



OREGON PARKS AND RECREATION DEPARTMENT OCEAN SHORE PERMIT APPLICATION

ADDENDUM C SAND ALTERATION

Section 1.

PROPOSED PROJECT INFORMATION

Project Purpose: Please check one of the following:

- | | | | |
|--------------------------|-------------------------|-------------------------------------|------------------|
| <input type="checkbox"/> | Dune Management Plan | <input type="checkbox"/> | Habitat Creation |
| <input type="checkbox"/> | Water Course Relocation | <input checked="" type="checkbox"/> | Dune Grading |
| <input type="checkbox"/> | Foredune Restoration | <input type="checkbox"/> | Dune Enhancement |
| <input type="checkbox"/> | Habitat Restoration | <input type="checkbox"/> | Other: _____ |

Project Type: Please check all of the following that apply to the proposed project

- | | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Fill |
| <input checked="" type="checkbox"/> | Removal |
| <input checked="" type="checkbox"/> | Alteration |

Amount of material to be altered: 13,760 Cubic yards

Description of equipment to be used and method of sand alteration:

A D-8 Caterpillar or equivalent will be used to excavate the sand and deposit it at the base of the existing dune among the coppice dune line. This approach has been successfully used at Breakers Point and in other beach areas such as Ocean Avenue in Cannon Beach and Manzanita. The dune sand will be graded in an area approximately 180' by 900' just below the foredune, as described in the attached Horning report. After grading has occurred, the dune area will be revegetated with native plant materials chosen to attract native animal species such as snowy plovers and horned larks. A team of local botanists and restoration specialists will be retained to plant the native material and to continue monitoring over a two to three year period. Kathryn Sayce, the botanist in charge of the project, has extensive experience in Ledbetter Point at the northern tip of the Long Beach Peninsula, which is a similar environment. Doug Ray, a local contractor, has helped restore large areas of wetlands and other sensitive environments in Clatsop and Tillamook Counties, and will be in charge of monitoring the growth of the native species. Instead of fencing, the project will utilize small signs to inform residents of the restoration project. Elk damage will be repaired as required.

Estimated project start date: May 2, 2016 Estimated completion date: May 6, 2016

BA- _____

Section 2.
PROPERTY IDENTIFICATION

Township: 5 N Range: 10 W Section: 19 Subsection 19DA Tax lot(s) 90000

Street Address: 253 N. Breakers Point Drive

City/Town: Cannon Beach Zip Code: 97110

County:

- | | |
|---|----------------------------------|
| <input checked="" type="checkbox"/> Clatsop | <input type="checkbox"/> Douglas |
| <input type="checkbox"/> Tillamook | <input type="checkbox"/> Coos |
| <input type="checkbox"/> Lincoln | <input type="checkbox"/> Curry |
| <input type="checkbox"/> Lane | |

Current Use:

- | | |
|--|---------------------------------------|
| <input type="checkbox"/> Residential – single family | <input type="checkbox"/> Park |
| <input checked="" type="checkbox"/> Residential – multiple units | <input type="checkbox"/> Commercial |
| <input type="checkbox"/> Residential – development | <input type="checkbox"/> Industrial |
| <input type="checkbox"/> Vacant (unbuilt) | <input type="checkbox"/> Other: _____ |

Please complete the following information on oceanfront property owners who are adjacent to and have common boundaries with the northern and southern most points of the proposed project. Information on how to contact them is required. Incomplete or incorrect information may result in processing delays.

NAME	PROPERTY ADDRESS	MAILING ADDRESS
See attachment 1		
Shirley Gittlesohn Trust	524 Ash Street (5 10 19AC 2600)	5410 Macadam Ave Portland 97239
City of Cannon Beach	tax lot 5 10 19DA 2800	PO Box 368 Cannon Beach 97110

Is there access to the beach from the property? Yes No

If Yes, what kind? (Please check all that apply):

- | | |
|--|---------------------------------------|
| <input type="checkbox"/> Stairway | <input type="checkbox"/> Public |
| <input checked="" type="checkbox"/> Ramp | <input type="checkbox"/> Private |
| <input type="checkbox"/> Road | <input type="checkbox"/> Other: _____ |
| <input checked="" type="checkbox"/> Path | |

Where is the nearest **public** beach access?

Location: Foot of Fifth Street

Distance from property: adjacent Feet

BA- _____

Section 3.
BEACH AND SHORE ENVIRONMENT DESCRIPTION

- Sea cliff, headland or bluff
 Dune
 Other: _____

Is there a sand beach? Yes No

Base rock material (if known): basalt
 Approximate height of property above beach area: 40-49 feet

Section 4.
PROJECT NEED

Explain why sand alteration is necessary.

Breakers Point Condominiums has been grading dunes under a previous permit (OPRD File Number BA-596-05) since about the year 2000. There have been over nine projects in which sand dunes have been altered on the property. However, the location of the complex at the mouth of Ecola Creek is such that massive amounts of sand continue to accumulate on the foredune. The dune accretion is caused in large part by the dense growth of European beach grass, which can trap large amounts of sand in a short period of time. In 2013, an area on the south end of the dunes grew over six feet in a 48 hour period. As described in the attached report by Tom Horning, dated May 25, 2015, (Attachment 2), in the past 15 years approximately 75,000 cubic yards of wind-blown sand have accumulated on the foredunes of Breakers Point. Views of the ocean and the beach have been reduced and in some cases obliterated by the dune growth, causing significant reduction in the value of the units and consternation for the property owners who purchased their units with the expectation that they could see the ocean or the beach. The area where the sand and grass are to be removed will be replanted with native vegetation. A team of botanists and restoration specialists have prepared a restoration plan, and the US Fish and Wildlife Service has endorsed the project. (Attachment 3, letter dated July 17, 2015.) If successful, the plan could be a model for many other areas where European beach grass is dominant. It is understood that fencing off areas of open sand is not acceptable, so small signs will be utilized to discourage human use of the restoration area.

Section 5.
PROJECT IMPACTS

Please describe any impacts that your project might have in the short or longer term and the steps that will be taken to minimize those impacts (see instructions for examples of potential impacts that OPRD takes into consideration).

Potential Impact	Steps that will be Taken to Minimize Impacts
Grading may expose open sand and increase blowing sand	Mulching will be employed to reduce sand movement. The area to the north will be maintained in dense grass until the next grading project.
Elk herd may destroy native plantings, and dogs may chase and harass Snowy Plover and other nesting bird species.	Signage will be employed to keep humans and their dogs from trampling the area. Restricting elk is not an option.
Sand disposal area may allow coppice dunes to grow.	Deposition on the beach is intended to be during high tides and storm season, which will drag sand into the ocean.

**Section 6.
EVALUATION OF HAZARD ALLEVIATION METHODS**

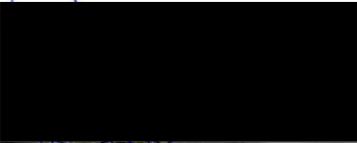
Please use the space provided below to describe alternatives considered to the proposed project. "No action" has been identified as one possible alternative to the proposed project.

Alternatives to Sand Alteration	Was alternative used/considered	Description of why alternative was not feasible
<u>No Action</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, date: _____	Dune growth has had a very negative effect on property values and views of ocean from the condominium units.
<u>Alternative 1</u> Removal of sand to another location.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, date: Sept 15, 2015	LCDC rules prevent removal of sand from littoral cell. Trucking to another part of the beach such as Tolovana Park would be extremely expensive.
<u>Alternative 2</u> Grade a smaller area of sand.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, date: _____	Relocation of 13,760 cubic yards of sand is a reasonable amount and will not disrupt the use of the beach. This amount represents less than 20% of the sand accumulation from 2000 to 2015.
<u>Alternative 3</u>	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, date: _____	

**Section 7.
COASTAL ZONE CERTIFICATION**

Large-scale projects below mean high water may require a federal permit from the U.S. Army Corps of Engineers. The Oregon Coastal Management Program reviews proposed federal permits for consistency with state and local programs. Applicants who need to obtain a federal permit must certify the statement below:

I certify that, to the best of my knowledge and belief, the proposed activity described in this application complies with the approved Oregon Coastal Zone Management Program and will be completed consistent with the program.


 Applicant / Property Owner Signature

12.10.15
 Date

Section 8.
CITY/COUNTY PLANNING DEPARTMENT AFFIDAVIT
(To be completed by local planning official)

- This project is not regulated by the local comprehensive plan and zoning ordinance.
- This project has been reviewed and is consistent with the local comprehensive plan and zoning ordinance.
- This project has been reviewed and is not consistent with the local comprehensive plan and zoning ordinance.
- Consistency of this project with local planning ordinance cannot be determined until the following local approval(s) are obtained:
- | | |
|--|---------------------------------------|
| <input checked="" type="checkbox"/> Conditional Use Approval | <input type="checkbox"/> Zone Change |
| <input type="checkbox"/> Plan Amendment | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Development Permit | |
- An application has has not been made for local approvals checked above.



City/County Planning Official Signature

12/10/2015

Date

Section 9.
SIGNATURE (Required)

Application is hereby made for the activities described on the attachment(s) identified. I certify that I am familiar with the information contained in the application, and, to the best of my knowledge and belief, this information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities. I understand that the granting of other permits by local, state or federal agencies does not release me from the requirement of obtaining the permits requested before commencing the project. I understand that local permits may be required before the state permit is issued. I understand that payment of any required state processing fee does not guarantee issuance of a permit.



Applicant / Property Owner Signature

12-10-15

Date

I certify that I am a duly authorized agent acting on behalf of the applicant.

Contractor / Agent Signature

Date

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OCEAN SHORE IMPROVEMENT APPLICATION FEE CALCULATION FORM

Please use the space below to calculate the fees due at the time you submit your application.

* Project value is based on:

1.	* List Project Value:		\$37,043.00		
		-			
2.	Subtract allowance		\$2,500.00		
3.	Subtotal Project Value	=	\$34,543.00		
	<small>(Project value – base fee allowance = subtotal project value)</small>				
4.	Multiply Subtotal Project Value by 3% (.03)	=	\$1,036.29		
5.	Add Standard Base Fee	+	400.00		
		=			
6.	Total Permit Fee		\$1,436.29		

1. A written cost estimate by a duly certified contractor as to the estimated costs, including materials and labor, of constructing the proposed project; OR
2. An itemized list of construction costs including materials and equipment rentals; OR
3. Other documentation determined acceptable by OPRD to reasonably establish a project's construction value.

EXAMPLE

1.	* List Project Value:		\$10,000.00		
2.	Subtract allowance	-	2,500.00		
3.	Subtotal Project Value	=	7,500.00		
	<small>(Project value – base fee allowance = subtotal project value)</small>				
4.	Multiply Subtotal Project Value by 3% (.03)	=	225.00		
5.	Add Standard Base Fee	+	400.00		
		=			
6.	Total Permit Fee		625.00		

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Dune Prairie Executive Summary



Based on discussions about the BPHOA dune modification proposal, the following summary for the plant element is as follows.

Two areas are to be modified by the addition of native species.

Area One (A1) is in the middle of the beach grass grassland, where the elevation is the lowest. This area will have some soil amendment with biochar and compost, and be seeded with a mixture of native wildflowers and grasses. Due to extensive trampling by elk, planting small plants is not proposed for this area. Biochar plus compost will mimic soil development over several hundred years. By locating A1 in a natural swale on site, this will take advantage of any surface water that might run downhill during high rainfall periods, and it will be less visually obtrusive than other sites, from all directions.

Area Two (A2) is the outer edge, where the dune will be lowered. Following regarding of this dune, the new open surface will be planted with American dunegrass, *Leymus mollis*, plants. Several native plants that thrive in open sand will be seeded among the starts. Dunegrass is not palatable to elk, and is likely to survive being trampled. It is less effective than beach grass at holding and trapping sand, so we propose to plant most of the disturbed surface in A2 to maximize this grass's ability to slow sand movement.

Optimal planting and seeding time is fall for native species. Plants will be placed in A1 and A2 based on availability of grass starts and seeds of native dune species.

Area 1 (A1) will have two plots, each of 1,000 square feet. This is the meadow area with older soils.

To address concerns of open blowing sand and within area 2 (A2), American Dune grass will be planted 1 plant per 10 feet on center (OC) approximately 500-600 plants on a 1.2 acre graded dune area

Due to the possible limitation of plant material, native dune plantings will continue each year until plant diversity and density establishment goals have been met.

This project also serves to provide critical restoration information to inform the new Dune Management Plan the city of Cannon Beach is having done. There can't be a viable DMP without a comprehensive native dune plant community restoration element to move beyond the historic use of non-native highly invasive European beach grass posing grading of sand dunes in Cannon Beach.

Adaptive management, based on monitoring, observation and active ongoing maintenance to ensure no European beach grass reestablishes within the dune grading area as well as on going native plant installation and seed sowing as needed to meet plan goals, helps ensure success of the native dune plant community restoration plan.

Kathleen Sayce, Shoalwater Botanical
January 10, 2016

Doug Ray, Carex Consulting

Dune Prairie Plant community / ESA listed species Recovery Restoration plan for Breaker's Point Homeowners Association

Overview

Since the first required dune grading at the Breakers Point condominiums, other locations in Cannon Beach and along the Oregon coast, Non Native European beach grass has been the conventional post grading planting solution.

The use of EBG to rapidly stabilize open sand both in recent time and beginning in the 1930's has contributed to the collapse at the landscape level, of historic native dune prairie plant communities and the globally and regionally significant biodiversity of life dependent on them.

In addition, it requires ever more frequent dune grading as EBG rapidly sequesters and accretes sand at unnatural rates and volumes, incurring more economic cost and biological diversity /ecological loss.

The proposed Dune prairie restoration planting plan uses an integrated adaptive management approach and best available science, to shift to a new paradigm in dune grading management plans in Cannon Beach. This proposal has also been reviewed by the United States Fish and Wildlife Service (USFWS) with the potential to be used as a template example for other dune grading projects elsewhere on the Oregon coast and within the range of the western snowy plover, Horned Lark and historic range of Pink Sand verbena.

In July of 2003, the city of Cannon Beach adopted an Endangered Species Act (ESA) Action plan. The focus of the plan was in response to the listing as Threatened, Evolutionary significant unit (ESU) Coastal Coho salmon under the ESA in 1996. No consideration was given to the western snowy plover, which was listed as Threatened in 1993 under the ESA. A final recovery plan was approved in 2007. The streaked horned lark was listed as a threatened species under the ESA in October 2013. Pink sand verbena is listed as endangered by the Oregon department of Agriculture

While the ESA action plan has not been updated to reflect the listings of either bird species or state listed pink sand verbena, this native dune prairie restoration plan provides Cannon Beach a unique coastal community leadership opportunity to support state and federal agency recovery goals for 3 listed species.

Nearly all species recovery efforts are developed and funded with public funding. The BPHOA brings this proposal as a privately funded contribution to T&E species recovery and advancing the city of Cannon Beach natural resource stewardship conservation goals.

The plan provides an opportunity for a positive public /private partnership to demonstrate how the common ground for conservation is the ground we all stand on.

Any questions regarding the plan before you can be directed to Kathleen Sayce, with Shoalwater Botanical, Restoration plan author, or Doug Ray, Carex Consulting.

Doug Ray, Wetland Ecology, Watershed Restoration Carex Consulting P.O. Box
441 Seaside, Oregon 97138 Home/Office Tel 503 738-8710 primary contact number

[REDACTED]

[REDACTED]

Kathleen Sayce Shoalwater Botanical PO Box 91 Nahcotta WA 98637

[REDACTED]

[REDACTED]

June 3, 2015

Dune Prairie Plant Recommendations for Breaker's Point Homeowners Association

Breakers Point Home Owners Association
Bruce Francis, Manager
P.O. Box 246
Cannon Beach, Oregon 97110

Site

Breaker's Point Home Owners Association (HOA) borders the ocean beach north of Ecola Creek, Cannon Beach, Oregon. I was contacted in Spring 2015 by Douglas Ray, followed by Bruce Francis, Manager, about developing a plan to improve plant species diversity in the dunes west of the HOA buildings. This would follow a planned regrade of a portion of the dunes, to move sand on the west side of the dunes into the open beach area to lower the dune height. The proposed impact area is 295 ft north to south, and varies from 150 to 285 ft east to west. See Tom Horning's letter of May 25, 2015, for details on this project. A figure from his letter is included to show the approximate Area One and Area Two locations, detailed below.

Current conditions

The dune prairie between the buildings and beach on this property is several hundred feet wide, and is a monoculture of *Ammophila arenaria*, European beachgrass, an introduced species that is now widespread on ocean beaches and coastal dunes in the Pacific Northwest. This area is better called a grassland due to the dominance of this one species of beachgrass in this area.

There is a very small amount of American dunegrass, *Leymus mollis*, along the open beach-side edge of this grassland; this is a native dunegrass. There are a few native species of wildflowers near the buildings on the east side of the dune prairie, with several more introduced plant species among them.

There is a small patch of American beachgrass, *Ammophila breviligulata*, sourced from a Great Lakes population and also not native, which has not done well. This site would make a good dune prairie test planting area. Other more vigorous strains of American beachgrass are co-dominants with European beachgrass on oceanside dunes on Clatsop Plains and the Long Beach Peninsula, north of the Columbia River.

Roosevelt elk regularly visit and trample the grassland, moving between Ecola State Park and Ecola Creek in Cannon Beach. Elk footprints and scat were seen throughout the site, and the manager concurred that elk are very common in the grassland and turf areas adjacent to the buildings.

On a site visit in Spring 2015, I saw small numbers (fewer than 100 individuals of each species) of beach strawberry, *Fragaria chiloensis*, beach pea, *Lathyrus japonicus*, and a small few native blackberry vines, *Rubus ursinus*. Introduced species on this site included red sorrel, *Rumex acetosella*,

hairy catsear, *Hypochaeris radicata*, evergreen blackberry, *Rubus armeniacus*, These plants were on the east edge of the grassland near the mown turf areas, where a thin soil layer is beginning to develop. These are the oldest areas of the dunefield, so soil development is more advanced here.

There were no patches of taller nectaring plants, such as yarrow, *Achillea millefolium*, or Douglas aster, *Aster subspicatus*, so potential use by pollinating insects is limited. One butterfly, probably a Western Painted Lady, flew into the grassland during this site visit. It was a warm day in May, with temperatures in the low 80s, so butterflies were very active.

Along the immediate east edge of the dune grassland there are several planted patches of Rugosa Rose; these border the mown lawn strip between the dunes and buildings. This rose is not native, and does well in sand dunes and salt wind locations. While there is a native rose (Nootka rose, *Rosa nutkana*) that could be planted in its place, there is no need to remove or disturb the Rugosa Rose plants. While the natural transition in dunes is to woody species of shrubs and trees, this is not being proposed for this site.

Potential for ESA Listed Species to Occupy Site

When Willapa National Wildlife Refuge created habitat for Western Snowy Plovers, *Charadrius nivosus nivosus*, more than ten years ago at Leadbetter Point, on the south side of the entrance to Willapa Bay in Pacific County, Washington, the immediate outcome was that Streaked Horned Larks, *Eremophila alpestris strigata*, also occupied the site. Then a rare native plant of open sand, Pink Sand-verbena, *Abronia umbellata*, reappeared after an absence of more than 60 years.

The refuge planned and created habitat for one listed species, and found that three species occupied it. Therefore, the HOA should be aware that while the dunes will be opened and lowered to preserve views for owners, that this could create habitat for birds and plants that require open sand habitats to thrive.

When the dense monoculture of beachgrass (*Ammophila arenaria*) is reduced, and native beach and dune conditions restored, then there is an opportunity for plants and animals that use this habitat to return. Several species are dependent on open sandy sites to live and thrive. Beachgrasses have hugely reduced this habitat on beaches in the Pacific Northwest over the past century. See List 1 for plants that thrive in open sand on local beaches.

Under the US Endangered Species Act (ESA), the following species have been listed, largely due to loss of habitat.

Two ground-nesting birds may occupy open sand/sparsely vegetated habitats. The following species nest in open sandy sites on Pacific Northwest beaches, with little or no vegetative cover.

Western Snowy Plover, *Charadrius nivosus nivosus*

Streaked Horned Lark, *Eremophila alpestris strigata*

Plovers prefer relatively flat and open ground with shells and small pieces of driftwood scattered over the surface. They nest on this open surface, relying on cryptic coloration of eggs, chicks and adults to protect them from predators. Chicks are precocial and can run about and feed themselves within hours of hatching. They forage from the high tide line upward.

Larks prefer sites hidden around plant clumps, such as those created by Silky Beach Pea, *Lathyrus littoralis*, and other species that form mounds more than 18 inches tall and wide. Nests are hidden among vegetation, and chicks are not precocial, relying on parents to feed them until they fledge.

Pink Sand-verbena, *Abronia umbellata*, is a short-lived, taprooted flowering plant of open sand along ocean beaches. Until it reappeared at Leadbetter Point in the Snowy Plover Habitat Restoration Area, it had been extirpated from Washington for more than sixty years. It is thought that deeply buried seeds in the sand dunes germinated once the overburden of sand and beachgrass was scraped away.

All three species are state or federally listed under the Endangered Species Act.

For a recent report on Leadbetter's Western Snowy Plover population and site, see <http://wdfw.wa.gov/publications/01625/wdfw01625.pdf> .

For information on plover sites on Oregon beaches, see <http://www.fws.gov/oregonfwo/FieldOffices/Newport/WesternSnowyPlover/HabitatRestoration.asp> .

For information about Streaked Horned Larks in the Pacific Northwest see http://www.oregon.gov/aviation/docs/Streak_Horned_Lark_and_Airports.pdf , http://wdfw.wa.gov/conservation/endangered/species/streaked_horned_lark.pdf , and <http://www.fws.gov/oregonfwo/Species/Data/StreakedHornedLark/> .

Pink sand-verbena lives from Vancouver Island to California along the coast, and is listed as a Species Of Concern in Oregon, and grows on some ocean beaches. For more information, see <http://www.oregon.gov/oda/shared/Documents/Publications/PlantConservation/AbroniaUmbellataBrevifloraProfile.pdf> .

Recommendations

The goal of these recommendations is to find cost-effective ways to increase native plant species to the site in two areas, one with stable sand levels and the other with open, mobile sand, despite the presence of large wild herbivores.

If carried out, these actions should:

- Determine the most cost-effective way to establish native plants,
- Increase onsite plant diversity,
- Improve habitat for native ground-nesting birds,
- Improve habitat for butterflies and other pollinators, and
- Establish seed and plant sources on site for later planting on the property.

To increase the presence of native plant species, I recommend creating several planting areas on stable sand surfaces (Area One) and in the west edge of the dunes to test methods of establishment on mobile sand surfaces (Area Two).

As elk are present on site, and capable of pulling up newly installed plants and seedlings, a combination of methods should be tested, to determine the most cost-effective and elk-resistant processes. These are Area One Recommendations, below. Once plants have established outside the exclosures, then these should be removed. This may take 3-4 years.

Fall planting or seeding is recommended, as this is the time of year when native species naturally germinate and grow, after the summer dry season is past. For more species suggestions in dunes, see Appendix 1, List 1.

On the west edge of the dunes after regrading is complete, I recommend fall seeding of several plant species that prefer open mobile sand surfaces. These are Area Two Recommendations, below. For more details on planting suggestions in open sand habitats, see Appendix 2.

Area One Recommendations, in the dune prairie near buildings

1. Compare elk exclosures to open plots to measure plant survival: Install two exclosures (elk-resistant fencing) 500 ft square (25 ft per side). Stake two areas of similar size (25 ft per side). These should be located in visually unobtrusive areas where the beachgrass is naturally less dense. The size can be adjusted upwards if desirable. These will be located southeast of the sand removal area, see Tom Horning's letter of May 25, 2015, Figure 4, for details of where this is located. This image is also included in this report, Figure 1, Appendix 1.
2. Inside these marked and fenced areas, amend the sand with compost and biochar, to mimic soil development in a natural dune prairie. If only seeds are used, then spread these seeds on the surface, and do not till them into the sand.
3. Monitor over the next few years, to compare all four areas. Plants plus seeds could be compared on all four plots; or, as seeding will be less expensive, use only seeds, and compare exclosures to open areas.
4. Plant/seed in the fall after the onset of cooler weather and fall rains.

5. Plant Species* to test initially in the stable dune area, Area One. Based on seed availability this summer, the goal is to plant at least six species from this list:

Yarrow, *Achillea millefolium*
Pearly Everlasting, *Anaphalis margaritacea*
Henderson's Angelica, *Angelica hendersonii*
Sea Thrift, *Armeria maritima*
Douglas Aster, *Aster subspicatus*
Sanddune Sedge, *Carex pansa*
Beach morning-glory, *Convolvulus soldanella*
Beach Pea, *Lathyrus japonicus*
Beach Lupine, *Lupinus littoralis*
Sanddune Goldenrod, *Solidago spathulata*
Dune Tansy, *Tanacetum camphoratum*

*These plant species are native to the north coast of Oregon and grow nearby in dunes.

Area Two Recommendations, in the outer (western) dunes, on open sands

1. Mark four areas of 500 -1,000 sq ft each with stakes inside the regraded area (Figure 4 in Horning's letter of May 25, 2015). These sites should be widely spaced, and no closer together than 50 ft.
2. The regraded area should be fenced off and signed to reduce access.
3. Seed all plant species into each area in mid to late Fall 2015, broadcasting widely, as these species grow widely spaced on open sand, and not in dense meadows. As species establish, they will spread out of the initial sites; each species is adapted to wind and sand dispersal of seeds, and in some cases, plant fragments.
4. Do not use soil amendments in these areas. The goal is to establish native species on natural habitat, which is open mobile sand. There is no soil in this habitat.
5. Put out seeds in fall, after onset of rain, and after dune grading is complete.

6. Plant Species* to test in the open sand area. The goal is to plant at least five species on this list, based on seed availability this summer and fall:

Yellow Sand-verbena, *Abronia latifolia*
Pink Sand-verbena, *Abronia umbellata*
Silver Bursage, *Ambrosia chamissonis*
Big-headed sedge, *Carex macrocephala*
Beach Carrot, *Glehnia littoralis*
Sea Purslane, *Honckenya littoralis*

Silky Beach Pea, *Lathyrus littoralis*
American dunegrass, *Leymus mollis*
Beach Lupine, *Lupinus littoralis*

* These species are native to the north coast of Oregon and grow nearby on open sand beaches.

Monitoring recommendations

1. Visit the marked sites in both areas in midsummer 2016 to 2018 to check for seedlings/plant survival. If species germinate and grow, seedlings will initially be visible in late spring and summer of 2016.
2. Monitor for elk activity in at least one staked plot, by installing a wildlife camera in a suitable location, which takes a picture whenever a large animal triggers it. This includes people, dogs, elk, deer, bears, large birds, and other animals. These cameras are battery powered, and can run for weeks to months without maintenance. They are mounted on posts with cross stakes for support, and are relatively waterproof. Optimal placements are to: face north (away from the sun and rain), and be adjacent to the plots.
3. Monitor open sand area for plant establishment over the next 3 years. Despite the harsh conditions, plants adapted to open sand environments germinate and grow rapidly, and if the site is acceptable, they spread quickly (via seeds) out of initial locations. Monitoring of all plots will be visual, with photo documentation.
4. Monitor open sand area for bird use, particularly for nesting birds. Consult with USFWS on timing of surveys for bird use, and hire an experienced birder to complete the surveys each summer during nesting season.
5. These birds will not nest successfully if disturbed regularly by people or animals. The HOA should plan on marking and signing the open sand area to keep people and pets out, especially during nesting/fledging season (March through October). Only people involved in surveying birds and plants in this area should enter. Any existing trails across this area should be closed and rerouted to north or south around it.
6. Report on elk impacts to planted areas, bird use, and plant survival/establishment in Fall 2016 and in following years.
7. Make recommendations to improve success in coming years during Fall 2016, based on initial findings.
8. Add additional plant species in following years, and continue monitoring birds and plants for

several years in these sites. See List 1, Appendix 1, for a list of native plant species common to high quality dune prairies, and List 2, Appendix 1, for native wetland plants common to dune prairies. These include species that could be added to Area One in later years. List 3, Appendix 1, is a list of native plants to open sand beaches and open areas in dunes, and includes species that are found on dynamic open sand beaches and into dune prairies.

Measures of Success

1. Establishment of two or more plant species in Area One in the exclosures and in the staked plots; these are species on the Area One list.
2. Establishment of two or more plant species in the staked plots of Area Two. These are species on the Area Two list.
3. Establishment of plant species outside the staked plots and exclosures in Area One, from the Area One list.
4. Establishment of plant species outside the staked plots of Area Two, from the Area Two list.
5. Presence of birds that require open sand habitats. This includes Western Snowy Plovers and Streaked Horned Larks. There are other ground nesting birds that may use the site.
6. Presence of other animals that use open sand and native dune prairie habitats. This includes native pollinators (bees, butterflies and other insects).

Appendix One

List 1. Native plants of coastal dune prairies

List 2. Native plants of wetlands in coastal dune prairies

List 3. Native plants of open sand beaches and dunes

Figure 1. Approximate locations of test plots, Area One and Area Two. Graphic from Tom Horning's letter of May 25, 2015, Figure 4.

List One. Native Plants of Coastal Dune Prairies

Graminoids (grasses, rushes, sedges):

- Agrostis exarata, spike bentgrass
- Calamagrostis nutkensis, Pacific reedgrass
- Carex brevicaulis, short-stemmed sedge
- Carex pansa, sand-dune sedge
- Danthonia californica, California oatgrass
- Leymus mollis, American dunegrass
- Poa confinis, dune bluegrass
- Poa macrantha, seashore bluegrass

Perennials:

- Achillea millefolium, yarrow
- Allium cernuum, nodding onion
- Anaphalis margaritacea, pearly-everlasting
- Angelica hendersonii, sea-coast angelica
- Agoseris apargioides, seaside agoseris
- Armeria maritima, sea thrift
- Artemisia campestris, silky field wormwood
- Artemisia suksdorfii, coast wormwood
- Aster chilensis, California aster
- Calystegia convolvulus, beach morning-glory
- Cardionema ramosissima, sand-bur
- Castilleja littoralis, Pacific paintbrush
- Cerastium arvense, field chickweed
- Cirsium brevistylum, short-styled thistle
- Cirsium edule, edible thistle
- Erigeron glaucus, beach fleabane, or beach daisy
- Fragaria chiloensis, beach strawberry
- Fritillaria affinis, chocolate lily
- Glehnia littoralis ssp. leiocarpa, beach carrot
- Lathyrus japonica, beach pea
- Lotus formosissimus, seaside birds-foot trefoil
- Lupinus littoralis, beach lupine
- Piperia elegans, coast piperia
- Polygonum paronychia, black knotweed
- Ranunculus occidentalis, western buttercup
- Sanicula arctopoides, footsteps-of-Spring
- Solidago simplex var. spathulata, coast goldenrod
- Spiranthes romanzoffiana, hooded lady's-tresses
- Tanacetum camphoratum, dune tansy

Trifolium wormskjoldii, coast clover
Triteleia coronaria, harvest brodiaea
Triteleia hyacinthina, white brodiaea
Vicia americana, American vetch
Vicia gigantea, giant vetch
Viola adunca, early blue violet

Shrubs/woody plants:

Arctostaphylos uva-ursi, bearberry or kinnikinnick
Baacharis pilularis, coyote brush
Gaultheria shallon, salal
Lonicera involucrata, black twinberry
Myrica californica, Pacific wax myrtle
Rubus ursinus, Pacific blackberry
Vaccinium ovatum, evergreen huckleberry
Vaccinium parvifolium, red huckleberry

Ferns:

Botrychium lanceolatum, leathery grape-fern
Polypodium glycyrrhiza, western licorice fern
Polystichum munitum, western sword fern
Pteridium aquilinum, bracken

List 2. Common native plants of wetlands in coastal dunes

Graminoids (grasses, rushes, sedges):

Carex obnupta, slough sedge
Eleocharis palustris, creeping spikerush
Eriophorum chamissonis, russet cotton-grass
Juncus acuminatus, sharp-fruited rush
Juncus articulatus, jointed-leaf rush
Juncus bolanderi, Bolander's rush
Juncus bufonius, toad rush (native phenotype)
Juncus falcatus, sickle-leaved rush
Juncus lesueurii, salt rush
Juncus phaeocephalus, brown-headed rush
Juncus supiniformis, hair-leaved rush

Perennials:

Aster subspicatus, Douglas aster
Centarium erythraea, rosy centaury
Epilobium ciliatum, Pacific willow-herb
Gentiana sceptrum, king's gentian
Euthamnia occidentalis, western goldenrod
Gnaphalium purpureum, purple cudweed
Hypericum anagalloides, bog St. John's wort
Lathyrus palustris, marsh pea
Oenanthe sarmentosa, Pacific water-parsley
Potentilla egedii, Pacific silverweed
Potentilla palustris, marsh cinquefoil
Ranunculus flammula, creeping spearwort
Sisyrinchium californicum, golden-eyed grass
Sisyrinchium idahoensis, Idaho blue-eyed grass
Viola palustris, marsh violet

Shrubs/woody plants:

Salix hookeriana, Hooker's willow
Salix scouleriana, Scouler's willow
Spiraea douglasii, Douglas spirea, or rosebay spirea

Ferns:

Athyrium filix-femina, ladyfern

List 3. Native plants of open sand beaches and into dunes

Graminoids (grasses, rushes, sedges):

Carex macrocephala, big-headed sedge

Leymus mollis, American dunegrass

Perennials:

Abronia latifolia, yellow sand-verbena

Abronia umbellata, pink sand-verbena

Ambrosia chamissonis, silver bur-sage

Calystegia convolvulus, beach morning-glory

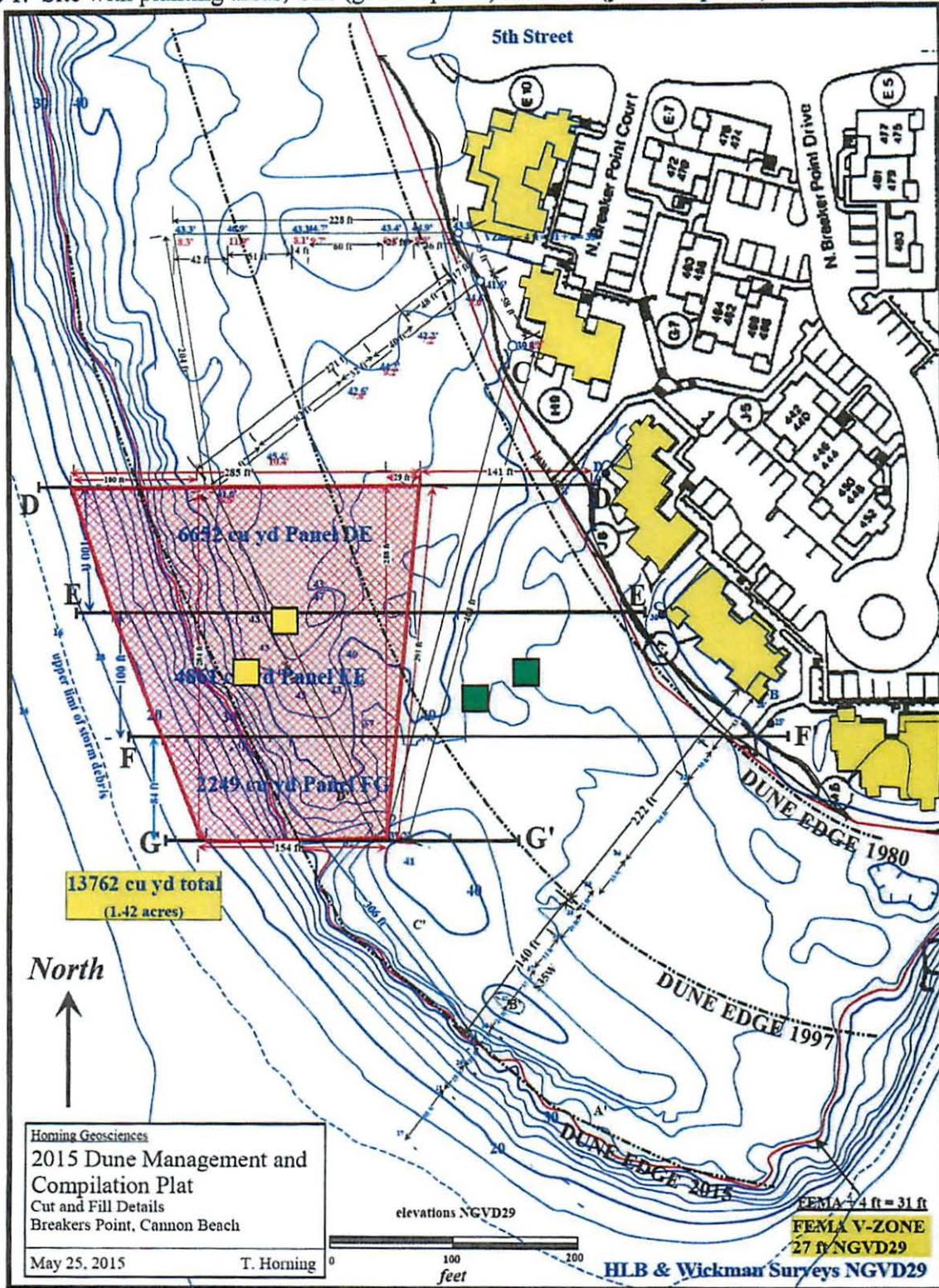
Glehnia littoralis ssp. leiocarpa, beach carrot

Honckenya peploides, sea purslane

Lathyrus littoralis, silky beach pea

Rumex maritimus, seaside dock

Figure 1. Site with planting areas, One (green squares) and Two (yellow squares) indicated.



Appendix Two. Planting notes for coastal dunes.

Coastal Dune Prairie Landscapes

Relict prairies found along the ocean on dunes in the Pacific Northwest are attractive meadow plant communities. These communities are easy to maintain, and are drought-resistant, fire-resistant and durable. They are composed of grasses, sedges and perennials. Prairies, also called meadows, are common in drier climates, and are found in both colder and warmer regions with less rainfall. The structure of these prairies is similar to ours, as each one has a mix of grasses, sedges and wildflowers. 'Grassland,' 'prairie' and 'meadow' are used in this handout to describe these *grass-plus-wildflowers* communities.

Many of the plant species that live in natural meadows are tough perennials; perennials persist and thrive for many years once they have established. Meadows, and especially dune prairies, provide important habitat for butterflies, many other insects, birds and small mammals, and flow smoothly into other native landscapes. The major management issue around homes in the dunes to maintain meadows or prairies is keeping out woody species. This is simple to do with annual hand weeding or mowing.

There is also room for personal preferences in developing each meadow. Wildflowers bloom over several months, providing a diverse palette of plant heights, leaf textures, leaf colors and flower colors. Species can be selected based on these colors and textures, and clumped or massed according to personal preference.

Basic approach—Three Levels of Meadow from Turf to Tall Prairie:

A progression in heights, from lawn (turf; irrigated and mown regularly) to low meadow to tall meadow, is used from the home out to the dune grassland. The latter two plant communities (low and tall meadows) are mown at most a few times each year and not watered at all after initial planting.

The combination of turf, low meadow and tall meadow gives homeowners several benefits:

- Fire protection buffer between home and dune grasslands
- Lawn for children (which *does* need water, fertilizer and regular mowing)
- Visually smooth transition to wildflower and grassy meadow areas

These meadows are low near the turf area (4 to 6 inches in fall and winter; somewhat taller during flowering and seed set), and much taller further out (18-30 inches, year round) where the landscape reaches dune grasslands. If you live next to wetlands or forests, there are additional options for visually smooth transitions to these plant communities.

Meadow areas need little to no mowing or watering compared to turf, and are attractive, low-maintenance habitats that are desirable to wildlife, especially birds and insects like butterflies. It is also possible to add non-native wildflowers to provide additional color and textural interest. Note that these species must be able to tolerate summer drought.

General Installation Guidelines:

1. Mimic a thousand years of soil building by using compost and biochar to add carbon to the soil. Add mulches to keep water in soil and reduce evaporation.

Use compost and biochar as sheet soil amendments on the surface, and tilled in, and around each plant's roots to provide a soil and nutrient base for the plant to use for growth. Two to four inches of compost or biochar, or both, tilled into the upper eight to ten inches of soil is a good base for seeded turf in sand.

Work additional compost into planting holes where root systems are deeper than eight inches — a basic guideline is one-third the hole's soil volume replaced by compost plus biochar, well mixed with native soil. Soak the hole with water before adding the plant. Remember to water in the new plants every day it doesn't rain while planting.

Install sod on a base of natural on-site sand plus amendments. If you are putting in an irrigation system for the turf, install turf as seed or sod, and irrigate based on usual guidelines for sandy soils. As with perennial wildflowers, grasses often settle in more quickly when installed in the fall.

In tall meadow areas and especially on slopes, mulches on top of the soil help it hold on to soil amendments, sand and soil moisture. Select a coarse mulch to install, one that is not blown around by wind or washed downhill during rainstorms. Especially on steep slopes (angle of repose >20 degrees), consider jute mesh to keep the soil surface in place while plants establish. Jute will decay in place over a couple of years. By the time the mesh breaks down, the new plants will be solidly anchored, and your new landscape will be off to a great start.

2. Take advantage of nature's growth cycle *and* climate — plant and seed in the fall.

The optimal time to install landscapes along the coast is early to mid fall, prior to or just as fall rains begin; this ranges from late September to early November. In nature, this is when many perennial seeds germinate and older plants build up their root systems.

Plant roots grow during cooler weather whenever soil temperatures are above 40 °F. Fall-planted plants also need less water in coming seasons. It's like getting a full year's jump on plant growth.

3. If you plant at other times than fall, remember to water regularly during the first few dry seasons (2-3 years). Water every week, and thoroughly, so that water gets down to the roots. Remember that in sand, moisture does not spread laterally more than a few inches.

The Pacific Northwest coast has a distinct dry season, a cool Mediterranean climate, with less than one inch of rain falling per month for more than three months. Planting at the start of the dry season means that new plants must put out roots and shoots, and flower while under prolonged water stress.

In addition, planting on coastal dunes means planting in *sand*, which is often stripped of all organic material, or never had any carbon to begin with. Adding carbon gives the soil needed organics, which improves water and nutrient storage. Regular summer watering compensates for planting at the optimal time of year—in the fall. Or save money, and do the right thing for the plants, and plant in fall.

General Maintenance Guidelines:

Turf: Water turf regularly, as needed during the dry season; fertilize as recommended by your turf specialist for sandy soils; and mow regularly at the recommended height.

Hand weed to remove unwanted species. Be on the lookout for sand bur (*Cardionema ramosissima*) and trail-weed or lawn-weed (*Soliva sessilis*). Both can make lawns unbearable for bare feet. These sticker-seeded plants can be kept out with winter and spring weeding. Herbicides can be used, but must be applied in the fall, when their seeds germinate. Vinegar is a good alternative for trail-weed seedlings in fall and winter, applied during dry weather.

Low Prairie: Mow in late summer or early fall to a height of four to six inches, unless fire danger is extreme; in this case mow even lower when the adjacent dune grasslands dry out to keep wildfires from reaching your home.

- If seeds of desirable perennials are available, scatter seeds as they ripen where new plants are desired. This helps them spread.
- Shred when you mow to scatter mowings on the meadow and help these materials break down, adding organic matter to the soil.

Hand weed to remove unwanted species. Keep woody plants and aggressive species out, including gorse, Scots broom, bull thistle, velvet grass, reed canary grass, hairy cat's-ear, tansy ragwort, Japanese knotweed, and sow thistle.

Tall Prairie: Tall meadows can be left until late winter for an annual mowing before new growth begins.

- Leave foliage on ferns until late winter; clip off old fronds before new fronds unroll.
- If a tidy edge or transition zone is desired, cut perennials with a hand held brush cutter, or by hand, edging and mowing between clumps of grass.
- Do not mow during the spring or summer.

Hand weed woody plants to keep them out of the tall prairie. These include tree seedlings (pine, alder, willow, etc), shrubs like gorse and Scots broom, and non-desirable herbaceous species, as mentioned above in the low prairie section.

SPECIFICS ON PLANTS & PLANTING DENSITIES

Coastal Turf: On sand dunes, the turf or lawn area should be seeded with a mix of fescues and perennial ryes. These grasses do well in mild climates, look good year round, and can tolerate high traffic and regular mowing.

Locate turf areas close to the house, and plan to use them as a firebreak between your home and natural areas.

Grass turf needs water and soil amendments; it should be mown regularly, and maintained with regular fertilizing. Adding compost and biochar to the soil helps grasses establish and grow well. Because the coast has a long wet season, mosses are common invaders, especially in shady areas. Aeration, proper use of fertilizers, and good winter drainage help keep mosses from overtaking grasses.

Hand-weed to remove unwanted species. Be on the lookout for sand bur (*Cardionema ramosissima*) and trail-weed or lawn-weed (*Soliva sessilis*). The former is native and perennial with very spiny seeds; the latter is from southern South America and a winter annual (seeds germinate in the fall, the plant grows over winter, and flowers in the spring, then dies), also with spiny seeds. Both can make lawns unbearable for bare feet, and can be kept out with careful winter and spring weeding. Herbicides can be used, but must be applied in the fall, when seeds germinate.

List 1. Turf grasses for coastal lawns —

Turf grasses: Follow seeding guidelines for coverage per thousand feet. Selections that do well here include:

- Red fescue, *Festuca rubra*
- Idaho fescue, *Festuca idahoensis*
- Chewings fescue
- Other fescue varieties suitable for coastal temperate conditions
- Tall hairgrass, *Deschampsia cespitosa*
- Perennial rye

Other plants: These often appear in sandy turf, and are easy to maintain in the lawn. None of them produce spiny fruits, leaves or are otherwise obnoxious.

- English daisy, *Bellis perennis*
- Cut-leaved plantain, *Plantago coronopus*
- Sea thrift, *Armeria maritima*
- Coast strawberry, *Fragaria chiloensis*

Mosses: Mosses will inevitably appear in turf, particularly in shady, wet areas. They are markers for wet, acidic soils.

In shady areas, it may be easier to live with moss rather than fight it.

Reduce mosses with good winter drainage, moss killers (usually containing iron), and regular summer water to encourage healthy grass growth. The best time to rejuvenate a mossy lawn is fall.

Low Meadow: Seed the meadow framework with red fescue or similar fescue hybrids, California oatgrass, and coast strawberry. Strawberries can be planted every 5 ft on center. These plants form the framework of the prairie. Sedges include short-stemmed and sanddune sedge; both grow in low turfs. Short-stemmed sedge is a particularly dense clump-former with a golden-green turf.

Along the Pacific Northwest coast, this framework of grasses and sedges is the backdrop for dozens of wildflowers, including nodding onion, white and harvest brodiaea, Oregon iris, checkered lily, coast goldenrod, yarrow, coast tansy, blue violets, western buttercup, sea thrift, and other species. These flowers are generally 12-18 inches tall or shorter; pre-flowering leaves are often less than 10 inches tall. Plants can be selected by color, height and time of flowering, or a full palette can be used to closely mimic the diversity of native meadows.

Low meadow needs little to no water, can be mown in late summer to about 4 inches high, after wildflowers are past flowering. These species provides months of flowers during the growing season. The meadow is drought and fire-tolerant once the plants are established, and does not need much fertilizer to maintain bloom. In fact, compost is better for this plant community than fertilizer. For best establishment, fall seeding and planting is recommended.

Low meadow is allowed to grow taller during spring and summer flowering periods so that plants can grow, flower and set seed.

Once plants have established, low meadow does not need irrigation. Note that some species absolutely require summer drought to thrive. These include native brodiaeas and fritillaries, which are bulbs that require dry summers to grow well, and will not thrive with summer irrigation.

Annual maintenance includes hand-weeding to remove undesirable species, and late summer to early fall mowing, to 4-6 inches height. Clippings should be shredded and left on the meadow during mowing. Species to weed out and remove include gorse, Scots broom, bull thistle, velvet grass, reed canary grass, hairy cat's-ear, tansy ragwort, and sow thistle, velvet grass, pines, and woody shrubs of all kinds.

If seedpods of desirable perennials are available, open pods when seeds are ripe and scatter where new plants are desired. This helps them spread. Shred as you mow to scatter leaves and shoots on the meadow and help these materials break down, adding organic matter to the soil.

List 2. Low meadow grasses, sedges and wildflowers — Spacing is given as between plants on center, one per one square foot, one per three square feet, et cetera.

Framework plants: These plants are the common or dominant plants in the low meadow. All thrive with regular mowing each fall. Red fescue is the main species, and forms the framework for other plants.

Plant species	Density or spacing	Per 1000 SF, or patch size	Note
Red fescue, <i>Festuca rubra</i> or closely related <i>F. idahoensis</i>	Seed at normal turf rates, or 1 plt per 1 sf	1,000/1K sf	Some forms have blue-green foliage
Tall hairgrass, <i>Deschampsia cespitosa</i>	Seed at normal turf rates, or 1 plt per 4 sf	250/ 1K sf	Native to salt marshes, flower spikes are 3-5 ft tall
Coast strawberry, <i>Fragaria chiloensis</i>	1 per 5 sf	200/1K sf	Sends out runners and spreads rapidly
California oatgrass, <i>Danthonia californica</i>	1 per 1 sf, in clumps of 5 or more plants	100/1K sf	Clump or patch up to 100 plts
Short-stemmed sedge, <i>Carex brevicaulis</i>	1 per 1 sf, in clumps of 5 or more plants	10 to 100 plts/P	Grows in gold-green dense clumps
Sanddune sedge, <i>Carex pansa</i>	1 per 1 sf, in clumps of 5 or more plants	5 to 10 plts/P	Grows in open patches
Coast goldenrod, <i>Solidago spathulata</i>	1 per 2-3 sf, in clumps of 3 or more	5 to 20 plts/P	Grows in dense patches. Spreads widely

Other plants: Plant in clumps, 3-5 plants or more, patches of 100 sf, or in masses, > 100 sf, to replicate historic dune prairie. Brodiaeas and fritillaries grow naturally in large masses. Lilies grow naturally in clumps. Spacing is given between plants on center.

Plant species	Spacing	Clump, patch or mass, or note
Nodding onion, <i>Allium cernuum</i>	1 plant per 1 sf	C,P, 3 or more plants
White brodiaea, <i>Brodiaea hyacinthina</i> or <i>Triteleia hyacinthina</i>	1 plant per 1 sf	C,P, M, 100 sf patches; absolutely needs summer drought to thrive
Harvest brodiaea, <i>Brodiaea coronaria</i> or <i>Dichelostemma coronaria</i>	1 plant per 1 sf	C,P, M, 100 sf patches; absolutely needs summer drought to thrive
Oregon iris, <i>Iris tenax</i>	1 plant per 1 sf	C or P, 3 plants or more
Checkered lily, <i>Fritillary lanceolata</i> or <i>F. affinis</i>	1 plant per 1 sf	C,P, M, 100 sf patches; absolutely needs summer drought to thrive
Columbia lily, <i>Lilium columbianum</i>	1 plant per 1 sf	C or P, 3 to 10 plants
Seashore bluegrass, <i>Poa macrantha</i>	1 plant per 2 sf	C or P, 3 to 10 plants
Little beach bluegrass, <i>Poa confinis</i>	1 plant per 1 sf	C or P, 3 to 10 plants
Yarrow, <i>Achillea millifolium</i>	1 plant per 2 sf	C, 3 or more plants
Coast tansy, <i>Tanacetum douglasii</i>	1 plant per 2 sf	C, 3 or more plants
Footsteps-of-Spring, <i>Sanicula arctopoides</i>	1 plant per sf	C or P, 3 or more plants, biennial, let seed and spread in open areas
Early blue violet, <i>Viola adunca</i>	1 plant per 1 sf	C or P, very low
Western buttercup, <i>Ranunculus occidentalis</i>	1 plant per 1 sf	C, sprawls among other plants
Sea thrift, <i>Armeria maritima</i>	1 plant per 1 sf	C or P, 5 or more plants

Beach daisy, <i>Erigeron glaucus</i>	1 plant per 2 sf	C or P, 3 to 5 plants, low
Douglas aster, <i>Aster subspicatus</i>	1 plant per 10 sf	C or P, 3 to 5 plants, tall
Kinnikinnick, <i>Arctostaphylos uva-ursi</i>	1 plant per 3 sf	C or P, especially to woods, low
Edible thistle, <i>Cirsium edule</i>	1 plant per 5 sf	C, 3 or more plants, tall
Black knotweed, <i>Polygonum paronychia</i>	1 plant per 3 sf	C, low open areas, low

Tall Meadow: This meadow has taller framework plants, to 3 feet high before flowering; these species do not tolerate regular low mowing but form dense thick cover, which is particularly useful on steep windy slopes to retain soil.

Common species include Pacific reedgrass and sword fern. These species are wind and salt tolerant once established and withstand drought. These tall framework species form a dense, tough layer that is particularly good for steep slopes, and for windy, salty sites. Woody perennials are included; these are common in grasslands dominated by Pacific reedgrass. Yarrow, coast tansy, fireweed, Pacific brome, California figwort and giant vetch are common native wildflowers in tall dune prairies.

American dunegrass is our only native dune grass, with very attractive bluegreen foliage. Refer to the low meadow list for wildflowers to grow with this grass. Plant framework grasses in separate areas; use dunegrass for shorter meadows and Pacific reedgrass for taller meadows. Pacific reedgrass is a very useful framework plant, and grows on steep slopes and into wetlands in our area. With reedgrass, plant ferns and other species on the following lists to increase diversity.

Tall meadows often transition to shrubs, such as Pacific wax myrtle, twinberry, wild rose, snowberry, serviceberry and salal, or to forest areas. Recommendations for transition areas into forests, List 4, and wetlands, List 5, follow this section.

Introduced shrubs and perennials—drought/salt/wind tolerant and more than 2 ft tall—can also be planted in tall meadows. Plants to consider include hebes, lavenders and sages. Airy tall grasses like tall stipa (*Stipa gigantea*) add a good vertical element to reedgrass and dunegrass meadows. As with low meadows, there is considerable room for personal preferences in color. The major requirement is that all plants be drought tolerant and capable of surviving without additional summer water after the first 1-3 years.

Tall meadows are mown short at most once each year (in late winter) to keep woody species down, or left alone to provide winter habitat for birds, amphibians and small mammals. Leave foliage on ferns until late winter, then clip off old fronds before new fronds unroll. If a tidy edge or transition zone is desired between tall and low meadow, cut perennials with a hand held brush cutter, edging and mowing between clumps of grass. Pacific reedgrass should be allowed to maintain a height of at least 18-24 inches during the winter.

Undesirable species are weeded out by hand, instead of mowing. Gorse, Scots broom, introduced blackberries, velvet grass and bull thistle need to be kept out of tall meadows and can be weeded out by hand as they appear. Also hand-weed to remove unwanted tree seedlings and undesirable herbs.

List 3. Tall prairie grasses, ferns and other plants — Spacing is given as between plants on center, one per one square foot, one per three square feet, et cetera. Pick one of the first two grasses, or plant in separate massed areas adjacent to each other.

Framework plants:

Plant species	Density or spacing	Per 1000 SF	Note
American dunegrass, <i>Leymus mollis</i>	1 plant per sf	1,000	Forms the framework, other plants are minor elements
Pacific reedgrass, <i>Calamagrostis nutkaensis</i>	1 plant per 3-5 sf	333 to 200	Forms the framework, other plants are minor elements
Sword fern, <i>Polystichum munitum</i>	1 plant per 5-10 sf	200 to 100	Thrives among reedgrass in sun
Salal, <i>Gautheria shallon</i>	1 plant per 3-5 sf	333 to 200	Grows among reedgrass clumps, esp forest edge
Red fescue, <i>Festuca rubra</i> or Idaho fescue, <i>Festuca idahohensis</i>	Seed at turf rates or 1 plt per sf	200 to 500, among other plants	Use as a cover between reedgrass clumps while first establishing plantings

Other plants: Interplant in clumps, on 5 to 10 ft spacing, with 3, 5, 7 or more plants, within clumps, plants of each type are 1-3 ft apart. Patches are larger, with more than 20 plants, among framework plants. Spacing is given as between plants on center, one per one square foot, one per three square feet, et cetera.

Plant species	Density or spacing	Note
Columbia brome, <i>Bromus communis</i>	1 plant per 1-3 sf, in patches	Tall grass, elegant
Tall stipa, <i>Stipa gigantea</i>	1 plant per 1-3 sf, in patches	Introduced, tall grass, elegant
Yarrow, <i>Achillea millifolium</i>	1 plant per 1-3 sf, in patches	Short perennial, grows in clumps
Coast tansy, <i>Tanacetum douglasii</i>	1 plant per 1-3 sf, in patches	Short perennial, grows in clumps
Pearly everlasting, <i>Anaphalis margaritacea</i>	1 plant per 1-3 sf, in patches	Short perennial, grows in clumps
Tall fireweed, <i>Epilobium angustifolium</i>	1 plant per 1-3 sf, in patches	Perennial, grows into large clumps
Edible thistle, <i>Cirsium edule</i>	1 plant per 1-3 sf, in patches	Tall perennial, good nectar plant
Douglas aster, <i>Aster subspicatus</i>	1 plant per 3 sf, in patches	Perennial, grows in large clumps
California figwort, <i>Scrophularia californica</i>	1 plant per 1-3 sf, in patches	Perennial, grows in large clumps
Giant vetch, <i>Vicia gigantea</i>	1 plant per 1-3 sf, in patches	Perennial vine, sprawls over other plants
Sea watch, <i>Angelica lucida</i>	1 plant per 3 sf, in patches	Tall perennial umbel
Henderson's angelica, <i>Angelica hendersonii</i>	1 plant per 3 sf, in patches	Tall perennial umbel

Transition Areas:

Forest Transition—

Plant shrubs and understory trees to create smooth transitions from planted tall meadow to natural forested area. If open understory is desired, use Pacific reedgrass instead to make a grassy transition into forest.

List 4. Forest Transition List—

Plant species	Density or spacing	Note
Salal, <i>Gaultheria shallon</i>	1 plant per 3-5 sf	Grows among reedgrass clumps, woody
Pacific wax myrtle, <i>Myrica californica</i>	1 plant per 5 sf	Tall and woody, shrub to understory tree
Red huckleberry, <i>Vaccinium parviflorum</i>	1 plant per 5 sf	Tall and woody, shrub
Evergreen huckleberry, <i>Vaccinium ovatum</i>	1 plant per 5 sf	Tall and woody, shrub
Black twinberry, <i>Lonicera involucrata</i>	1 plant per 5 sf	Tall and woody, shrub
Red elderberry, <i>Sambucus racemosa</i>	1 plant per 5 sf	Tall and woody, shrub to understory tree

Wetland Transition—

Developments around wetlands are regulated by state and federal agencies. Work with a wetlands specialist to enhance buffers on specific sites. The following list is offered so that developers and landscapers know some of the species that can be used to enhance the tall meadow to wetland boundary.

Wetland transition species grow from tall meadow to wetland areas; plant on edge of upland area down into wetlands. Pacific reedgrass also grows into wetlands, and can be used as framework into wetland if grasses are preferred. Natural transitions to marshy wetlands are often shrubby, with huckleberries, wax myrtle, Douglas spiraea and lady fern.

List 5. Wetland Transition List —

Plant species	Density or spacing	Note
Pacific wax myrtle, <i>Myrica californica</i>	1 plant per 5 sf	Tall shrub, grows right to wetland edge
Evergreen huckleberry, <i>Vaccinium ovatum</i>	1 plant per 5 sf	Tall shrub, grows right to wetland edge
Black twinberry, <i>Lonicera involucrata</i>	1 plant per 5 sf	Tall shrub, grows into wetland
Douglas spiraea, <i>Spiraea douglasii</i>	1 plant per 5 sf	Low shrub, grows into wetland
Sweet gale, <i>Myrica gale</i>	1 plant per 5 sf	Low shrub, grows into wetland
Lady fern, <i>Athyrium filix-femina</i>	1 plant per 2 sf	Fern, grows in wetlands

Dune Beachgrass Transition—

This transition is different than others in this document. Modern dune grasslands are dominated by beachgrasses, which are not native. Deliberate planting in the 20th Century replaced native dune prairies and stopped moving sand fields, both of which are natural to this coastal region, with introduced beachgrass species: European beachgrass, *Ammophila arenaria* and American beachgrass, *Ammophila breviligulata*. Pretty as these monocultures may be, they are not native, nor are they particularly good animal habitat.

These beachgrasses grow in dense meadows, unlike native dune prairies. They increase fire danger considerably, and crowd out many native plants, and the animals that depend on them for habitat. As an adjacent homeowner, you can push back on this monoculture by creating openings in the dense meadows and putting in seeds or plants in fall, or by adding deep borders of a mix of appropriate wildflowers to your turf areas alongside the dune grasslands.

Next to beachgrass grasslands, add native perennials in clumps and patches to break up the monoculture of beachgrass, bringing in more color and increasing visual interest in all seasons.

List 6. Dune Grassland Transition—

Plant species	Density or spacing	Note
Yarrow, <i>Achillea millifolium</i>	1 plant per 1-3 sf, in patches or large clumps	Short perennial, grows in clumps
Coast tansy, <i>Tanacetum douglasii</i>	1 plant per 1-3 sf, in patches or large clumps	Short perennial, grows in clumps
Pearly everlasting, <i>Anaphalis margaritacea</i>	1 plant per 1-3 sf, in patches or large clumps	Short perennial, grows in clumps
Tall fireweed, <i>Epilobium angustifolium</i>	1 plant per 1-3 sf, in patches	Perennial, grows into large clumps
Edible thistle, <i>Cirsium edule</i>	1 plant per 1-3 sf, in small patches	Tall perennial, good nectar plant
Douglas aster, <i>Aster subspicatus</i>	1 plant per 3 sf, in patches or large clumps	Perennial, grows in large clumps; prefers wetter areas
Giant vetch, <i>Vicia gigantea</i>	1 plant per 1-3 sf, in small patches	Perennial vine, sprawls over other plants
Henderson's angelica, <i>Angelica hendersonii</i>	1 plant per 3 sf, in small patches	Tall perennial umbel

Note: Removed from this list was Cow Parsnip, *Heracleum maximum*, a native parsley family wildflower. Cow parsnip has rash-inducing compounds in its skin that can make sensitive people break out in hives, or even cause anaphylaxis. While it is native, and beautiful, and a good pollinator plant, if children may play in these meadows, I strongly recommend not planting it.

Native Plant Material & Turf/Meadow Sources

Seed Sources for turf areas:

- 1 Garden supply stores — Usually a good source of seeds
- 2 Plant nurseries — Usually a good source for seeds and some perennials

Plant sources (which carry some if not all the above-mentioned native species):

- 3 Watershed Garden Works — Native plants, sizes from tubes to gallons, in Longview, Wash., www.watershedgardensworks.com. Grasses, sedges, some wildflowers and bulbs
- 4 Fourth Corner Nurseries — Native plants, tubes, minimum of 50 plts of each species, in Bellingham, Wash., www.fourthcornernurseries.com. Grasses, sedges, some wildflowers and bulbs
- 5 Telos Rare Bulbs — Native western bulbs, and dry climate bulbs from around the world, including all our native bulbs. Ship in late summer, during the Pacific West dormant season. www.telosrarebulbs.com.
- 6 ForestFarm — Native and cultivated plants from around the world. Tubes to multiple gallon sizes, www.forestfarm.com.
- 7 Also check listings for native plant nurseries on the web, via Washington Native Plant Society, Native Plant Society of Oregon, California Native Plant Society, using horticulture links.

Subject: Response to sections 5,6 and 7.

Section 5. addendum A, section 4, Project need.

After reviewing public testimony and detailed discussions among the restoration team there will be no use of fencing to exclude elk or people from the native dune plant restoration areas. Ideally it will be allowed to install either a simple steel T post and or a cedar log (untreated) post that we have special access to mount a small sign asking people to avoid trampling / travel within the restoration areas. It is important to note that in this first phase we are limited in the amount of native seed and native plant starts available and as the plan notes in the attached figure we will focus first on the core areas identified for ease of monitoring and to test the effectiveness of sowing native seed in both a windward and more leeward setting post dune grading. No enclosure fencing will used only T post or cedar log (OPRD's choice.) If Oregon parks has a preferred alternative to those two options please let us know the type and vendor to secure them.

Section 6. addendum 5, project impacts.

While the restoration plan notes the potential for Snowy plover and horned larks to utilize the restored native dune habitat the public opposition to the use of any fencing makes their use of the area for nesting problematic combined with the very high use of the Chapman beach by the public. Anthropogenic disturbance as OPRD well knows from its involvement in Snowy plover recovery efforts render moot the chance the restored area is used for nesting. It is likely that the area is utilized by transient birds if the native dune plant restoration project is successful in establishing a native dune plant assemblage with its associated biota of macroinvertebrates that both species of birds would find forage opportunities from.

OPRD has been a long time partner in the more than 25 million dollar effort to recovery the ESA listed Snowy plover on the Pacific coast in Oregon. This modest grading plan proposing for the first time to eliminate the use and replanting of non native European dune grass and instead test the potential to combine dune grading for view shed maintenance with best available restoration science for habitat development/restoration in support of ESA listed species should be supported.

Fee calculation.

Native plant material seeds and nursery stock: \$3,000.
Labor for native wilding seed and rooted stock collection: \$2,000.
Mulch and misc materials: \$1,000.
Labor for implementation: \$2,000.
Project management oversight: \$4,000.

Keith Keranen Excavating Inc: \$25,043.

TOTAL \$37,043.

As noted in the letter of support from the United States Fish and Wildlife Service their support is predicated on our efforts to restore native dune plant assemblages and that direct benefit to biodiversity that historically had association native dune plant dominated ecosystems not the non native monocultures of European beach grass that now dominate all the Oregon beaches.

The restoration plan will focus on the planting and post grading maintenance to exclude non native European beach grass from recolonizing the graded area and allow passive ecological successional processes to establish the sown and

installed plant material. Current OPRD policy and all Snowy plover recovery management areas require seasonal exclusion to the public. We are not proposing any closure only small areas of our core area plantings as shown in the restoration plan figure to have signage to encourage the public to avoid planted areas.

We intend as was committed to the Cannon Beach Planning commission to sow and plant as much of the graded area as we can secure native plant material for but with the understanding and proviso the majority of the graded dune area will be accessible to the public.

This project will provide open sand and a fore dune profile that will provide safe public use and benefits.

Bruce Francis

Property Manager Breakers Point HOA.

Keith Keranen Excavating, Inc.

P.O. Box 2031
Gearhart, OR 97138
503-717-2200
CCB# 173131 - DEQ#38452

Estimate

Date	Estimate #
11/4/2015	25347

Name / Address
Breakers Point Bruce Francis PO Box 246 Cannon Beach, OR 97110

Fax #
800-446-0263

E-mail
████████████████████

Web Site
www.keithkeranenexcavating.com

Project
W. of Breakers Point

Description	Qty	Total
JOB SITE: NW. OF BREAKERS POINT MIDWAY BETWEEN 5TH ST. AND ECOLA CREEK ESTUARY APPROX. 1.42 ACRES OF AREA SCOPE OF WORK: CUT AND REMOVE BEACH GRASS AND STOCKPILE ON EDGE OF WORK AREA PUSH AND RELOCATE SAND TO THE WEST TO BENCH BELOW. TOTAL CUBIC YDS. - 13,760 PLACE STOCKPILED BEACH GRASS OVER FINISHED WORK AREA PRICE PER YD. OF SAND RELOCATED - \$1.82		25,043.00

This bid is good for 30 days due to fluctuating costs. Any necessary permits are the responsibility of the customer.

Signature/Date _____

Total	\$25,043.00
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Breakers Point Office

P O Box 246
253 N. Breakers Point Drive
Cannon Beach, OR 97110
503-436-2981

Office Hours:

Monday through Sunday 9:00 am– 5:00 pm (closed between 12:00-1:30)
Days closed are subject to change.

Property Manager days off: Saturday and Sunday

Office Phone: 503-436-2981

Fax: 503-436-1518

Clubhouse Phones: 503-436-0977 Pool, hot tub, exercise, tennis court

E-Mail: [REDACTED]

BP Managers:

On Site Resident Manager: Jennifer Ponath	503-504-1610 Cell Phone
Assistant Resident Manager: Susan Neuwirth	503-440-8511 Cell Phone
Property Manager: Bruce Francis	503-440-0033 Cell Phone

Website: www.breakerspointhoa.com

Username: bphoa

Password: sand

3 Wireless Internet Connections: bphoa-secured clubhouse-2.4 clubhouse-5G

Password on all: sandsand

The clubhouse hours are:

WINTER Hours (October through June):

8:00 am to 9:00 pm Sunday, Monday, Tuesday

8:00 am to 5:00 pm Wednesday

9:00 am to 9:00 pm Thursday

8:00 am to 10:00 pm Friday and Saturday

SUMMER Hours (July through September):

8:00 am to 9:00 pm Sunday through Thursday

8:00 am to 10:00 pm Friday and Saturday

Horning Geosciences

808 26th Avenue, Seaside, OR 97138

Ph./FAX: (503)738-3738

Email: [REDACTED]



May 25, 2015

Breakers Point Home Owners Association
 Bruce Francis, Manager
 P.O. Box 246
 Cannon Beach, Oregon 97110

RE: Dune Management Report and Sand Volume Calculations, Breakers Point Condominiums, ocean beach foredune between 5th Street and Ecola Creek estuary, Cannon Beach, Clatsop County, Oregon

Dear Bruce:

The purpose of this report is to provide sand volume calculations and a grading plan to support excavation of the growing foredune west of Breakers Point Condominiums. This iteration of the 2014 and 2015 grading plans focuses on how to remove less than 15,000 cubic yards of the foredune in the central part of the complex west of the condos.

EXECUTIVE SUMMARY

Dune grading is proposed to take place in the fall of 2015. Excavation will take place in western one-half of the foredune complex, midway between 5th Street and Ecola Creek estuary. The proposed area consists of 1.42 acres of land, approximately trapezoidal and about 285 ft on a side. Dunes are as tall as 47 ft in places, but range from 43 to 37 ft high. Plans call for grading the dunes so the finished surface slopes down to the west until it reaches the 20 ft elevation contour line, which is slightly above the line of storm tossed logs and other debris. Approximately 13,760 cubic yards of sand will be relocated and spread as a 2.3 ft thick blanket on the upper middle beach over an area of 60 yards by 300 yards. It will smooth out within days and much or all of it will be pulled into the ocean by winter storm waves. The open-sand graded area is proposed to be fenced off and set aside as habitat for endangered snowy plover and other indigenous life.

Figures & Maps

A site location, sand inundation, and project summary map are shown in Figures 1, 2, and 3. Plan and cross sections with measured cross sectional areas and calculated sand volumes are provided in Figures 4 and 5.

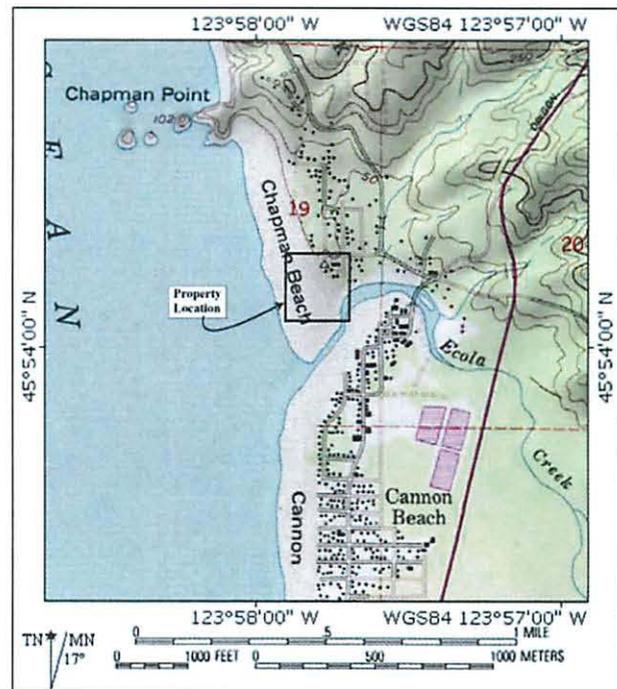


Figure 1: Project location map.

Methods

The existing dune topographic map was prepared by Horning Geosciences using a laser leveler to determine heights and laser range finder for distances from recognizable landforms, such as houses, and plotted at a scale of 1 inch = 50 ft, the elevations tied into known surveyed elevations at Breakers Point Condos. Additional profiles have been provided by Castle Rock Surveying. All surveys are referenced to the National Geodetic Vertical Datum of 1929. The North American Vertical Datum of 1988 (e.g. FEMA Flood Maps) is converted to NGVD29 by subtracting 3.6 ft. Essentially, NAVD88 corresponds to Mean Lower Low Water (MLLW), whereas NGVD29 is equivalent to Mean Tide Level (MTL). Elevations are accurate to 1 ft and locations to 3 ft horizontally.

Elevation data points have been hand-contoured at 2 ft intervals. East-west dune profiles have been laid out on 100 ft spacings. Sand volumes are calculated from profiles by determining cross sectional areas of sand between existing dune surface and finished grade, averaging them for each panel (area between profiles), multiplying these by panel widths to obtain volumes, and summing all the volumes. Dimensions of the beach fill area are based on calculated disposal volumes, assuming that a blanket of sand of uniform thickness is laid down. Sand disposal will be above Mean High Water (6 ft NGVD).

Background

The foredune continues to gain elevation with the assistance of a dense growth of European beach grass. It is blocking views of the ocean for the condominium home owners. Based on several phases of dune mapping and surveying in this area since 1997, it can be stated that dune sand generally is deposited as a blanket of sand approximately 150 wide, thicker on the west and thinner on the east but averaging about 12 inches in thickness overall. Annually, a blanket of sand 150 ft wide, 1 ft thick, and 900 ft in length amounts to 5000 cubic yards of sand deposited west of the condos, from Ecola Creek north to 5th Street. Roughly 1600 cubic yards of sand has accumulated annually in the proposed excavation area.

In the past 15 years, approximately 75,000 cubic yards of wind-blown sand has been added to the dunes west of the condos. At the same time, we have graded the dune and have moved about 25,000 cubic yards of the sand, placing most of it on the west face of the foredune, immediately above the beach and within a zone of distributed coppice dune hummocks. This has contributed to the widening of the dune complex. In general, we have reconfigured the dune, lowering its height while widening its base as it has grown in volume. As a result, views toward Chapman Point by neighbors on the south side of Ecola Creek are at the point of being blocked. Since the Breaker's Point Condominiums were built, around 1980, the dunes have grown westward from 250 to 300 ft.

The unusual accumulation of dune sand and growth of a vegetated foredune is partly a continuation of natural processes that have operated for decades to centuries along the Cannon Beach littoral cell. It also appears to be a response to disturbances in the beach sand budget, possibly from more frequent and large El Nino climate excursions with attendant storm waves, and possibly from stormier weather since about 1980, speculated to be caused by climate warming from greenhouse gas emissions. Further, the dunes may be accreting at abnormal rates at their present location because of the introduction of European beachgrass, beginning in the late 1950s, which preferentially traps sand within a discrete band along the beachfront. Dune growth appears to have expanded into the beaches south of Ecola Creek, beginning in the early 1970s and rapidly expanding in the early to middle 1980s.

Proposal

It is proposed that the west-central part of the foredune be excavated within an area that is 295 ft wide north-south by 150 to 285 ft east-west, as shown in Figures 3 and 4. The sand will be excavated down to a ramp that slopes down to the west, ending at about the 20 ft NGVD elevation contour. This is shown in Figure 4. At most, 12 ft of sand will be removed from above the ramp along the measured dune cross sections, as shown in Figure 5. Excavated sand will be placed on the upper beach above Mean Higher High Water (~9 ft NAVD; ~6 ft NGVD), or at about 12 ft NGVD or higher, where larger winter storm waves can still pull the sand back into the ocean, shown in Figure 3. Excavation will comply with new dune management recommendations in the FEMA Coastal Construction Man-

ual (2011), which doubles the amount of sand reserved above the 100-yr stillstand elevation of the ocean from 540 sq ft in cross sectional area to 1100 sq ft. The generally observed standard of not grading below the "FEMA + 4 ft" elevation of 31 ft NGVD applies to sand within the 1100 sq ft cross sectional area, as developed for narrow dunes on the Atlantic and Gulf Coasts, and applicable in Cannon Beach to that area adjacent to the shoreline as it was mapped in 1978, or about 200 ft farther to the east near the lawn of the condos.

Cut Volume

The total volume of sand to be excavated totals approximately 13,762 cubic yards. This calculation does not account for the small amount of sand that slopes down or up from the edge of the excavated area. It also does not account for sand that contains dense growths and roots of European beachgrass. This beachgrass should not be placed on the beach and so may be trucked to the Rippet Quarry, near Seaside, or, preferably, may be buried in the newly open sand of the excavated area. The rooted sand is assumed to be 1 ft thick, which equates to a maximum of about 2300 cubic yards of contaminated sand. The net amount of sand will still be on the order of 13,700 cubic yards, assuming that buried beachgrass will displace an equal volume of clean dune sand.

Fill Volume

Fill volume of 13,700 cubic yards is equivalent to a blanket of sand 2.3 ft deep laid on an area of 60 by 300 yards. This is shown in Figure 3.

Sand Disposal on Beach

The excavated sand will be rapidly carried away by tides and storm surf, which can run up to a maximum elevations of about 12 to 16 ft NGVD. Recent experience at Breakers Point and along the Presidential Streets shows that sand can be smoothed within 48 hours and washed away within 2 or 3 weeks, provided the waves can reach it. Sand will be incorporated into the littoral drift more effectively if it is laid out on the middle to upper beach. According to the NANOOS VMS website, Mean Higher High Water for the Breakers Point vicinity is about 8.5 ft NAVD88, or about 6 ft NGVD29. Sand will be deposited between elevations of 10 and 14 ft NGVD29. The area between 20 and 14 ft NGVD29 will not be filled and will be restored to its original profile if sand is bulldozed across it.

Revegetation versus Habitat

The open cut surface will not be replanted with European beachgrass. Rather, it will be left open and fenced off as habitat for snowy plovers. Botanists involved with this project may propose changes to this part of the project.

Potential Adverse Impacts to Adjacent Properties

Properties down-wind (N20E on average) from the excavated areas will be at elevated risk of sand inundation. The sand will possibly blow northeastward into areas that recently have not received annual sand invasions. Given that great amounts of sand can be transported disproportionately by dry storm winds, the uncertainty of weather conditions can overwhelm any sand transport predictions. Possibly, sand may be able to reach the lawn areas adjacent to the condo buildings. Given the variability of all these factors, it is expected that homeowners located N20E down-wind from the site of the dune hummock will experience at least a modest increase of sand influx (~15 percent) over the next few years.

Monitoring and Maintenance

Standards already set forth in the existing dune management plan should apply to these properties. It would be prudent to require a completion report after the site has been graded, and also to monitor the rate of erosion and recycling of excavated sand placed near the intertidal zone. This would provide a reference useful for subsequent grading actions in the future.

Please call or write if you have questions. Good luck with your project.

Thomas S. Horning, CEG #E1131
Horning Geosciences



Expires: 6/30/15

References Cited

FEMA, 2010, Flood Insurance Study; Clatsop County, Oregon and Incorporated Areas Volume 1 of 2; Federal Emergency Management Agency, Flood Insurance Study Number 41007CV001A; dated Sept. 17, 2010.

FEMA, 2011, Coastal Construction Manual-Principals and Practices of Planning, Siting, Designing, Constructing, and Maintaining Residential Buildings in Coastal Areas (Fourth Edition); FEMA P55 Vol. 1.

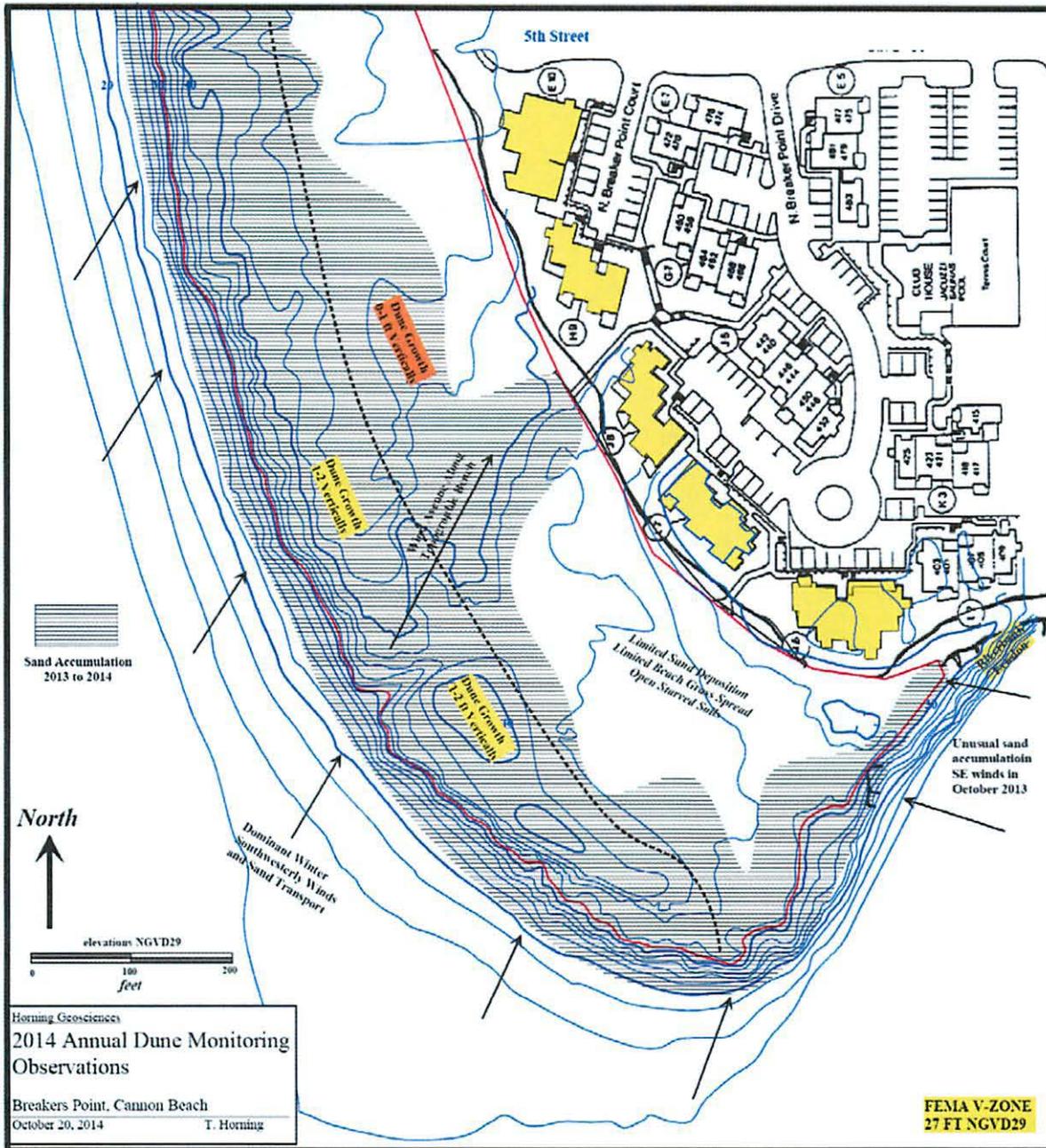


Figure 2: Sand inundation map for the 2013-14 winter season, the hatched areas are characterized by open sand within the beach grasses, indicating burial of dry grasses from the previous summer's growth. Dashed line marks the approximate position where sand is 12 inches thick; less thick to the east and thicker to the west.



Figure 3: Map of proposed sand excavation area (blue hatched) and disposal area (white rectangle). Sand will either be bulldozed to the disposal site or loaded and trucked to it. Excess European beachgrass can be buried in the excavated area, or it may be trucked away for disposal in Rippet Pit, near Seaside.

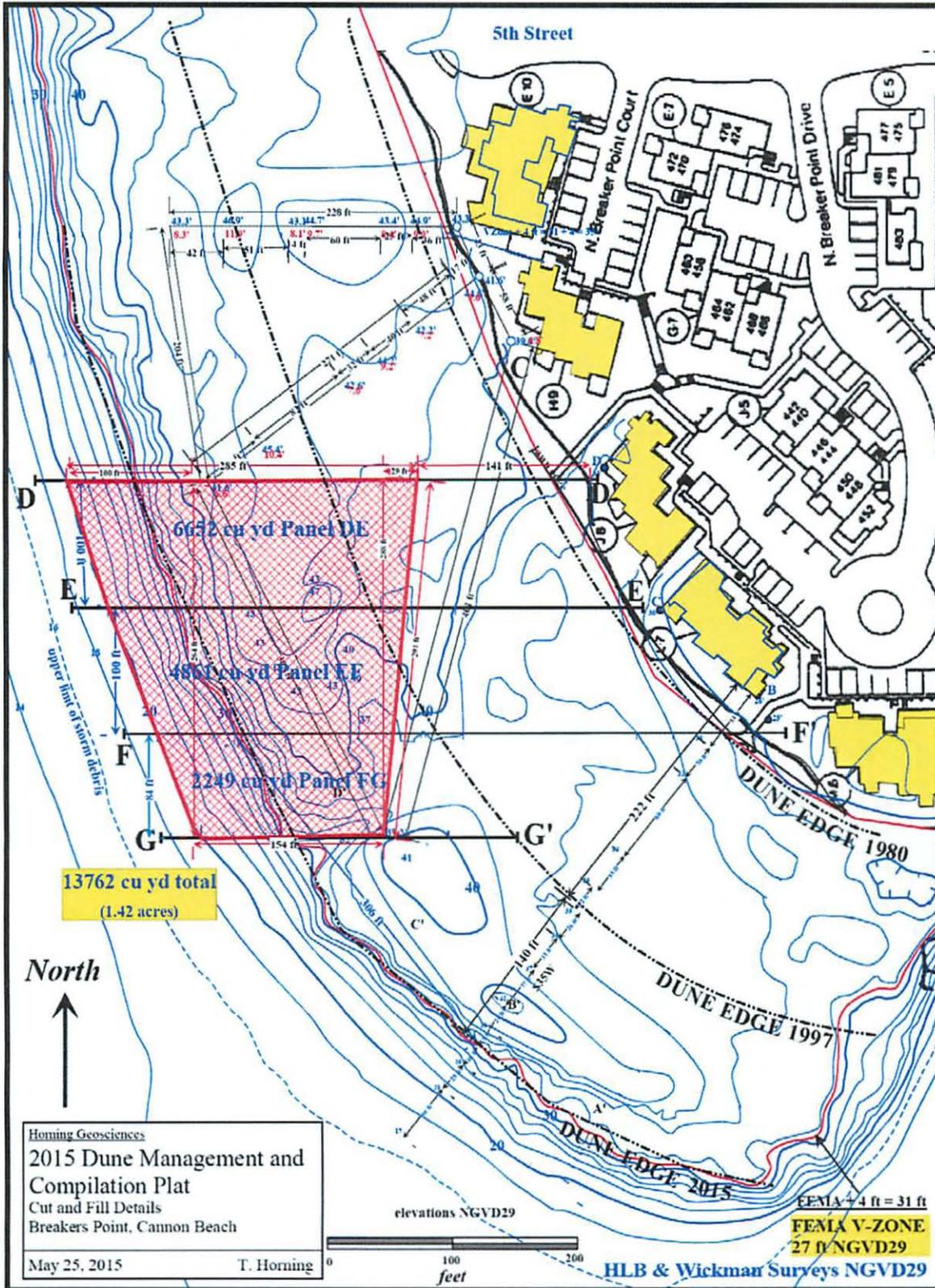


Figure 4: Summary plan for grading of dune sand at Breakers Point. Sand volumes (red hatch) are calculated by multiplying the distance between cross sections by the average cross sectional area of sand to be removed and summing for all three panels. Cross sectional areas are determined in Figure 5. Dune edges correspond to the 31 ft NGVD (FEMA + 4 ft) elevation contours for the relevant date, taken from past surveys and reports. Topographic survey profiles are by Castle Rock Surveying and Horning Geosciences. Additional data points and elevation contours from the City GIS LIDAR maps have been integrated to complete the elevation contours.

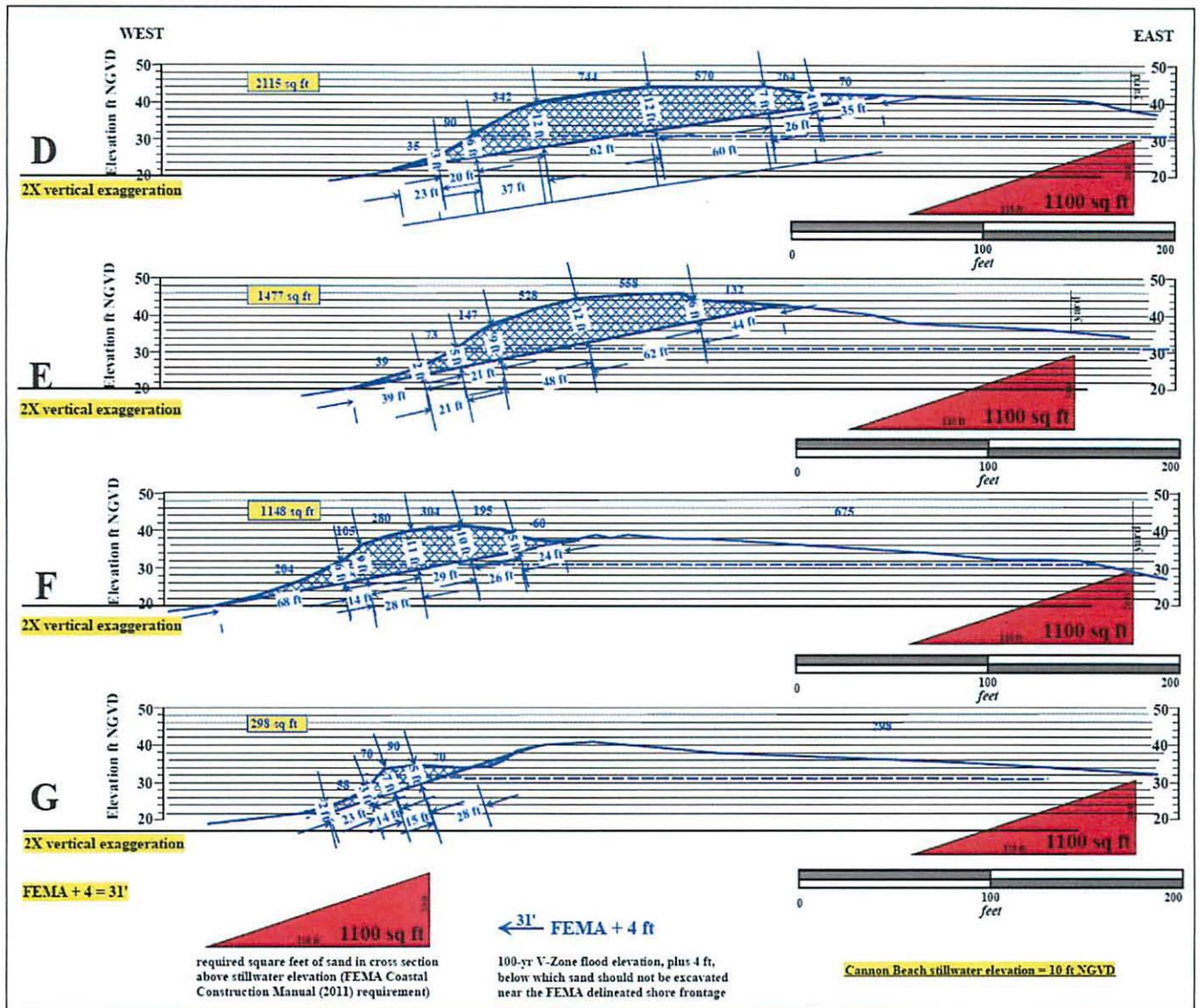


Figure 5: Dune cross sectional profiles from Figure 4, showing dimensions of sand lying above a ramp that slopes down to the 20 ft NGVD29 elevation contour. Red triangles denote newly mandated 1100 sq ft of reserved cross sectional sand in cross section, proposed recently by FEMA (2011). Note that the vertical dimension is exaggerated by 100 percent for illustration purposes.



United States Department of the Interior



FISH AND WILDLIFE SERVICE
 Newport Field Office
 2127 SE Marine Science Drive
 Newport, Oregon 97365
 Phone: (541) 867-4558 FAX: (541) 867-4551

Reply To: 6900.2105
 File Name: Letter of Support_Breakers Point HOA
 TS Number: 15-705

JUL 17 2015

Bruce Francis, Manager
 Breakers Point Home Owners Association
 P.O. Box 246
 Cannon Beach, OR 97110

Subject: Support for Coastal Dune Restoration for Breaker's Point Homeowners Association

Dear Mr. Francis:

This letter is to express our support for the Breaker's Point Homeowners Association (HOA) efforts in restoring coastal dune habitat between 5th Street and Ecola Creek estuary, Cannon Beach, Clatsop County, Oregon. The dune between the HOA buildings and the beach on this property is currently dominated by a monoculture of European beachgrass (*Ammophila arenaria*). European beachgrass captures sand with greater efficiency than native beach grasses (Zarnetske et al. 2012), has been extremely successful since its introduction in the late 1950s, and is now the predominant plant community along Oregon's sandy beaches and dunes. The stabilization of the beachfront and foredune along the Oregon coast by European beachgrass has greatly reduced the amount of flat and sparsely vegetated areas above mean high water favored by many native coastal dune species.

The proposed restoration project will increase the amount of bare sand habitat and improve native plant species diversity by removing European beachgrass, re-establishing the historic elevation of the foredune, and by creating several native plant areas. Establishment of native plant areas will also likely benefit native pollinator communities, such as bees, butterflies and hummingbirds. Without the proposed project, European beachgrass will persist as the dune's dominant plant community. The dune may also continue to accrete west of the HOA buildings as it has over the past 30-40 years (Horning 2015). Non-listed but rare and declining plant communities, like the American dune grass (*Lyemus mollis*) community, will be difficult to recover on the dune because of the dominance of European beachgrass.

The Newport Field Office is pleased to support efforts to restore coastal dune habitat on this property. We appreciate the opportunity to cooperate with you in conserving fish and wildlife

species. If you have any questions regarding these comments, please contact Dan Elbert of this office at [REDACTED]

Sincerely,

Acting for

[REDACTED]
Laura L. Todd
Field Supervisor

Reference:

Zarnetske, P. L., S. D. Hacker, E. W. Seabloom, P. Ruggiero, J. R. Killian, T. B. Maddux, and D. Cox. 2012. Biophysical feedback mediates effects of invasive grasses on coastal dune shape. *Ecology*. 93: 1439-1450.

Horning, T. S. 2015. RE: Dune management report and sand volume calculations, Breakers Point Condominiums, ocean beach foredune between 5th Street and Ecola Creek estuary, Cannon Beach, Clatsop County, Oregon. 9 pp.

CC:

OFWO – Rollie White, Madeleine Vander Heyden
ODFW – Herman Biederbeck