high tide, coincident with a 3.3 ft storm surge. For bluff-backed shoreline areas, the high risk zone portrays bluff retreat that would occur if only gradual erosion at a relatively low mean rate were to occur over a 60-year period after the slope reaches and maintains its ideal angle of repose(for talus of the bluff material).

Moderate Risk Erosion Hazard Zones – For dune-backed shorelines, the moderate risk scenario is based on an extremely severe storm event (waves 52.5 ft high) coupled with a long term rise in sea level of 1.31 ft. For bluff-backed shoreline areas, the moderate risk zone portrays an average amount of bluff retreat that would occur from the combined processes of block failures, retreat to an angle of repose, and erosion for 60 to 100 years.

Low Risk Erosion Hazard Zones – For dune-backed shorelines, the low risk scenario is similar to the moderate risk approach but incorporates a 3.3 ft vertical lowering of the coast as a result of a Cascadia subduction zone earthquake. For bluff-backed shoreline areas, the low risk zone illustrates a worst case for bluff retreat in 60-100 years considering maximum bluff slope failure, erosion back to an ideal angle of repose, and gradual bluff retreat for 100 years.

Shoreland Resources

Significant Habitats

Significant material regarding shoreland and wetland biological habitats and riparian vegetation along the ocean shoreline in Lincoln County were compiled by Dr. D.W. Thomas in September 1981.[22] Recent aerial photographs and additional information from the Nature Conservancy, Oregon Department of Fish and Wildlife (ODFW), the U.S. Army Corps of Engineers, OCC&DC, and the U.S. Fish and Wildlife Service National Wetlands Inventory were obtained during that study. In July 1983, the City of Newport, in coordination with Lincoln County and the Oregon Department of Fish and Wildlife, reexamined the Thomas Study in the South Beach dune complex. The Ocean Shorelands Map (beginning on page 50) was amended to include only those areas considered by ODFW to be significant shoreland and wetland biological habitat (see the description of South Beach's significant habitat areas on the next page).

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22 D.W. Thomas, Significant Shoreland and Wetland Biological Habitat and Riparian Vegetation, 1981.

The City of Newport also amended the Ocean Shoreland map to exclude the Yaquina Estuary north and south jetties and existing jetty access roads as significant habitat.

The following significant shoreland and wetland biological habitats on Newport's ocean shorelands have been noted and are shown on the Ocean Shorelands map (beginning on page 50):

> Grant Creek west of Highway 101.

> An unnamed drainage east and west of Highway 101 just to the north of the Newport Municipal Airport property and south of South Beach State Park.

> South Beach dune complex.

> The cliffs and offshore rocks at Yaquina Head.

Coastal Headlands

There are two headlands within the Newport urban growth boundary, and one is the well-known Jump-Off Joe Rock. A prominent headland in the last century, only skeletal remains are left, and it is now a minor promontory of the marine terrace upon which most of the City of Newport is located. It has been subject to rapid and substantial marine erosion and seacliff retreat. (See the History and the Parks and Recreation sections of this plan.)

The remaining and more prominent coastal headland is Yaquina Head. This headland is formed by the Cape Foulweather basalt. The surficial extent of this geologic unit was mapped in 1973 by Schlicker.[23] The seaward exposure of this unit is included within the shorelands boundary as a major visual resource of the Newport area. Walker, Havens, and Reickson's Visual Resources Analysis of the Oregon Coastal Zone identified Yaquina Head as an area with potential for an exceptional coastal experience. Congress designated about 100 acres of the Head as an Outstanding Natural Area (ONA) on March 5, 1979, in Section 119 of Public Law 96-199. The act also provided for wind energy research within the ONA. The boundary of the Yaquina Head ONA established by this act is shown on the Ocean Shorelands map.

Once the site of a privately-owned commercial quarry, the primary developed land uses on this headland now are the Yaquina Head Lighthouse and a few residences.

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[23] State of Oregon, Bulletin 81: Environmental Geology of Lincoln County, Oregon, 1973.

Recreation Associated with the Pacific Ocean

Yaquina Head, city and state parks, and several public rights-of-way to the ocean beaches provide for recreational opportunities along the ocean shorelands. The designation of the beaches as a special recreational area by the State of Oregon and the acquisition and development of Agate Beach, South Beach, and Yaquina Bay State parks encompass all of the area that is especially suited for recreation along the ocean shorelands within the Newport UGB. Public access to the beach outside of state parks occurs over public rights-of-way or specially acquired parcels. Major public access points are noted on the Ocean Shorelands map and the Inventory Of Oregon Coastal Beach Access Sites, published by Benkendorf and Associates,[24] hereby included within this plan by reference.

Navigation Facilities

Navigation facilities are important uses in the ocean shorelands area. Navigation facilities currently consist of the jetties at the mouth of Yaquina Bay, the Yaquina Bay Lighthouse, and the Yaquina Head Lighthouse.

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GOALS/POLICIES
NATURAL FEATURES

Goal 1: To protect life and property, to reduce costs to the public, and to minimize damage to the natural resources of the coastal zone that might result from inappropriate development in environmentally hazardous areas.

Policy 1: In areas of known hazards, the City of Newport shall require a site evaluation of the potential dangers posed by environmental hazards prior to city review and approval of a proposed development. It shall be the applicant's burden to show that construction in an environmentally hazardous area is feasible and safe. Site investigations in geologic hazardous areas shall be prepared by a registered geologist or engineer.

Policy 2: The city shall maintain and, where necessary, update ordinances that control development in an environmentally hazardous area.

Policy 3: Where hazardous areas are not specifically identified but a potential hazard may exist, the City should establish procedures within its land use regulations to require a site-specific analysis tool, such as a geologic report.

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[24] Benkendorf and Associates, Inventory of Oregon Coastal Beach Access Sites, 1989.

Policy 4: The city shall continue its participation in the Flood Insurance Program administered by the Federal Emergency Management Agency.

Policy 5: Development within the Ocean Shorelands Boundary, as identified on the Ocean Shorelands Map, shall comply with development criteria established within the Zoning Ordinance, except to the extent development is permitted in accordance with the variance procedures of the Zoning Ordinance. The city shall, from time to time, evaluate those regulations to assure compliance with city goals.

Policy 6: Nonstructural solutions to problems of erosion or flooding shall be preferred to structural solutions. Where flood and erosion control structures are shown to be necessary, they shall be designed to minimize adverse impacts on water currents, erosion, and accretion patterns.

Policy 7: Engineering solutions or other measures to provide appropriate safeguards shall be required prior to issuance of building permits in identified hazardous areas if required by a geological report.

Policy 8: The City of Newport will utilize DOGAMI's Tsunami Inundation Maps as the basis of a zoning overlay to guide the placement of new essential and special occupancy structures and develop related tsunami hazard resiliency measures.

Policy 9: Enact building codes to enhance resiliency of structures within tsunami inundation areas, with an emphasis on those serving high-risk populations or that are necessary for post tsunami recovery.

Policy 10: Provide for the development of vertical evacuation structures in areas where reaching high ground is impractical.

Goal 2: Promote public education of known hazards, and facilitate orderly and expedient evacuation of residents and visitors in response to a catastrophic event.

Policy 1: Periodically update, implement, and refine natural hazard mitigation and emergency operations plans, and ensure city ordinance and regulations respond to plan recommendations.

Policy 2: Encourage and support hazard education, outreach, training and practice.

Policy 3: Develop robust and redundant evacuation routes that are well signed and integrated with evacuation assembly areas, shelters and supply caches.

Policy 4: Collaborate with local, state, and federal partners to effectively leverage resources, and establish a culture of preparedness supporting evacuation route planning to minimize risk and maximize hazard resiliency.

Goal 3: To protect and, where practical, enhance identified environmentally sensitive areas.

Policy 1: Identified environmentally sensitive areas shall be mapped on the Ocean Shorelands Map.

Policy 2: Residential development and commercial and industrial buildings shall be prohibited on active foredunes, conditionally stable foredunes that are subject to ocean undercutting or wave overtopping, and beaches and deflation plains that are subject to ocean flooding. Other development in these areas shall be permitted only if the findings required in Policy 8, below, are met and it is demonstrated that the proposed development:

> Is adequately protected from any geologic hazards, wind erosion, undercutting, ocean flooding and storm waves; and

> Is designed to minimize adverse environmental effects.

Policy 3: Foredunes shall not be breached by non-natural causes except in an emergency and shall be restored after the emergency by the party causing the breach.

Policy 4: The city shall cooperate with federal and state agencies, private individuals, and others in the determination of natural areas.

Policy 5: The city will complete the Goal 5 process for wetlands identified on the U.S. Fish and Wildlife Service Wetland Inventory maps by the next regularly scheduled periodic review.

Policy 6: The criteria for review of all shore and beach front protective structures shall provide that:

> Visual impacts are minimized;

> Necessary access to the beach is maintained;

> Negative impacts on adjacent property are minimized; and

> Long-term or recurring costs to the public are avoided.

Policy 7: Significant shoreland and wetland biological habitats and coastal headlands shall be protected. Uses in these areas shall be consistent with the protection of natural values.

Policy 8: Development in beach and dune areas other than older, stabilized dunes shall only be permitted if the following issues are examined and appropriate findings are made:

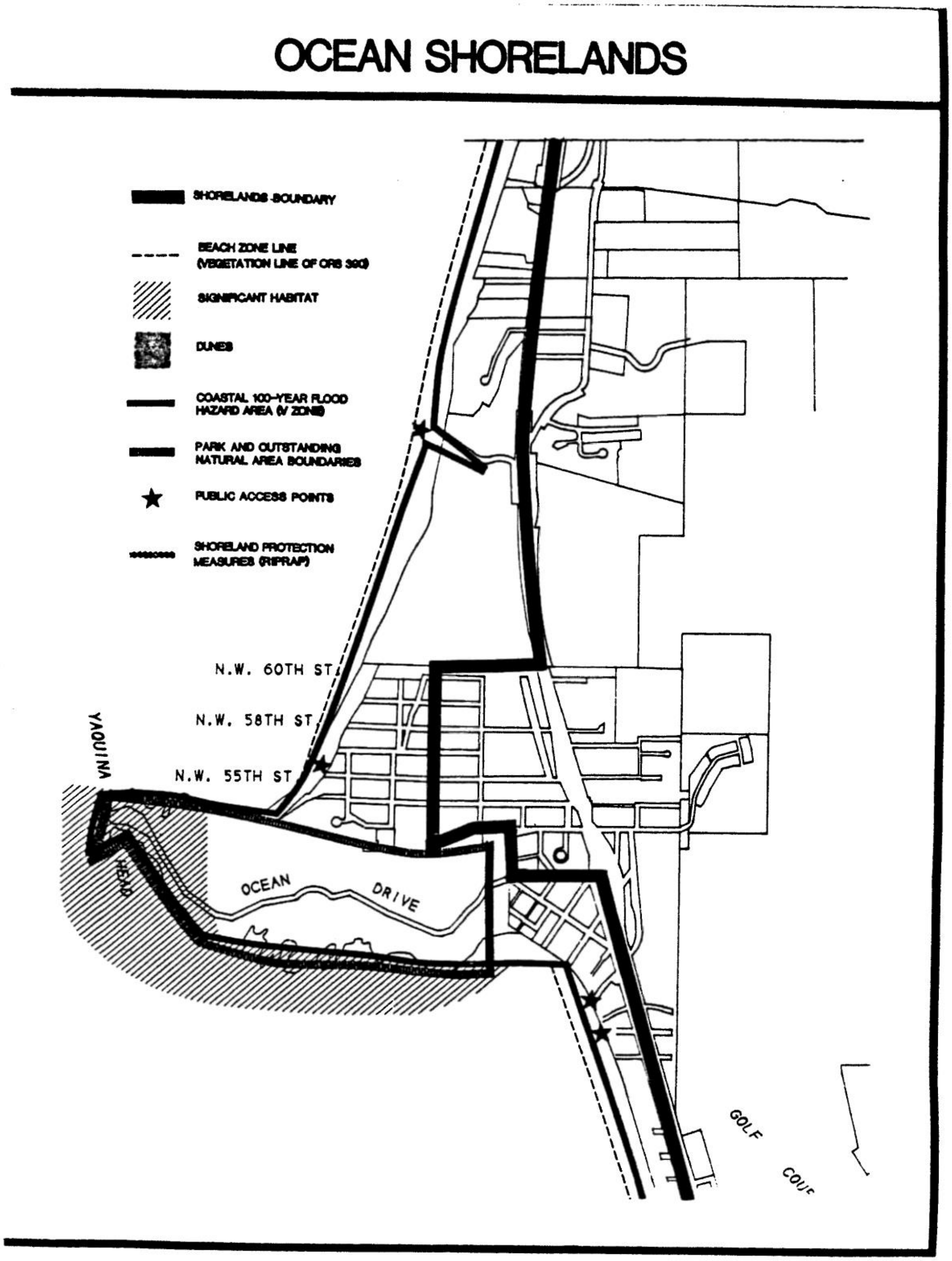
> The type of use proposed and the adverse effects it might have on the site and adjacent areas;

> Temporary and permanent stabilization programs and the planned maintenance of new and existing vegetation;

> Methods for protecting the surrounding area from any adverse effects of the development; and

> Hazards to life, public and private property, and the natural environment that may be caused by the proposed use.

Policy 9: Excavations and fill shall be limited to those minimal areas where alteration is necessary to accommodate allowed development. Cleared areas, where vegetation is removed during construction, shall be revegetated or land-scaped to prevent surface erosion and sedimentation of near shore ocean waters.


OCEAN SHORELANDS
SHORELANDS BOUNDARY
BEACH ZONE LINE
(VEGETATION LINE OF ORS 390)
SIGNIFICANT HABITAT
DUNES
COASTAL 100-YEAR FLOOD
HAZARD AREA (V ZONE)
PARK AND OUTSTANDING
NATURAL AREA BOUNDARIES
PUBLIC ACCESS POINTS
SHORELAND PROTECTION
MEASURES (RIPRAP)
N.W. 60TH ST
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N.W. 55TH ST
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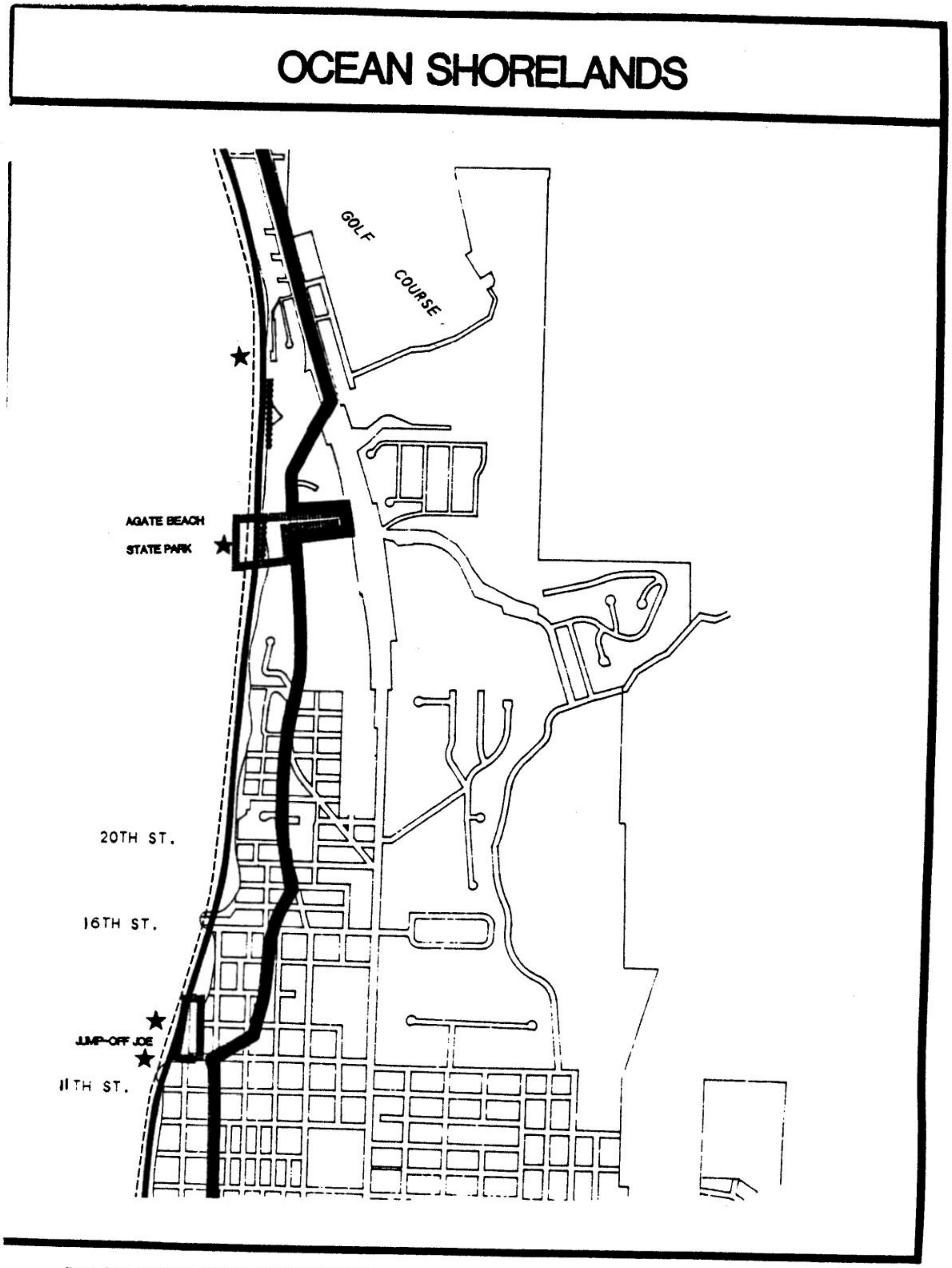
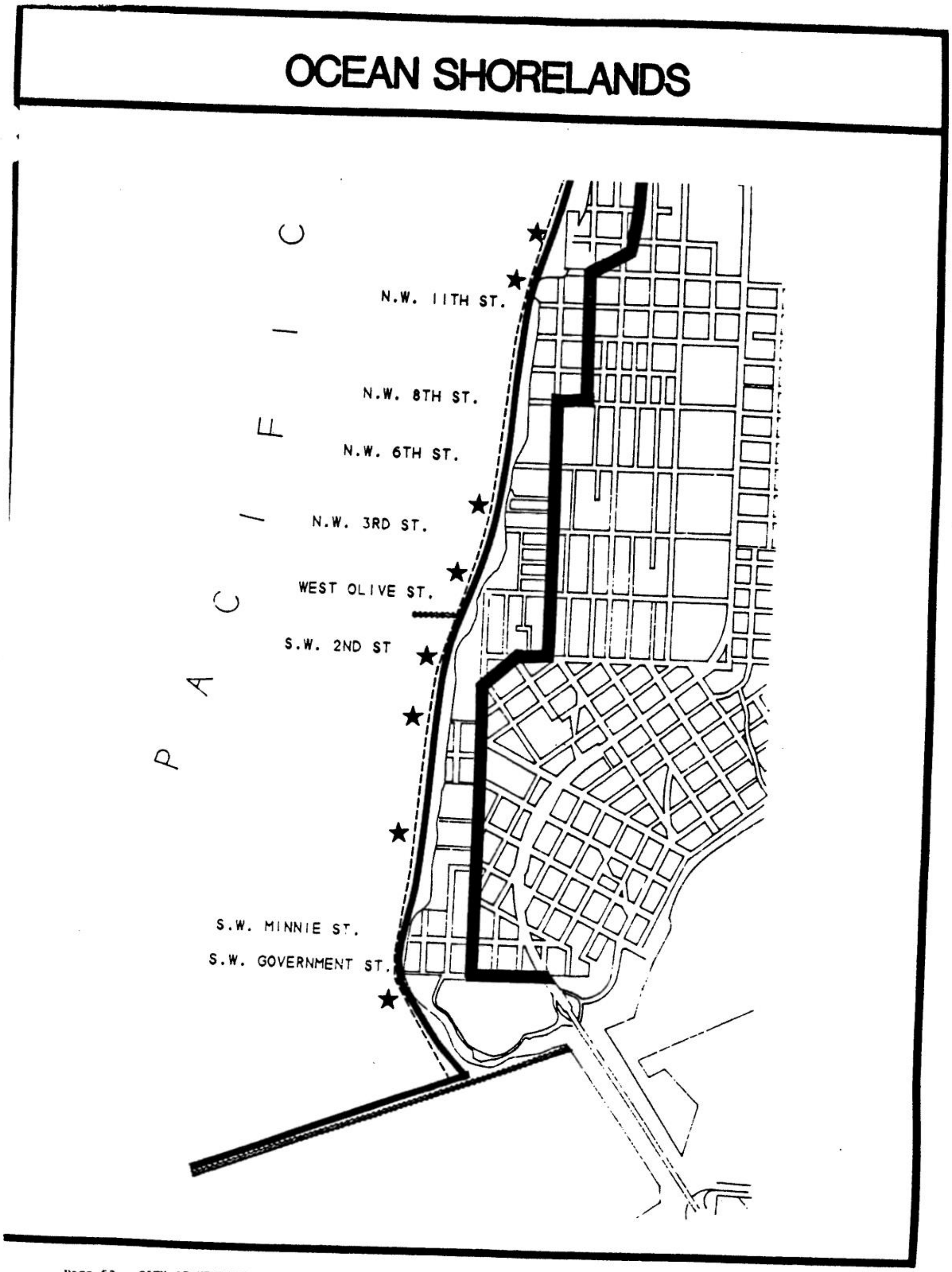
HEAD
OCEAN DRIVE
GOLF

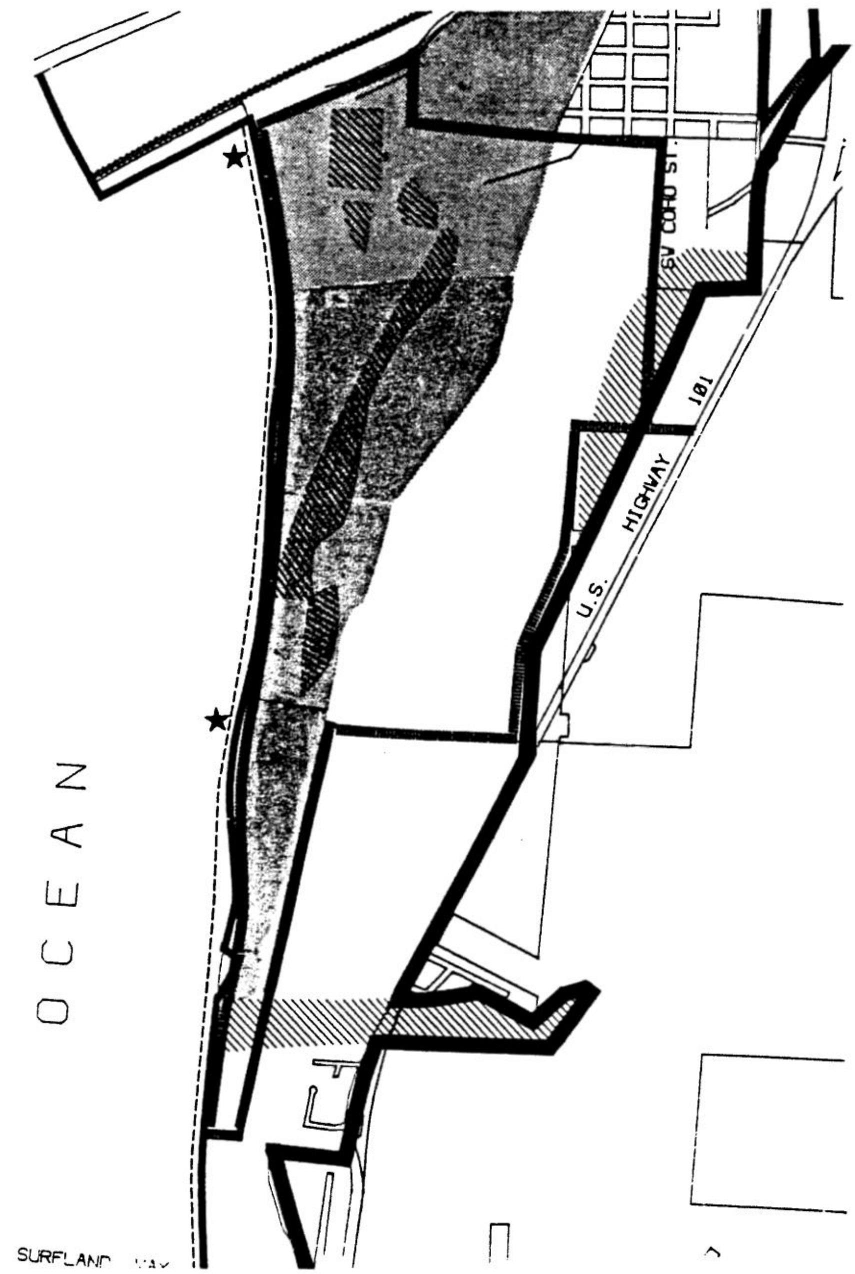


Page 51. CITY OF NEWPORT COMPREHENSIVE PLAN: Natural Features.



Page 52. CITY OF NEWPORT COMPREHENSIVE PLAN: Natural Features.

OCEAN SHORELANDS



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