DUNES CITY

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EXHIBIT A
PAGE

September 15, 2006

Director Lane Shetterly
Dept. of Land Conservation and Development
635 Capitol Street N.E., Suite 150
Salem, OR 97301

Dear Lane:

On May 12th, 2006, Dunes City instated a 120-day limited moratorium on land development prohibiting the acceptance of applications for partitions, subdivisions and planned unit developments. This time was intended to allow the city to examine its current city codes to add protections and provisions for our coastal lakes, which not only serve as recreational waters, but as drinking water sources for our city. The Moratorium Support Committee (MSC) was established by the city council in May and has met every Wednesday night since the inception of the moratorium under the chairmanship of Councilors Johan Hogervorst and Peter Howison. As reported to DLCD in May, several objectives were laid out, and with professional help, a group of volunteers has been working toward the attainment of those prioritized objectives. The moratorium ended on September 8th and detailed reports were submitted to the Mayor & the City Council on September 14th. What follows is a summary of the work that has been accomplished for each objective in order of priority:

Priority #1 – Amend current city code to incorporate Best Management Practices (BMPs) regarding erosion, storm water runoff and vegetative stabilization during construction activities.

With paid professional help from Denise Kalakay of Lane Council of Governments (LCOG), a draft Erosion and Sediment Control Ordinance has been completed for Dunes City and is included with this letter. This ordinance will now be reviewed by the public and comments will be received, reviewed and incorporated by the MSC over the next 45 days. It will then be submitted to our Planning Commission for review and recommendations will be given to the City Council by January, 2007.

A Post-construction Storm Water Runoff ordinance is currently being developed by the MSC, but is not ready for public review. Tim Bingham of LCOG is helping the MSC with the drafting of this ordinance, which should be ready for public review by late 2006.

Both of the above mentioned ordinances will refer to established Best Management Practices manuals to aid developers and landowners in preventing sediment from erosion from entering Woahink and Siltcoos Lakes. The goal of the committee has been to make prescriptions practical

for use but strong enough to prevent sediment from leaving developed sites and threatening the city's drinking water sources.

Priority #2 – Implementation of "Septic System Maintenance Ordinance 173".

In cooperation with our Water Quality Committee, the MSC has begun preparing for notification of landowners who will be required to furnish the city with proof of regular septic tank inspection and pumping every 5 years. The MSC has developed a list of landowners with the oldest septic systems in closest proximity to our lakeshores. It has also researched evaluation methods and has talked at length to DEQ about certification of inspectors in the State of Oregon. Concurrently, Dune City has contracted with a computer software specialist to put together a new, state of the art database that will include a module that tracks the results of septic tank inspections and pumpings in the city. This database should be fully operational by early 2007.

Priority #3 – Adopt and implement appropriate code changes for higher standards for new subsurface waste disposal systems.

Budgeted City funds for ordinance revision were used to contract with Mark Chernaik, PhD. Dr. Chernaik aided in the research report that defines the threat posed by phosphates from human activity, how septic systems contribute to the inflow of nutrients into the lake, and makes prescriptions for new systems that will be installed in Dunes City in the future. This report resulted in a draft ordinance which is included with this letter and will undergo the same public review and process as mentioned above for the Erosion and Sediment Control ordinance. Every effort will be made by the City to aid those with failing systems so that the extra cost incurred by a higher standard system can be deferred through low cost loans or grants for those with demonstrated financial need.

Priority #4 - Conduct an educational outreach program to alert citizens of the dangers of inadequately maintained water and septic systems, as well as practices detrimental to water quality.

A very active education subcommittee to the MSC has been using several avenues to educate the community on water quality issues. They produced a Dunes City newsletter outlining several important aspects of water quality education, which was sent to all city residents. They have also been disseminating an illustrated booklet produced by LCOG on how septic systems operate and have produced informational pamphlets on phosphates in household products. The first ever Festival of the Lakes aimed at both water quality education and fun was held on August 19th and was a great success. We had 5 speakers on water quality related issues, including Dr Chernaik who spoke on the dangers of phosphate-containing detergents and how they can affect lake systems. There were more than 15 informational tables, music, food, children's activities and a photo contest. The event was well attended and showcased the best of Dunes City while providing education on water quality.

Priority #6 - Survey of lakeshores to identify storm water sources and areas in need of protective measures.

The Woahink lakeshore survey was completed on July 20th including over 900 photos, Global Positioning System (GPS) points tied to potential problem areas and mapping of existing slides. This data is being compiled and will be handed over to the city to serve as baseline data for use by planners and committees who will have the responsibility for carrying out ongoing protective measures. Portions of Siltcoos Lake that lie within city limits will be done in the near future using the same technology.

Priority #7. Documentation provided to Dunes City on the progress toward moratorium objectives.

All Wednesday night meetings were open to the public, were recorded and minutes are on file at Dunes City hall. Councilor Johan Hogervorst gave regular reports to the city council at their regularly scheduled meetings.

In addition to the draft ordinances included with this letter, zoning and land use portions of our city code are being revised by our city attorney and LCOG personnel. The purposes of this revision are to improve procedural aspects of land development applications and to better uphold mandates of our Comprehensive Plan with regard to water quality. A draft of this document has been presented to our city council and will be reviewed by both the Moratorium Support Committee and the general public over the coming months.

Although much work has been done over the last four months, much is yet to be done. Our city is in need of a comprehensive monitoring program for our lakes that includes work by paid staff. Heroic efforts by volunteers on both Siltcoos and Woahink Lakes have provided some data, but not at a level that gives us the ability to establish a baseline that can then be used to track change over time. We will be applying for both DEQ and EPA grant funding soon to begin proper monitoring that befits the drinking water sources that serve our community.

We, as a city, are working toward stronger lake protection and smart growth. We want to thank the Oregon Department of Land Conservation and Development for its support of this effort, particularly through the Oregon Coastal Land Management Program's technical assistance grant that we have recently finalized to support our efforts at code revision. The Moratorium Support Committee is an established Committee for Citizen Involvement (CCI), and volunteers will continue to work towards meeting the objectives assigned to them by the temporary moratorium until they have been completed. If you have any additional questions or comments concerning our efforts, feel free to contact us for more information.

Sincerely,

Sheldon Meyer
Mayor, Dunes City

Springfield Development Code Section 16.050(5) Solar Setback Standard

(2) 5 feet for interior side yard setbacks.

EXCEPTIONS:

(a) Attached dwellings (zero lot line) on individual lots/parcels; and

(b) A dwelling constructed over the common property line of two lots/parcels, where there is a recorded deed restriction.

(3) Accessory structures shall not be located between any front or street side yard and a primary structure and shall be set back at least 3 feet from interior side and rear lot lines.

EXCEPTIONS:

(a) Stand alone garages and carports shall meet the setback standards specified in Subsections (1) and (2) of this Section.

(b) Group C accessory structures shall be permitted within setbacks as specified in Section 16.100(1)(e) of this Article.

(4) Special provisions for panhandle and duplex lots/parcels.

(a) All setbacks for panhandle lots/parcels shall be based on the orientation of the front and rear of the dwelling occupying the lot/parcel

(b) All setbacks for duplexes on corner lots/parcels shall be based upon the front yard of each unit established by the street or streets used for address purposes."

(5) All buildings in the LDR and MDR Districts shall protect the solar access of neighboring residential lots as specified in this Subsection. See also Section 16.110(4)(d)2. and 3., of this Code, HDR Districts shall protect the solar access of LDR and MDR lots as specified in Section 16.060 of this Article.

(a) **Solar Setback Standard.** The proposed building shall comply with one of the subsections below.

1. Solar Setback. The solar setback of the shade point shall be greater than or equal to the setback specified in Table 1 or as computed using the following formula.

   SSB = (2.5 * SPH) + N/2 – 75

   Where:

   SSB = The solar setback (the horizontal distance between the shade point and the Northern lot line, see Figure 6);

SPH = The height of the shade point (see Figures 4 and 5); and N = The north-south dimension, provided that a north-south dimension more than 90 feet shall use a value of 90 feet for this calculation. Provide, the solar setback of the shade point may be decreased 2.5 feet above the amount calculated using the formula or Table 1 for each foot that the average grade at the rear property line exceeds the average grade at the front property line.

2. **Alternative Standard:** Maximum Shade Point Height. The maximum height of the shade point shall be less than or equal to the height specified in Table 2 or as computed using the following

$$\text{Formula:} \quad SPH = \frac{(2 * SSB) - N + 150}{5}$$

Provided, the maximum allowed height of the shade point may be increased one foot above the amount calculated using the formula or Table 2 for each foot that the average grade at the rear property line exceeds the average grade at the front property line..

3. **Performance Option.** The proposed building will shade no more than 20 percent of the south-facing wall of existing habitable buildings, or, where applicable, the proposed building will comply with section 3B or 3C of the Solar Design Standards. If section 3B is used, the shade point of the building(s) shall be setback from the solar building line 2.5 feet for every 1-foot of height of the shade point.

(b) Solar setback for panhandle lots shall be calculated on the north-south dimension of the pan portion of the lot. The southern-most lot, with a north south dimension less than 60 feet in the pan portion of the lot shall have a restricted building height of 21 feet.

(c) **Exemptions.** A building is exempt from the Solar Setback Standards when any of the following conditions exist:

1. **Slopes.** The lot on which the building is located has an average slope 20 percent or more in a direction greater than 45 degrees east or west of true south.

2. **Pre-existing Shade.** The building will shade an area that is shaded by one or more of the following:

   a. An existing or approved building or structure;

   b. A topographic feature; or

   c. A non-exempt tree that will remain after development of the site. It is assumed that a tree will remain after development if: it is situated in a required setback; or it is part of a developed area, public park, or legally

reserved open space; or it is part of landscaping required pursuant to this code. A duly executed covenant also can be used to preserve trees causing such shade.

3. **Insignificant Benefit.** The proposed building shades one or more of the following:

   a. A non-developable area, such as designated open space or roadways, or a public use, which does not need solar access (park land, roadway, public facility) or similar uses.

   b. The wall of an unheated space, such as a garage, excluding solar greenhouses and other similar solar structures.

   c. Shade less than 20 square feet of south-facing glazing.

(6) Where an easement is larger than the required setback standard, no building or above grade structure, except for a fence, shall be built upon or over that easement.

(7) When additional right of way is required, whether by City Engineering standards or the Metro Plan including the TransPlan, setbacks shall be based on future right of way locations. Right of way shall be dedicated prior to the issuance of any building permit that increases parking requirements.

(8) Architectural extensions may protrude into any 5-foot or larger setback area by not more than 2 feet.

16.060 HEIGHT STANDARDS

(1) In residential districts, the maximum building height shall be determined by solar access considerations, in accordance with Section 16.050 of this Article. Except as specified elsewhere in this Code, no building shall exceed 30 feet in height in the LDR district and 35 feet in the MDR District and HDR District. No building shall be required to be less than 21 feet in height when set back from the northern lot line a minimum of one-half of the north-south dimension. Where the HDR District abuts an LDR or MDR district, the building height standard of the HDR District shall be one of the following:

   (a) When abutting an LDR or MDR District to the north, the maximum building height for the HDR District shall be defined by the Maximum Shade Point Height requirement of Section 16.050(5)(a)(2) up to 50 feet south of a northern lot line or on a plane extending south with an angle of 23 degrees and originating from the top of a 16-foot hypothetical fence located on the northern lot line. In the HDR District, the maximum height may be increased to 50 feet when setback 200 feet from an LDR or MDR lot line.

   (b) When abutting an LDR or MDR District to the east, west or south, the building height limitation on the HDR District shall be no greater than permitted in the LDR or MDR

EXHIBIT C
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Draft Erosion and Sediment Control Ordinance amended 9/14/06

1.100 EROSION AND SEDIMENT CONTROL

1.111 Purpose The purpose of these standards is to preserve and enhance the unique water resources of Dunes City for the health, safety, and beneficial uses of residents and visitors. These uses include the ready availability of safe, pure drinking water for both Woahink residents and the numerous visitors who use the Lakes for recreational purposes and to enjoy the beauty of the environment. The objective of this ordinance is to control soil disturbance in order to prevent sediment from entering the water bodies of Dunes City by the application of proper planning of development activities and by mitigating sources of erosion. While these measures may place increased responsibility on developers and residents; the impact of inadequate erosion prevention and sediment control will be irreversible degradation of our waters.

1.112 Applicability Except as exempted under Dunes City Code 1.113, the standards in Chapter 1.100 of the Dunes City Code apply to all land use applications and development/building permits submitted after the effective date of this ordinance requesting approval of one or more of the following:

A. Land use applications – [list as appropriate, such as partitions, subdivisions, site review, PUDs, conditional use, etc]

B. Development/Building Permit Applications

C. Grading Permit Applications

1.113 Exemptions: The requirements and standards of Chapter 1.100 of the Dunes City Code do not apply to land use activities that will result in:

A. The disturbance of less than 1,200 square feet of land surface area, or

B. A land disturbance of less than 500 square feet within 100 horizontal feet of the top of the bank of any wetland, lake, stream, river or

C. The disturbance of land or vegetation affecting less than 800 square feet land area on slopes of 12 percent or greater; or

D. The disturbance of land or vegetation affecting less than 800 square of land within 1,000 feet of Woahink, Little Woahink, or Siltcoos Lakes or any of their tributaries.

1.114 Inspector Required The city shall appoint a City inspector with responsibility for evaluating erosion and sediment control plan implementation and effectiveness.

1.115 Erosion and Sediment Control Plan Submission Requirements under conditions of Sec. 1.112. The required Erosion and Sediment Control Plan shall include a description and scaled drawings that address:

A. The physical characteristics of the site, including a map of existing topography using at least 5 foot contour intervals and a minimum of 2 foot contour intervals if there are slopes greater than 12 percent on the parcel. The map should also show the location of wetland, riparian, and water areas, and a description of the pertinent soil characteristics.

B. The nature of the proposed development, including any phasing plans, which may affect soils or create soil erosion. Areas of excavation, grubbing, clearing, stockpiling, or vegetation removal shall be specifically identified.

C. Specific erosion control measures and practices, selected from the April 2005 and subsequent revisions of the Oregon Department of Environmental Quality (DEQ) Erosion and Sediment Control Manual, to be used to demonstrate compliance with Section 1.114. The DEQ Manual shall be the primary guide for establishing and reviewing erosion control techniques, methods, and requirements

D. Written justification of how the Plan meets the Approval Standards in 1.114

E. All documents shall be submitted as both paper copies and/or electronic media as requested by the planning secretary.

1.116 Approval Criteria. The Erosion and Sediment Control Plan shall be reviewed and approved by the City Council, or its designee, with consultation by the City Engineer and shall determine that the following conditions are satisfied prior to approval:

A. That the project has been designed to minimize disturbance of natural topography, native vegetation and soils.

B. That the site design maximizes the preservation of healthy trees, understory shrubs and ground cover.

C. That the plan complies with the applicable technical guidelines, as determined by the City Engineer in consultation with the Planning Commission. In the case of erosion control standards, the current Oregon Department of Environmental Quality (DEQ) Erosion and Sediment Control Manual shall be the recognized authority, unless more stringent standards are required by Dunes City Code.

D. The plan was prepared by an engineer, engineering geologist licensed by the State of Oregon, or a professional hydrologist licensed by the State of Oregon.

E. On a single lot or parcel on which the development activity will occur on slopes of less than 15 %, the plan may be prepared by the applicant utilizing best management practices. Topographical mapping is not required on single lot development if it can be demonstrated that all land disturbance will occur on slopes of less than 6%. Plans for development activities that will result in the division of land may not be prepared pursuant to this subsection.

1.117 Erosion and Sediment Control Plan Standards. In addition to compliance with relevant portions of the Dunes City Code, the required Erosion and Sediment Control Plan shall comply with the following standards:

A. **Control Measures.** Specific methods of soil erosion and sediment control shall be used during development and construction to minimize visible and measurable erosion and sediment transport. In no case shall soil erosion or sediment transport occur off of the construction site. These methods shall include all of the following:

1. The land area to be grubbed, stripped, used for temporary placement of soil, or to otherwise expose soil shall be confined to the immediate construction site only.

2. During construction, runoff from the site shall be controlled, and increased runoff and sediment resulting from soil disturbance shall be retained on–site. Temporary diversions, sediment basins, barriers, check dams, silt fences, or other methods shall be provided as necessary to hold sediment and runoff. All temporary erosion control measures shall be installed to comply with approved best management practices found in the current Oregon Department of Environmental Quality (DEQ) Erosion and Sediment Control Manual, (See Sec. 1.113 C.). Temporary measures must be removed when replaced by permanent measures as per approved Stormwater Management Plan.

3. The duration of exposure of bare soil shall be kept to a minimum during site development and construction. Visual signs of rutting or puddling of soil shall warrant suspension of work if there is evidence of sediment transport off subject property or into wetlands. All disturbed land areas that will remain unworked for twenty-one (21) days or more during construction shall be covered by weed-free straw mulch, bark, or erosion control sheeting. These erosion control measures must provide complete coverage of all bare soil surfaces.

4. Clearing, grading, and land excavation shall be phased to avoid wet weather work.. Grading that has potential to overwhelm erosion

control measures, road or driveway construction, shall be prohibited during periods of frequent or heavy rains.

5. A stabilized pad of gravel shall be constructed and maintained at all entrances and exits to the construction site. The stabilized gravel pad shall be the only allowable entrance or exit to the site. No sediments or mud shall be tracked from the construction site on trucks or equipment. Sediments shall be washed from equipment on site.

6. Topsoil removal for development shall be stockpiled and reused on–site to the degree necessary to restore disturbed areas to their original or enhanced condition, or to assure a minimum amount of stable topsoil for re–vegetation. Additional soil shall be provided if necessary to support re–vegetation.

7. The removal of all sediments that are carried off the site, or on to adjacent property, are the responsibility of the owner. The owner or his designee shall also be responsible for cleaning and repairing streets, catch basins, and adjacent properties, where sediments or mud affects such properties. In no case shall sediments be washed into storm drains, ditches, drainage ways, streams, wetlands or lakes.

B. **Preservation and Restoration of Vegetation.** Compliance with native vegetation removal and enhancement provisions of the Dunes City Code is required, see Ordinance 154. The owner shall be responsible for re–vegetating public and private open spaces, utility easements, and undeveloped rights–of–way in accordance with an approved Schedule of Installation. Vegetation shall be restored and preserved in the following manner:

1. If the vegetation existing prior to site development is non–native or invasive, it shall be replaced with native or non–invasive plant species

2. Work areas on the immediate site shall be carefully identified and marked to reduce potential damage to trees and vegetation. Trees to be preserved shall have a marked buffer around the drip. Disturbance within these boundaries shall be avoided.

3. Trees shall not be used as anchors for stabilizing working equipment.

4. During clearing operations, trees and vegetation shall not be permitted to fall or be placed outside of the work area.

5. In areas designated for selective cutting, care in falling and removing trees and brush shall be taken to avoid injuring trees and shrubs to be left in place.

C. **Schedule of Installation.** A schedule of planned erosion and sediment control and re–vegetation measures shall be provided at the time of application submission, which sets forth the progress of construction activities, and mitigating erosion control measures.

D. **On Site Representative.** The owner shall designate a specific person to carry out and oversee the Erosion and Sediment Control Plan.

E. **Alternative Procedures.** The City Council, or its designee, in consultation with the City Engineer, may also develop more specific or appropriate procedures to implement erosion control measures as needed.

1.118 Plan Implementation Requirements. An approved Erosion and Sediment Control Plan shall be implemented and maintained as follows:

A. **Plan Approval Prior to Clearing or Grading**. No grading, clearing, or excavation of land requiring an Erosion and Sediment Control Plan shall be undertaken prior to submission of and approval of an Erosion and Sediment Control Plan. Erosion control measures shall be installed prior to any stripping or excavation work. All road development prior to and during construction must follow the requirements established in the erosion and sediment control plan.

B. **Implementation**. The owner or his designee shall implement the measures and construct facilities contained in the approved Erosion and Sediment Control Plan in a timely manner and consistent with the following:

1. Upon completion of the installation the developer shall call for City inspection to certify that erosion control measures are installed in accordance with the Erosion and Sediment Control Plan.

2. During active construction, the owner or his designee shall inspect erosion control measures daily during rainy periods and report the results to the city immediately if any of the standards of part 1.111 B are exceeded. In all cases, the owner shall be responsible for maintenance, adjustment, repair and replacement of erosion control measures to ensure that they are functioning properly without interruption.

3. Sediment shall be removed immediately from pavement surfaces, off–site drainage inlets, ditches and culverts. In the event that sediment is inadvertently deposited on adjacent property, in a

wetland, stream, or lake, the owner or his designee shall contact the City Engineer and coordinate remedial actions with the City as soon as possible.

4. Written and/or electronic records of all site inspections of erosion control measures shall be maintained and provided to the City monthly.

C. **Correction of Ineffective Measures and Expedited Plans.**

1. If the implementation of the approved plan, based on an inspection of the site by the City Inspector, does not fulfill the requirements of the approved Erosion and Sediment Control Plan, or

2. If the City finds that visible amounts of sediment have entered or is likely to enter public stormwater conveyances, streams, or lake waters as a result of any soil disturbing activity from development, an expedited Erosion and Sediment Control Plan shall be required of the property owner. The property owner will be notified by the city, must take immediate corrective actions, and develop an Expedited Erosion and Sediment Control Plan to prevent recurrences in consultation with the City Engineer. This plan must be submitted within 5 days of notification of the finding. As used in this section, "visible or measurable sediment" shall include the following:

    a. Deposition of soil or sediment exceeding one cubic foot in volume onto a public or private street, adjacent property, or into the surface water management system either by direct deposit, dropping, discharge or as a result of erosion.

    b. Flows of water over exposures of bare soils resulting in turbid or sediment–laden flows, or of evidence of erosion on the site as seen in rivulets on bare soil slopes, where the flow of water is not filtered or captured on the site.

    c. Earth slides, mudflows, earth sloughing, or other earth movement.

3. The City Engineer shall require submission and approval of an Expedited Plan.

    a. A modified and expedited Erosion and Sediment Control Plan shall be provided within five (5) working days of written notification by the City.

b. The owner or his designee shall implement the expedited plan within five (5) working days of approval.

c. In cases where serious erosion is occurring, the City Engineer may require the owner or his designee to install interim control measures immediately.

D. **Emergency Measures.** If the health or safety of residents or the community is threatened, excavation or grading can commence without prior notice to the city. In this case notice shall be provided to the city as immediately as possible.

E. **Additional Standards.** The following additional standards shall apply:

1. Construction within a stream bed shall be prohibited unless absolutely necessary to construct required public facilities.

2. Pollutants such as fuels, lubricants, bitumens, raw sewage, and other harmful materials shall not be discharged onto the ground, shall be protected from the weather, and shall be properly stored and disposed of. Where the construction process results in or reveals soils contaminated with hazardous materials, petroleum products, or machine fluids, the owner or his designee shall remove all spill-contaminated soil from the site to an approved location. Spill kits are required with all construction machinery.

E. **Duration of Maintenance.** Continuing maintenance after development pursuant to the Erosion and Sediment Control Plan and the Stormwater Management Plan shall be the responsibility of the property owner.

1. Erosion control measures shall be maintained during construction. They shall be either removed upon completion if specified as a temporary measure. Measures shall be maintained into perpetuity by property owner if incorporated into Stormwater Management Plan as a permanent installation. All measures installed as permanent shall comply with performance standards in Chapter XXX of Dunes City Code.

2. Final recorded plats and subdivision maps shall indicate that all lots or parcels must be developed consistent with the Erosion and Sediment Control Plan and that the measures and improvements specified in the plan must be maintained by the owner of each lot or parcel.

3. The applicant or owner of any lot or parcel on which an Erosion Control Plan has been approved shall record on the title to the subject property a notification of the existence of the plan and of the

obligation of subsequent landowners to refrain from interfering with such measures or improvements and to maintain them.

4. The plan will be available for review in the Planning Department files.

1.119 Security. For all site reviews, planned unit developments, subdivisions, and partitions, after an Erosion Prevention and Sediment Control Plan is approved and prior to construction or grading, the applicant shall provide a performance bond or other financial guarantee in the amount of 120% of the value of the erosion prevention/control and/or water quality measures necessary to stabilize the site and maintain water quality. Any financial guarantee instrument proposed other than a performance bond shall be approved by the City Attorney.

A. Duration. The financial guarantee instrument shall be in effect for a period of at least one year, and shall be released when the City Inspector determines that the site has been stabilized. All or a portion of the security retained by the City may be withheld for a period of up to five years beyond the one-year maintenance period, if it has been determined by the City Inspector that the site has not been sufficiently stabilized against erosion or control measures are not operating as intended.

B. Exemptions. Individual lots zoned for single-family and multi-family residential use prior to the effective date of this Section, and individual lots subject to the erosion control plan stated in the requirements of Section 1.116 E of this ordinance shall be exempt from the security requirements of Section 1.119 of this ordinance.

C. Conflict. Due to the immediate threat to the public health, safety and welfare posed by failure to comply with the strict provisions of the erosion control measures required under this Section, the provisions of Section 1.119 shall supersede the more general provisions of the Dunes City Development Code, where they exist.

1.120 Enforcement. Failure to carry out the conditions and standards of erosion and sediment control set forth in this ordinance, shall be unlawful and a civil infraction subject to the enforcement provisions of Dunes City code, Section X.X.

A. Additional Penalties. In addition to those penalties available under Dunes City code, Section X.X, the City Council may enforce the following additional penalties:

1. Issue a stop work order where erosion control measures are not being properly maintained or are not functioning properly due to faulty installation or neglect.

2. Revoke or suspend any development or building permit or the subject property, or deny occupancy of the subject property until erosion control measures have been installed properly and maintained in accordance with this ordinance.

B. The owner of the property from which the erosion and/or sediment transport occurs, together with any person or parties who cause such erosion, shall be responsible for mitigating the impacts of the erosion and for preventing future erosion. A property owner shall not be held responsible for the products of erosion or sediment transport that originate on other properties.

EXHIBIT D
PAGE

FINAL DRAFT

Protecting Critical Water Resources in Dunes City, Oregon
Standards for Septic Systems and their Effluents, including Phosphorus and Nitrogen, and Regulation of Phosphate Containing Products

(Photograph by Bob Anderson)

Background Information Document

And

Draft Ordinance

September 14, 2006

Table of Contents

INTRODUCTION

On March 9, 2006, Dunes City, Oregon, adopted a Septic System Maintenance ordinance "to ensure that all onsite wastewater disposal systems, also known as sewage disposal systems or septic systems, are operated in a safe, healthful and environmentally responsible manner."[1] The Septic System Maintenance ordinance requires homeowners in Dunes City to provide updated maps of the location of their onsite wastewater disposal systems and to regularly evaluate the integrity of their onsite wastewater disposal systems.

On May 11, 2006, Dunes City adopted an ordinance imposing a moratorium on land development prohibiting the acceptance of applications for partitions, subdivisions and planned

[1] Dunes City, Ordinance number 173, Septic System Maintenance. http://www.dunescity.com/ord173_2nd_read_final.pdf

unit developments.[2] The moratorium found that "subsurface disposal system effluents contain nitrates and phosphorus that eventually migrate into groundwater and surface water sources, providing nutrients that enrich phytoplankton populations ... nutrients are also introduced into surface waters through erosion and run-off [and] both Woahink and Siltcoos Lakes have experienced episodes of rapid growth of phytoplankton populations (algae bloom) in recent years."[3]

The moratorium granted an exemption for "development that demonstrates through site specific soil testing, development of phosphorus adsorption isotherms, and computations performed by an Oregon registered Professional Engineer that detectable levels of phosphorus in the soil from the proposed drainfield locations ... will not occur for at least 100-years after installation of the system."[4]

The moratorium incorporated by reference findings stating that:

> "Residents and commercial businesses exclusively use subsurface waste disposal systems for waste treatment. Dunes City has no septic design criteria, installation standards or ordinances of its own. It generally defers to the standards or criteria set by Lane County or the State of Oregon that do not reflect best practices for the highly permeable soils and nearness of the lakes and wetlands. Higher standards and criteria are needed to reduce nutrient flows to ground waters, wetlands and the lakes. ... Numerous recent advances in the efficiency of subsurface systems in removal of detrimental nutrients bring acceptable standards within reach of an adequate set of ordinances."[5]
>
> "Dunes City lacks an ordinance addressing the prohibition of fertilizer use containing phosphorus within its minimal 50-foot riparian overlay zone or within it's 1000 foot sensitive zone. And the use of these fertilizers in such close proximity to lakes, streams, and wetlands is very likely a significant source of detrimental nutrient loading to these water bodies.."[6]

In these findings presented here, we discuss the basis for *An Ordinance to Protect Critical Water Resources in Dunes City I – Minimizing phosphorus releases from septic systems*, which is given at the end of this document. In these findings, we first lay out the approaches necessary to maintain the integrity of the water supply for Dunes City. Based on these arguments, we then propose an ordinance to establish standards for reducing nutrient flows to lakes in Dunes City.

The findings and ordinance were drafted with major contributions by Dr. Mark Chernaik - an environmental scientist with fifteen years of experience helping communities solve environmental problems. In preparing the findings and ordinance, Dr. Chernaik solicited and received input and feedback from the following experts:

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[2] Dunes City, Ordinance number 181, Moratorium on Development. http://www.dunescity.com/ord181.pdf
[3] Ibid., at Paragraphs C and E.
[4] Ibid., at Section 2c.
[5] Ibid., at Exhibit A, paragraph 45.
[6] Ibid., at Exhibit A, paragraph 56.

- Dr. Carl Etnier, Project Scientist, Stone Environmental Inc., Montpelier, Vermont, and principal author of the June 2005 publication "Micro-Scale Evaluation of Phosphorus Management: Alternative Wastewater Systems Evaluation;"

- Dr. Anish Jantrania, Technical Services Engineer, Virginia Department of Health, Division of Onsite Sewage and Water Services, Richmond, Virginia, and co-author of the 2006 book "Advanced Onsite Wastewater Systems Technologies;"

- Mark Repasky, Professional Engineer and President, Wastewater Technologies Inc., Tallahassee, Florida;

- Pio Lombardo, Professional Engineer and President, Lombardo Associates, Inc., Newton, Massachusetts, and author of the April 2006 publication "Phosphorus Geochemistry in Septic Tanks, Soil Absorption Systems, and Groundwater;"

- Michael Kucinski, Section Supervisor, Roseburg, Oregon Department of Environmental Quality, Onsite Wastewater Management Program;

- Denise Kalakay, Water Quality Specialist, Lane County Council of Governments, Eugene, Oregon.

1. Consequences of lake over eutrophication

Lake over eutrophication can cause human death and illness through exposure to pathogenic microbes that proliferate in eutrophic conditions.[7] Cryptosporidium and Plesiomonas shigelloides are pathogens that proliferate in lakes experiencing over eutrophication.[8] Cryptosporidium oocysts are highly resistant to common disinfectants, such as chlorine, and survive for months. Over eutrophication of coastal dune lakes near to Dunes City has forced the Oregon Department of Human Services to issue public health advisories against exposure to water from these lakes.[9]

Lake over eutrophication causes chemical and microbial changes in water quality that can impart to water an obnoxious and unpalatable taste and odor.[10]

Lake over eutrophication causes overgrowth of pathogenic microbes that can reduce or eliminate recreational uses of lakes. Overgrowth of pathogenic microbes caused by over eutrophication has forced the Oregon Department of Human Services to advise closure of several coastal dune

[7] Oregon Department of Human Services "Blue-Green Algae Health Concerns in Oregon." http://oregon.gov/DHS/ph/envtox/docs/bgahealthconcernsfaq.pdf

[8] U.S. EPA "Safe Drinking Water - Guidance for people with severely weakened immune systems." http://www.epa.gov/OGWDW/crypto.html; U.S. Food and Drug Administration "Plesiomonas shigelloides." http://www.cfsan.fda.gov/~mow/chap18.html

[9] Oregon Department of Human Services "Tenmile Lakes Toxic Microcystis Bloom." http://oregon.gov/DHS/ph/envtox/tenml.shtml

[10] Davies, J.M. et al. (2004) "Origins and implications of drinking water odours in lakes and reservoirs of British Columbia, Canada." *Water Research*, 38(7):1900-10, page 1900.

lakes to recreational use.[11] Lake over eutrophication also reduces aesthetic values by increasing turbidity and causing discoloration.[12]

2. Status of lakes in Dunes City

More than a thousand people use water from lakes in Dunes City for domestic purposes, including for drinking. Tens of thousands of people visit lakes in Dunes City each year to go swimming, enjoy water sports, fishing and boating and to enjoy their beauty. Algal blooms, obnoxious and unpalatable taste and odor, increased turbidity, and discoloration have been detected during the summer in recent years in lakes in Dunes City, particularly Lake Woahink.[13, 14, 15] Cryptosporidium and Plesiomonas shigelloides have recently infected individuals consuming water from homes that take their water from lakes in Dunes City.[16]

Several studies of conditions at Lake Woahink dating back to the mid-1960s reveal a lake that is in a precarious state.

According to a study published by researchers from Portland State University, the trophic state of Lake Woahink had declined from the late-1960's to the early-1990's:

> "This paper discusses evidence suggesting that the study lakes have become more biologically productive (eutropic), apparently as a result of human activities, and provides additional limnological information about each lake. ... Increases in the rate of phytoplankton primary productivity, densities of selected zooplankton species, sedimentation rate, sedimentary vanadium, and numbers of Cyclotella stelligera frustules all indicate that Lake Woahink has undergone significant change relative to its presettlement condition. The primary productivity measurements made in 1992 average 1.5 times larger than the maximum rates measured during 1970-1972 (Table 2). A comparison of data from 1991 and Malick (1970) for the total density of four zooplankton species ... showed that the lowest 1991 density (15,300 m3) was almost twice as large as the highest 1968-1969 density (8,200 m3)."[17]

However, this same 1996 study failed to detect changes in Lake Woahink beyond perturbations in the relative composition, not total abundance, of lake microbes:

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[11] Oregon Department of Human Services (October 2002) "Potential recreational hazard at Mercer Lake." http://www.oregon.gov/DHS/ph/envtox/ma102002.shtml

[12] Environment Canada (2001) "Nutrients in the Canadian environment," page 13. http://dsp-psd.pwgsc.gc.ca/Collection/EN1-11-97E.pdf

[13] Dr. Doug. Larson, a limnologist studying these lakes for over thirty years, reported observing 'toxic' blue-green algae in Siltcoos Lake in his fly-overs in 1991. He reported to residents of Dunes City at the City Hall, January 28, 2006, and stated, in part, "... Anybody that takes their drinking water should be very concerned."

[14] Testimony of Susie Navetta before the Dunes City Council, February 20, 2006; Testimony of Mark Chandler before the Dunes City Council, March 2, 2006.

[15] Testimony of Gerald Wasserburg before the Dunes City Council, March 2, 2006.

[16] Testimonies of Holly H. Martin and Miffy Honda to the Dunes City Council

[17] Dagget et al. (1996) "Eutrophication of Mercer, Munsel, and Woahink Lakes, Oregon," Northwest Science, 70(special issue 2):28-38

"The presence of Cyclotella stelligera in Woahink was cited by Johnson et al. (1985) as partial justification for assigning the lake to oligotrophy, yet the relative numbers of frustules from this species, already the most abundant taxon in Woahink sediments, increased by over a third between the lower strata and the 2 cm depth ..., the same period of time that the lake has been apparently undergoing cultural eutrophication. The increase in the relative abundance of C. stelligera as this lake underwent enrichment may be an early indicator of eutrophication. .... Data for chlorophyll a and *dissolved oxygen show no apparent change over time* (Daggett 1994) suggesting that there was a greater shift in species composition than in total primary productivity."[18]

A more recent study published in 2001 by researchers with the Center for Lakes and Reservoirs, Portland State University, noted additional and more serious symptoms of over eutrophication in Lake Woahink evident by 2000 that were not evident in 1994:

"*Dissolved oxygen concentrations in the hypolimnion of Woahink Lake were generally lower than in previous years* (Figure 16). The lowest concentration measured just prior to turnover was 4 mg/L. Lower concentrations were measured in the hypolimnion when turnover occurred later."[19]

According to a 1999 study by the U.S. Forest Service, Siuslaw National Forest:

"Eutrophication of Woahink and Siltcoos Lakes is particularly alarming since development continues with neither area wide sewage nor water treatment facilities in this area. Currently, several housing developments around Woahink and Siltcoos lakes rely on small private water treatment facilities of varying size and effectiveness that draw their water from the lakes. Simultaneously, the condition of septic tanks around the lake varies based on age and type. Thorough site evaluations take place by Lane County officials for the installation of new septic systems which must account for soil type and proximity to the lake, but a 1972 survey of septic tanks found that 26% of all tanks within 100 feet of the lake were performing unsatisfactorily (Lane County, 1978). Where systems had failed, sewage was coming to the ground surface very near the lake and in winter almost certainly drained there. ...

"If nutrient levels continue to increase relatively unchecked by State or County officials, problems such as those in Tenmile Lake south of this watershed will begin to take place. In Tenmile Lake, toxic algal blooms (Microcystis) have made water unsafe for drinking or recreation during certain times of year with uncertainty of its long-term effects on public safety and the viability of local tourism."[20]

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[18] Ibid.

[19] Systma and Haag (2001) "Oregon Lake Watch 2000 Final Report," Portland State University, at page 17. http://www.clr.pdx.edu/publications/files/clw_report_2000.pdf

[20] U.S. Forest Service/Siuslaw National Forest (1999) "Coastal lakes watershed analysis,"at pages 48-49.

3. The role of nutrients in lake over eutrophication

Lake over eutrophication is one of the most well studied ecological phenomena. Excess input of nutrients, especially phosphorus, but also nitrogen, is always the cause of lake over eutrophication.[21]

3.1. The role of phosphorus

Beginning in 1968, the Experimental Lakes Area Research Unit (ELA) of the University of Manitoba has conducted extensive studies on the role of nutrients as the cause of lake over eutrophication. These studies have dramatically confirmed that phosphorus is the key nutrient that causes lake over eutrophication. According to the ELA:

> "Using small, natural lakes as experimental systems, scientists at the ELA were able to add various combinations of nutrients and determine which of the major plant nutrients (carbon, nitrogen, phosphorus) was the key to controlling cultural eutrophication in lakes. Over a number of years, seven different ELA lakes (227, 304, 302, 261, 226, 303, 230) were experimentally fertilized in various ways. Two of these lakes (227 and 226) were particularly important in demonstrating that phosphorus was the key nutrient for the control of eutrophication.
>
> "Studies of gas exchange and internal mixing in ELA lake 227 during the early 1970's clearly demonstrated that algae in lakes were able to obtain sufficient carbon dioxide, via diffusion from the atmosphere to the lake water, to support eutrophic blooms. Other studies in the same lake demonstrated that certain blue green 'algae' (Cyanophytes or Cyanobacteria) were able to 'fix' nitrogen that had diffused naturally into the lake from the air, thereby making the nitrogen available for supporting algal growth.
>
> "ELA Lake 226 was the site of a visually spectacular experiment. The lake was divided into two approximately equal portions using a plastic divider curtain. Carbon and nitrogen were added to one half of the lake, while carbon, nitrogen and phosphorus were added to the other half. For eight consecutive years, the side receiving phosphorus developed eutrophic algal blooms, while the side receiving only carbon and nitrogen did not. However, after only two years, this experiment convinced even the skeptics that phosphorus is the key nutrient. A multi-billion dollar phosphate control program was soon instituted within the St. Lawrence Great Lakes Basin. Legislation to control phosphates in sewage, and to remove phosphates from laundry detergents, was part of this program."[22]

Depicted on the following page is an aerial photo of divided lake showing over eutrophication in response to added phosphorus. The upper portion of the lake received added carbon and nitrogen and remained clear; the lower portion of the lake received added carbon, nitrogen and phosphorus and experienced an algal bloom.

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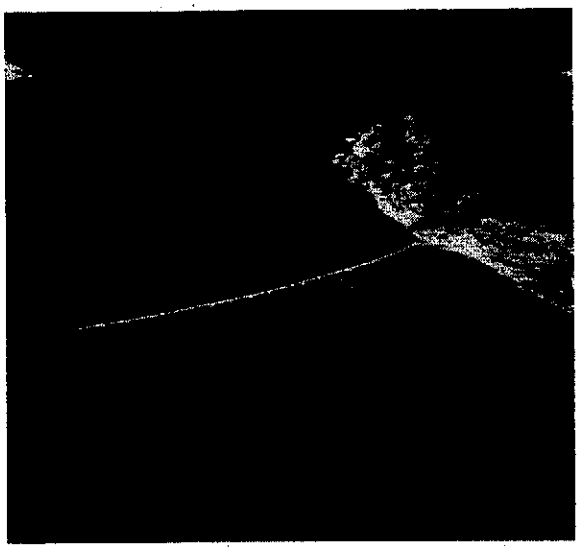
[21] Carpenter, S. (2005) "Regime Shifts in Lake Ecosystems: Pattern and Variation."

[22] Experimental Lakes Area Research Unit of the University of Manitoba, Eutrophication (Nutrient Pollution). http://www.umanitoba.ca/institutes/fisheries/eutro.html



The trophic state of a lake follows a sigmoidal dependence on phosphorus levels, meaning that as a lake becomes more eutrophied, relatively small additional inputs of phosphorus can cause a very large shift in the lake's trophic state.[23] In certain cases, when a lake is in a mesotrophic state (approaching the midpoint), a small increase in phosphorus loading can abruptly shift a lake to a eutrophic state.

3.2. The role of nitrogen

Excess nitrogen can also encourage lake over eutrophication. According to a 2005 report of the UK Centre for Ecology & Hydrology:

> "Phosphorus is traditionally regarded as the primary nutrient controlling lake productivity. This belief is derived, first of all, from correlations, across a large number of lakes, between phosphorus concentration, usually expressed as total phosphorus, and phytoplankton abundance, usually measured as the concentration of chlorophyll a. A second reason for the focus on phosphorus rather than nitrogen (or carbon) is that the history of eutrophication of lakes ... is related to an increase in the availability of phosphorus rather than nitrogen. A third reason for the focus on phosphorus derives from seminal whole–lake experiments on Canadian shield lakes which demonstrated that, in these, phosphorus was the prime limiting nutrient.
>
> "Nevertheless, while it is true that phosphorus is usually the main limiting nutrient in freshwaters, other resources may also be limiting on occasion. ... Furthermore, after decades of anthropogenic P loading and associated eutrophication it is likely that the number of lakes limited by nitrogen has increased. These, in addition to the lakes which might be naturally nitrogen limited, such as those with naturally high P levels, or where

[23] Srinivasu, P.D.N. (2004) "Regime shifts in eutrophied lakes: a mathematical study." *Ecological Modelling*, 179:115-130, at page 4. http://www.ictp.trieste.it/~eee/files/wp19.pdf

denitrification rates are high, suggests that the role of nitrogen in driving over eutrophication in lakes needs to be reviewed.

"Nitrogen is the primary or co–limiting nutrient for phytoplankton production in some lakes in North America. .... N–limitation does not appear to be confined to eutrophic lakes, and has been reported in mesotrophic lakes and in oligotrophic lakes for periods during the late summer in North America. Even where lakes are not predominately N–limited, the N–limitation of phytoplankton can occur even for short periods. ...

"As a result of the fixation activities of cyanobacteria it is argued that P–limitation should prevail and any N–limitation should be short lived (Schindler, 1977; Howarth et al.,1999). Nevertheless, Maberly et al. (2002) suggested that the lack of escape from nitrogen–limitation in the relatively unproductive upland lakes they studied may have resulted from environmental factors that were not favourable for cyanobacteria such as low concentrations of P, low pH and high loss rates through flushing.

"Although phosphorus is the main resource that limits phytoplankton growth in many lakes, there is growing evidence that suggests that in certain types of lakes, both upland and lowland, nitrogen may be the primary–limiting or co–limiting nutrient. Some cyanobacteria can fix nitrogen and so, potentially, escape from nitrogen–limitation. This may not be the only mechanism for their dominance in productive lakes with relatively low concentrations of nitrogen but there is a danger that increased phosphorus concentrations, resulting from eutrophication, may lead to greater frequency of nitrogen–limitation, furthering cyanobacterial blooms, some of which may be toxic. In upland lakes where conditions tend not to be favourable for cyanobacteria, nitrogen limitation may be frequent and the lakes accordingly sensitive to changes in nitrogen availability. Overall, it is desirable that N–reduction is carried out hand in hand with P–reduction measures (van der Molen et al., 1998)."[24]

3.3. Irreversibility of lake over eutrophication

Numerous case studies show that lake over eutrophication is often irreversible.[25] After a lake reaches a eutrophic state, decreased oxygen levels in the hypolimnium cause lake sediments to release more phosphorus. Under these conditions, the lake's sediments act as a reservoir of continued phosphorus input into the lake's waters, establishing a dynamic that locks-in eutrophic conditions.[26] Therefore, additional release of phosphorus could result in the irreversible over eutrophication of lakes in Dunes City and the loss of the vital public benefits they provide.

4. Use of fertilizer and input of phosphorus to lakes in Dunes City

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[24] UK Centre for Ecology & Hydrology (2005) "Deriving practical guidance on the importance of nitrogen in freshwater eutrophication." http://194.247.95.101/Resource/Doc/26350/0014464.pdf

[25] Carpenter, S. (2005) "Regime Shifts in Lake Ecosystems: Pattern and Variation." Chapter 2. Regime Shifts in Lakes.

[26] Janssen, M.A. & Carpenter, S.R. (1999) "Managing the Resilience of Lakes: A multi-agent modeling approach." *Conservation Ecology* 3(2): 15. http://www.ecologyandsociety.org/vol3/iss2/art15/

A report of the U.S. Forest Service, Siuslaw National Forest states:

> "An additional source of nutrients to Woahink Lake is the runoff from lawns and driveways that lead directly into Woahink Lake. Sediment and fertilizer laden runoff from these areas are high in phosphorus and nitrogen and are key components of the eutophication now observed. Education and increased awareness of private shore owners is very important to limiting this nutrient source."[27]

A recent study of the U.S. Geological Survey in Wisconsin analyzes in more detail the contribution lawn maintenance makes to the release of phosphorus to lakes:

> "The annual phosphorus load from the nearshore area of Lauderdale Lakes may be greater than the 430 pounds previously estimated. Using a revised median concentration of 2.3 mg/L for surface runoff from an estimated 220 acres of developed shoreline (67 percent of shoreline) within 200 feet from the edge of water, annual total phosphorus load from residential lawns could be as much as 370 pounds (assuming all of the phosphorus reaches the lake). If a delivery of 50 percent of the load is assumed, and the total surface-water load is recomputed using the surface runoff values from the previous study, the total annual surfacewater load from the nearshore drainage area would be 620 pounds, which represents 60 percent of the total annual phosphorus input from all sources."[28]

This study also concluded that: "Runoff from lawn sites with nonphosphorus fertilizer applications had a median total phosphorus concentration that was similar to that of unfertilized sites, an indication that nonphosphorus fertilizer use may be an effective, low-cost practice for reducing phosphorus in runoff."[29]

5. Soil phosphorus levels and plant growth

According to the Oregon Extension Service:

> "Healthy turf does not show a growth or color response to phosphorus. Contrary to the popular notion expressed in many newspapers, magazines and garden books, phosphorus does not enhance root growth of grasses unless it is added to deficient turf. Since the vast majority of lawn soils contain adequate P, supplement applications are usually wasteful.
>
> "Phosphorus is best applied only when soil tests indicate it is low. In all regions of Oregon, a soil test level above 20 ppm indicates that P is adequate and does not need to be applied."[30]

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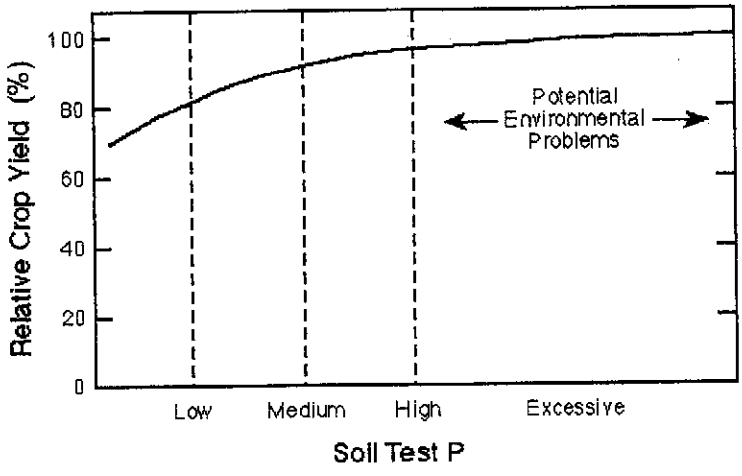
[27] U.S. Forest Service/Siuslaw National Forest (1999) "Coastal lakes watershed analysis,"at pages 48-49

[28] U.S. Geological Survey (2002) "Effects of Lawn Fertilizer on Nutrient Concentration in Runoff from Lakeshore Lawns, Lauderdale Lakes, Wisconsin." USGS Water-Resources Investigations Report 02--4130. http://wi.water.usgs.gov/pubs/wrir-02-4130/wrir-02-4130.pdf

[29] Ibid.

[30] Oregon State University Extension Service (2005) "Fertilizing Lawns." http://extension.oregonstate.edu/catalog/pdf/ec/ec1278.pdf

This is in accord with the Extension Services of other states that have examined the relationship between soil phosphorus levels and healthy plant growth. A publication of the University of Minnesota Extension Service depicts the following response of plants to soil phosphorus.[31]



According to this publication:

> "Soil test levels are measured in a laboratory by either the Bray or Olsen procedure. The Bray procedure is usually used when soil pH is less than 7.4. The Olsen procedure is used when soil pH is 7.4 or higher. The soil test values for phosphorus which correspond to the relative levels are listed [below]:[32]

	Procedure	
	Bray	Olsen
	- - - - - - - - ppm - - - - - - -	
very low	0-5	0-3
low	6-10	4-7
medium	11-15	8-11
high	16-20	12-15
very high	21+	16+

According to the Oregon Extension Service: "On the Oregon Coast, soils range from fine sand to subsoil clays and have a pH in the range of 5.5 (∀ 0.5)."[33] The PH should be determined in order to choose the appropriate analytical method. Therefore, soils in Dunes City should be

[31] University of Minnesota Extension Service (1998) "Agronomic and Environmental Management of Phosphorus." http://www.extension.umn.edu/distribution/cropsystems/DC6797.html

[32] Ibid.

[33] Oregon State University Extension Service (2004) "Practical Lawn Establishment and Renovation." http://extension.oregonstate.edu/catalog/pdf/ec/ec1550.pdf

considered to have medium phosphorus levels if the Bray procedure shows phosphorus levels between 11-15 ppm or 8-11 ppm by the Olsen procedure. Even at these medium soil phosphorus levels, grass growth should be at >80% of levels occurring with abundant soil phosphorus levels.

Moreover, the external addition of phosphate-containing fertilizer is not the only option of insuring that soils contain adequate levels of phosphorus. Best management practices, such as returning grass clippings to a lawn by use of a mulching mower, returns phosphorus to soil, further reducing the need for any use of phosphate fertilizer. Lawn clippings contain about 0.13 pounds phosphorus per 1000 square feet, making them excellent natural fertilizer.[34]

The draft ordinance presented in Section 12 presumes that the use of phosphate fertilizer is not necessary in Dunes City. However, the draft ordinance allows homeowners in Dunes City to still use phosphate fertilizer by performing soil tests on their property that show that their soil is deficient in phosphorus.

Homeowners can collect soil from their property by following a simple procedure.[35] Homeowners can then bring or send soil samples to a laboratory for analysis of phosphorus by the Bray or Olsen procedure, whichever is appropriate. Excluding the cost of shipping, the cost of soil testing for phosphorus is minimal. The Central Analytical Laboratory at Oregon State University charges seven dollars per sample for testing soil phosphorus levels.[36]

Under the ordinance, a test showing that soil deficient in phosphorus is not a license for a homeowner to apply any amount of phosphate fertilizer. Instead, the application of phosphate fertilizer must "not exceed rates recommended by the Oregon State University Extension service for application to a particular plant species." This rate will depend on the level of phosphorus found in a soil test. For example, if a homeowner found soil phosphorus levels of 12 ppm, then an application of only 0.5 pounds of phosphate (as P_2O_5) per 1000 ft^2 of lawn would be necessary.[37]

6. Septic systems and input of nutrients to lakes in Dunes City

Like carbon, phosphorus and nitrogen are essential building blocks of life. Phosphorus is a key element of DNA, and nitrogen is a key element of protein. The human body contains about 1% phosphorus. Phosphorus and nitrogen are in all the foods we eat and, hence, in the wastes people generate. As a result, onsite wastewater systems inevitably receive substantial amounts of these chemical elements.

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[34] Minnesota Department of Agriculture (2005) "Phosphorus in Lawns, Landscapes, and Lakes: An Informative Guide on Phosphorus." http://www.mda.state.mn.us/appd/ace/phosphorusguide.pdf

[35] University of Minnesota Extension Service "Lawn Soil Testing." http://www.extension.umn.edu/info-u/plants/BG468.html

[36] Central Analytical Laboratory Oregon State University Soil Test Price List http://cropandsoil.oregonstate.edu/Services/Plntanal/CAL/price.htm

[37] University of Minnesota Extension Service "Soil Test Interpretations and Fertilizer Management for Lawns, Turf, Gardens, and Landscape Plants Established Lawns and Turf." http://www.extension.umn.edu/distribution/horticulture/components/1731-22.html

6.1. Capacity of conventional septic systems to remove nutrients

Conventional septic tanks have little capacity to remove phosphorus. According to a recent review:

> "Organic wastes in the septic tank are partially digested under anaerobic conditions by microorganisms in the tank, which typically reduce biological oxygen demand (BOD) in the effluent by 30 to 50% (US EPA 2002). Nitrogen and phosphorus compounds are also transformed in the septic tank via microbially mediated processes. *Most of the* nitrogen and *phosphorus that enters the tank* in organic molecules from feces, urine, and food waste *is converted to mineralized forms*: organic nitrogen (urea) to ammonia and *organic phosphorus to soluble orthophosphate. .... Orthophosphate is the most bioavailable and mobile form of phosphorus; therefore, conversion to orthophosphate in the septic tank has implications for subsequent steps in the wastewater treatment process.*
>
> "*Septic tanks were not developed to remove phosphorus from wastewater.* Cantor and Knox (1986) conclude that septic tanks are not highly efficient in phosphorus removal. The amount of phosphorus removed from the wastewater stream is a function of sludge accumulation in the interval between tank pumpouts. When a septic tank is pumped out, the phosphorus contained in the septage (the sludge, scum, and volume of wastewater in the tank) is removed from the wastewater treatment system. ....
>
> "*In a summary of Scandinavian and US sources, Refsgaard and Etnier (1998) found 3 to 5% phosphorus sequestration in septic tanks.* A recent estimate of phosphorus-removal efficiency of a conventional septic tank was developed by the Ventura Regional Sanitation District (2001) in a demonstration study of several advanced onsite sewage dispersal systems. .... The mean influent phosphorus concentration for the duration of the test period was 3.2 mg/L ... The mean effluent phosphorus concentration was 2.9 mg/L, a 9% reduction in total phosphorus. The ranges in phosphorus concentration were 2.3 to 4.5 mg/L and [only] 2.0 to 3.3 mg/L for influent and effluent, respectively. *Despite substantial overlap in the ranges, these data suggest marginal phosphorus removal during normal system operation.*"[38]

Conventional septic tanks are not much better at removing nitrogen. According to a recent report of the Washington State Department of Health:

> "Removal of nitrogen from wastewater is a complex process, even for large wastewater treatment plants. Quality control of nitrogen removal processes from individual onsite wastewater systems is even more difficult to manage. Treatment systems that are most commonly used are relatively efficient in the removal of biological oxygen demand (BOD) and total suspended solids (TSS) from wastewater, but provide less than optimal removal of nitrogen (10-30 %). Most of the nitrogen is released as nitrate (NO_3^-), which

[38] Etnier, C.D., et al. (2005) "Micro-Scale Evaluation of Phosphorus Management: Alternative Wastewater Systems Evaluation." Project No. WU-HT-03-22. Prepared for the National Decentralized Water Resources Capacity Development Project, Washington University, St. Louis, MO, by Stone Environmental, Inc., Montpelier, VT, at page 2-35. http://www.ndwrcdp.org/userfiles/WUHT0322.pdf

is highly mobile in the soil water. In a conventional septic tank and drainfield system organic nitrogen in household wastes is transformed into ammonia products in the anaerobic conditions of the septic tank (ammonification). When these products exit the septic tank and encounter the aerobic conditions in the drainfield, the ammonia products are biochemically transformed primarily into nitrates (nitrification). These two steps, ammonification and nitrification, occur naturally in conventional systems."[39]

According to this same report:

> "A typical family of four using a conventional septic system can be expected to generate 20 to 50 pounds of nitrogen per year. Ten to thirty percent of this nitrogen is trapped in the septic tank as part of the sludge/scum accumulation in the tank. The nitrogen remaining in the liquid waste is transformed to nitrate when the wastewater leaves the anaerobic conditions of the septic tank and percolates through the aerobic environment of the soil portions of the drainfield. Although there is some potential for denitrification as the wastewater moves through the soil, the majority of the nitrogen produced by the family remains as nitrate loading to the soil. Drainfields installed 2-3 feet deep in soils where there is little organic matter, are relatively inefficient at removing nitrogen."[40]
>
> "Untreated domestic wastewater typically contains 20 to 85 mg/L Total-N."[41]

Because conventional on-site wastewater treatment systems are not designed to remove phosphorus or nitrogen, the use of these systems in lakeshore communities can make up the locally dominant pathway for entry of nutrients to a lake.

6.2. Nutrient limits under Oregon law applicable to septic systems

The primary function of onsite wastewater treatment systems is to protect public health by minimizing human exposure to pathogenic bacteria, of which fecal coliform is an indicator.

The Oregon Department of Environmental Quality (DEQ) has enacted an extensive rule that applies to onsite wastewater treatment systems throughout the state.[42] Under this rule, new, conventional onsite wastewater treatment systems must be designed to comply with 'Treatment Standard 1,' which includes the following numerical limits only:

- A 30-day average of less than 20 mg/L of biochemical oxygen demand (BOD); and
- A 20 mg/L of total suspended solids (TSS)

Thus, there are no limits under existing Oregon law that limit the release of nutrients from new, conventional onsite wastewater treatment systems.

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[39] Washington Department of Health (June 2005) "Report to the Puget Sound Action Team: Nitrogen Reducing Technologies for Onsite Wastewater Treatment Systems."
http://www.psat.wa.gov/Publications/hood_canal/n_reducing_technologies.pdf

[40] Ibid., at page 8.

[41] Ibid., at page A-15.

[42] Oregon Administrative Rules for Onsite Wastewater Treatment Systems, OAR Chapter 340, Division 071

Also under this DEQ rule, some new onsite wastewater treatment systems that include a recirculating sand filter or alternative treatment technology, must be designed to comply with "Treatment Standard 2," which includes the following numerical limits only.

- A 30-day average of less than 20 mg/L of biochemical oxygen demand (BOD);
- A 20 mg/L of total suspended solids (TSS);
- A 30-day geometric mean of less than 400 fecal coliform per 100 milliliters; and
- A 30-day average of 30 mg/L of Total Nitrogen (TN)

Although Treatment Standard 2 includes a limit on levels of nitrogen some onsite wastewater treatment systems may release, it does not include a limit on phosphorus. Furthermore, because Treatment Standard 2 is restricted to onsite wastewater treatment systems that include a recirculating sand filter or alternative treatment technology, the limit on nitrogen levels might have minimal application to Dunes City. We are unaware of any onsite wastewater treatment systems in Dunes City, existing or planned, that would include a recirculating sand filter or alternative treatment technology.[43]

Moreover, as discussed above, typical levels of total nitrogen in septic tank influent range from 20-85 mg/L. So, the 30 mg/L numerical limit for nitrogen in the DEQ rule, in the rare instance it does apply, does not require a substantial reduction, if any, in the amount of nitrogen released by an onsite wastewater treatment system. Rather, it seems that the purpose of the numerical limit for nitrogen in the DEQ rule is to insure that when developers and homeowners install a new onsite wastewater treatment systems that includes a recirculating sand filter or alternative treatment technology, these systems do not increase nitrogen output over what a conventional septic system releases.

7. Removing nutrients from septic systems

There are several options for removing nutrients from on-site wastewater treatment systems. What follows is a discussion of the efficacy and cost-effectiveness of these options.

7.1. Removal of phosphorus via source reduction

7.1.1. Diversion of blackwater

Toilet wastewater (often referred to as blackwater) contributes a substantial fraction of phosphorus to onsite wastewater treatment systems. According to the 2005 NDWRCDP Research Project Report:

[43] Under the DEQ rule, 'alternative treatment technology' is defined as 'an alternative system,' which in turn is defined as a system 'for use in lieu of the standard subsurface system.' OAR 340-071-0100 – Definitions. If developers and homeowners use the post-septic tank treatment technologies for the removal of phosphorus described in Section 7.2 of this report, then DEQ would likely consider these devices to be 'add-on treatment units' rather than alternative treatment technology.

"removing blackwater from domestic wastewater reduces phosphorus by 75%."[44]

A number of composting toilets with proven track records are commercially available, including the Clivus Multrum composting toilet,[45] the EcoTech Carousel composting toilet system,[46] and the Sun-Mar composting toilet.[47] The total estimated life-cycle cost of a composting toilet ranges from $1600-$6400.[48]

Another option for the diversion of blackwater is the installation of a zero-discharge water recycling system. An example of this technology is the Equaris Infinity Water Recycling System that uses a closed-loop system that eliminates the discharge of phosphorus and other pollutants typically found in septic tank effluent.[49] However, this option is relatively expensive. According to the 2005 NDWRCDP Research Project Report, the system costs $35,000, plus $3,000-5,000 for installation, and entails operating and maintenance costs of $400-500 per year.[50]

7.1.2. Diversion of phosphorus in detergents

Banning the use of high-phosphate detergents is a simple, cost-effective means of lowering phosphorus levels in onsite wastewater treatment system effluent. In addition to normal human wastes, high-phosphate cleaning compounds and detergents are a considerable source of phosphorus contribution to onsite wastewater treatment systems. Many people assume incorrectly that Oregon law prohibits the sale of high-phosphate automatic dishwasher detergent (ADD). However, Oregon law only prohibits the sale of high-phosphate laundry detergent. According to the NDWRCDP Research Project Report:

> "In the early 1970s, when phosphorus limits for laundry detergent were set, automatic dishwashers were relatively uncommon and there was not a perceived need to severely limit or ban phosphorus in dishwashing detergents. Now that dishwashers are common in many homes, efforts are underway in several states to ban phosphorus in dishwashing detergents as well ..."[51]

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[44] Etnier, C.D., et al. (2005) "Micro-Scale Evaluation of Phosphorus Management: Alternative Wastewater Systems Evaluation." Project No. WU-HT-03-22. Prepared for the National Decentralized Water Resources Capacity Development Project, Washington University, St. Louis, MO, by Stone Environmental, Inc., Montpelier, VT, at page 2-8. http://www.ndwrcdp.org/userfiles/WUHT0322.pdf

[45] See: http://www.clivusmultrum.com/projects/residential/index.html

[46] See: http://www.ecological-engineering.com/carousel.html

[47] See: http://www.sun-mar.com

[48] Ibid, at page 2-11.

[49] Equaris Total Household Water Recycling and Wastewater Treatment Systems. http://www.alascanofmn.com/default.asp?Page=Disinfection

[50] Etnier, C.D., et al. (2005) "Micro-Scale Evaluation of Phosphorus Management: Alternative Wastewater Systems Evaluation." Project No. WU-HT-03-22. Prepared for the National Decentralized Water Resources Capacity Development Project, Washington University, St. Louis, MO, by Stone Environmental, Inc., Montpelier, VT, at page A-45. http://www.ndwrcdp.org/userfiles/WUHT0322.pdf

[51] Etnier, C.D., et al. (2005) "Micro-Scale Evaluation of Phosphorus Management: Alternative Wastewater Systems Evaluation. Project No. WU-HT-03-22. Prepared for the National Decentralized Water Resources Capacity Development Project, Washington University, St. Louis, MO, by Stone Environmental, Inc., Montpelier, VT, at page 2-2. http://www.ndwrcdp.org/userfiles/WUHT0322.pdf

Automatic dishwashers (ADWs) are common in existing homes in Dunes City. Virtually every new home in Dunes City is expected to have an ADW. Thus, prohibiting the use of high-phosphate ADD would have an immediate and substantial, beneficial impact on phosphorus levels in on-site wastewater treatment system effluent. According to the NDWRCDP Research Project Report:

> "Restrictions on the phosphorus content of dishwashing detergent similar to those for laundry detergent, limiting phosphorus content to 0.5% or less by weight, would result in an average wastewater influent phosphorus reduction of 23% (0.61 g/day) ...."[52]

Low-phosphate ADD performs just as well as high-phosphate ADD but at little additional cost. A recent analysis of policy options for reducing phosphorus loading in Lake Champlain stated the following:

> "This policy option suggests amending the statutes in Vermont and New York to reduce the P content of all household cleansers to less than 0.5 percent elemental P. ....
>
> "Seventh Generation, Inc. has commissioned independent laboratories to test the effectiveness of phosphate-free ADDs in soft and hard water. The results show that phosphate-free ADDs, both powder and gel, performed as well as phosphate ADDs. Seventh Generation uses sodium citrate and sodium carbonate (washing soda) in its ADD powder and a polycarboxylate in its gel.
>
> "This analysis estimates that there are 5.5 tablespoons of ADD used per wash [and] that the current price differential between P and non-P ADDs will move towards zero as non-P ADDs become the norm rather than the exception, which affects the cost-effectiveness of this policy option. ....
>
> "Currently, phosphate-free ADDs are approximately 15 percent more expensive to consumers than commercial phosphate ADDs. ... Assuming that it is not more expensive to produce phosphate-free ADD products, economic forces should result in no additional cost to consumers from this policy.... If the current price differential is maintained ... it will cost $8.65 per year for each household with an ADW .... Even under this scenario, they found a ban on P in ADDs to be much more cost-effective than many other options. If the ultimate price differential were to become zero, as we assume, the cost-effectiveness of this policy option would be very high."[53]

In September 2002, Shuster Laboratoriesm a leading independent consumer products testing, quality assurance and R&D firm, compared the performance of several phosphate-free ADDs with the performance of conventional, high-phosphate ADDs, including Procter & Gamble's Cascade™. Shuster Laboratories found that phosphate-free ADDs were just as effective as conventional, high-phosphate ADDs in: 1) removing coffee and tea stains; and 2) preventing filming and spotting.

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[52] Ibid.,at page 2-2.
[53] Winsten, J.R. (2004) "Policy Options for Reducing Phosphorus Loading in Lake Champlain."

Lists, by brand name, of automatic dishwasher detergents and the amount of phosphorus they contain, are readily available.[54]

7.2. Removal of phosphorus via post-septic tank treatment technologies

In 2003, the National Decentralized Water Resources Capacity Development Project commissioned a comprehensive survey of technologies and policy options for controlling the release of phoshorous from on-site wastewater treatment systems. The survey culminated in a report released in June 2005 titled "Micro-Scale Evaluation of Phosphorus Management: Alternative Wastewater Systems Evaluation" (2005 NDWRCDP Research Project Report). More recently, the Massachusetts Alternative Septic System Test Center (MASSTC) evaluated the performance of several phosphorus removal technologies. MASSTC presented its findings in a report titled "Evaluation of Methods to Control Phosphorus in Areas Served by Onsite Septic Systems"(June 2006 MASSTC Report).

The MASSTC report presents the issues quite clearly. The Executive Summary states:

> "Phosphorus presents a unique challenge to watershed managers where residences are served by onsite septic systems to the dearth of available treatment technologies and the role that phosphorus plays in the over eutrophication of freshwater ecosystems. ...
>
> "Three technologies were directly tested for their ability to remove phosphorus. A Waterloo Biofilter™, that demonstrated efficacy in removing nitrogen in previous testing, was modified with a small experimental module of hematite-coated wood chips. The modification exhibited only limited increase in phosphorus removal (~29%) compared with this system without the experimental module (~11%). Phosphex™, a patented upflow filter following a recirculating sand filter and containing basic oxygen furnace slag exhibited > 99% total phosphorus (TP) removal, however the discharge pH was > 11, which precludes discharge to the groundwater under the Massachusetts Department of Environmental Protection regulations. Attempts to buffer the pH of this unit were unsuccessful with the exception of a short period following its passage through peat. PhosRid™, a treatment system with a unique configuration that manipulates the valence state of iron to optimize its combination with phosphorus removed > 99% TP following passage through a final sand filter. This system continues to undergo research and development at MASSTC and has proceeded to the Pilot Approval stage in the Commonwealth of Massachusetts."

It is evident that the phosphate is of first importance and that significant efforts are underway toward developing systems capable of delivering final outflow with total phosphorus less than 1 milligram per liter. While there do not appear to be currently approved systems capable of this performance criterion, it is reasonable to expect that in the next few years they will be available. Some possible contenders are discussed below.

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[54] Missoula Valley Water Quality District "Automatic Dishwasher Detergents." http://www.co.missoula.mt.us/wq/Nutrients/automatic_dishwasher_detergents.htm

7.2.1. Packed-bed filters containing an iron-rich media

According to the 2006 MASSTC Report, a packed-bed filter containing iron-rich media called the PhosRID™ system (Lombardo Associates, Inc.)[55] appears to a promising system:

> "PhosRID is a treatment process for phosphorus that proceeds from the work of Robertson (2000) and others based on a process called reductive iron dissolution (RID). Tn this passive process, an iron (Fe[III]) rich porous media is placed in direct contact with unoxidized sewage, such as effluent of a septic tank. ...
>
> "At first glance, it may appear that the PhosRID strategy for removing phosphorus is much like the standard addition of ferric chloride ($FeCl_3$) or alum to precipitate the phosphorus. The difference, however is that the iron-rich porous media (containing for instance ferric hydroxide – $Fe(OH)_3$) is slowly dissolved by the sewage under reducing conditions in the septic tank effluent and is utilized for phosphorus adsorption as it is produced. Thus the wastewater stream itself 'triggers' the release of the phosphorus treatment, reducing the need for accurately dosing amounts of other precipitants such as ferric chloride or alum. Another difference between simple alum addition and the RID is that the deposition of the iron-phosphorus compounds takes the form of secondary mineral grains and grain coatings as opposed to a low density flocculant that increases the sludge production (Robertson, 2000).
>
> "As configured at MASSTC, the PhosRID system was undergoing continuing development. ...
>
> "During the initial three months, the total phosphorus reductions as measured just after the RID media showed significant reductions (Figure 3-12). However following this initial period, reductions in phosphorus do not appear significant.
>
> "This contrasts with the reductions in total phosphorus following the sand filter element of the system (figure 3-13). During those periods when concurrent samples were taken, total phosphorus levels were generally below our detection limit of 0.5 mg/L.
>
> "Data suggest that this technology has potential to remove phosphorus to levels below 0.5 mg/L. However, significant design features must be determined. The proponent of this technology [Lomardo Associates] has been conducting significant research and developm,ent efforts at MASSTC and continues to do so as of March, 2006."[56]

7.2.2. Packed-bed filters containing lightweight expandable clay aggregate

Examples of lightweight expandable clay aggregate include: Filtralite® (Optiroc Group AB)[57] and Utelite® (Utelite Corporation).[58] According to the NDWRCDP Research Project Report:

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[55] For more details, see: http://www.lombardoassociates.com/phosrid.shtml

[56] Massachusetts Septic System Testing Center (June 2006) "Evaluation of Methods to Control Phosphorus in Areas Served by Onsite Septic Systems." at pages 18-21.

[57] For more details, see: http://www.filtralite.com/arch/_img/177293.pdf

> "Lightweight aggregates (LWAs) are a sort of clay 'popcorn' with high surface area and are often used in horticulture. Some are specially manufactured to increase their phosphorus-sorption capability. It can be used as a medium in packed-bed filters of various designs. .... Filtralite is specially manufactured to increase its phosphorus-sorption capability. It can be used as a medium in packed-bed filters of various designs. One type is composed of 62% SiO_2, 18% Al_2O_3, 7% FeO_3, and less than 5% each of K_2O, MgO, CaO, and Na_2O. ...
>
> "For 12 constructed wetland systems using LWAs, average removal is 79%-98% (Jenssen et al. 2004). Over time, the manufacturer has changed the 'recipe' to increase the phosphorus-removal capabilities. Removal percentage is over 95% in all 10 facilities that use blackwater, and they are built from 1991 to 2000. Effluent phosphorus concentrations range from 0.05 to 0.6 mg/L. .... A study in the Florida Keys found that the LWA tested in phase II had the highest phosphorus removal of any method tested, averaging 94% with a mean effluent concentration of 0.53 mg/L (Ayres Associates 2000).

A special version of Filtralite® (Filtralite-P) is designed specifically for phosphorus removal.[59] Performance data of an onsite wastewater treatment system using Filtralite® installed in Florida showed treated effluent had phosphorus levels averaging 0.53 mg/L.[60]

Filtralite® has a substantial cross-capacity to remove nitrogen, removing on average 40% of nitrogen in septic tank effluent.[61]

7.3. Removal of nitrogen via post-septic tank treatment technologies

The most promising post-septic tank treatment technologies that have been tested for the removal of phosphorus from onsite wastewater treatment systems are two types of trickling filters: 1) the Waterloo Biofilter™; and 2) the Nitrex Filter™. These technologies were recently evaluated by the Washington State Department of Health.[62]

7.3.1. The Waterloo Biofilter™

According to the Washington Department of Health:

> "[The Waterloo Biofilter™] averaged 62% removal of total nitrogen with an average total nitrogen effluent of 14 mg/l over the 13-month testing period. Earlier testing of this

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[58] For more details, see: http://www.utelite.com/
[59] Filtralite P. http://www.filtralite.com/arch/_img/176569.pdf
[60] Ayres Associates (2000) "Florida Keys Onsite Wastewater Nutrient Reduction Systems Demonstration Project Phase II Addendum." http://www.doh.state.fl.us/environment/ostds/zip/keysnutrientdemoph2.zip
[61] Ibid.
[62] Washington Department of Health (June 2005) "Report to the Puget Sound Action Team: Nitrogen Reducing Technologies for Onsite Wastewater Treatment Systems."
http://www.psat.wa.gov/Publications/hood_canal/n_reducing_technologies.pdf

product in a single pass mode demonstrated that it could produce a 20-40% TN reduction."[63]

Unfortunately, the Waterloo Biofilter™ has only limited cross-capacity to remove phosphorus. According to the MASSTC report:

> "The modified Waterloo Biofilter removed an average of 29% (median 27%) of total phosphorus (Figure 3-5) over the period tested. This compares with 11% removal of total phosphorus observed in the standard un-modified Waterloo Biofilter in 1999-2001. While the modification demonstrated some success, the effluent mean concentration of 4.2 mg/L total phosphorus still exceeds levels generally considered necessary to prevent undesirable environmental consequences."[64]

7.3.2. The Nitrex Filter™

According to the Washington Department of Health:

> "The Nitrex™ is a proprietary trickling biofilter developed at the University of Waterloo in Ontario, Canada. Nitrex™ is designed for denitrification and requires a nitrification process prior to the unit. The nitrification unit can be either a public domain process like a lined sand filter or there are a variety of proprietary products that would serve the same purpose. The unit is filled with a proprietary wood byproduct mixture that promotes nitrogen removal. Wastewater containing nitrate, such as nitrified wastewater is applied to the surface of the Nitrex filter. As the wastewater moves through the organic medium, microbial reduction of the nitrate nitrogen (denitrification) occurs. The bed must remain submerged for this to occur due to the anaerobic nature of this reaction. Typically the units are singlepass and do not require pumping.
>
> "Results of testing have been encouraging, with reductions to levels of 2 mg/l reported (Rich, 2003). Unpublished testing data from the Massachusetts Septic System Testing Center (MASSTC) indicate slightly higher results (average of 5.4 mg/l; median of 4.2 mg/l) but still very good results (Heufelder, personal communication 2005)."

Unfortunately, the Nitrex Filter™ has no significant cross-capacity to remove phosphorus. Evaluation of the Nitrex Filter™ at installations in Oregon, Montana, Massachusetts and Rhode Island showed no significant removal of phosphorus.[65]

7.4. Using post-septic tank treatment technologies in Dunes City

Although the post-septic tank treatment technologies have the best performance in terms of removing phosphorus and nitrogen, respectively, these technologies are still developmental in

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[63] Ibid., at page A-45.
[64] Massachusetts Septic System Testing Center (June 2006) "Evaluation of Methods to Control Phosphorus in Areas Served by Onsite Septic Systems."
[65] Lombardo Associates (October 2005) "Supporting Information on Nitrex™ Nitrogen Removal Treatment System."

nature. They are not available off-the-shelf. DEQ has not approved for general use either post-septic tank treatment technologies for the removal of phosphorus or nitrogen. There is serious interest in such systems and the Oregon DEQ Technology Review Committee, which reviews applications for approval of add-on control technologies, is considering such possibilities for approval of add-on control technologies.[66]

For now, developers or homeowners considering the installation of these post-septic tank treatment technologies for the removal of phosphorus or nitrogen can do so only by applying for and receiving a Water Pollution Control Facilities (WPCF) permit.

Under the DEQ rule for onsite wastewater treatment systems:

> "The criteria and standards for design and construction in this division and OAR chapter 340, division 073 apply to all onsite systems.
>
> "(a) For onsite systems subject to WPCF onsite permits, the department may allow variations of the criteria, standards, and technologies in this division and OAR chapter 340, division 073 based on adequate documentation of successful operation of the proposed technology or design. The system designer must demonstrate the performance of new processes, treatment systems, and technologies in accordance with OAR chapter 340, division 052."[67]

The DEQ rule specifies the process of applying for a WPCF permit, including a fee schedule.[68] Information required in the application includes "adequate documentation of successful operation" of the add-on treatment unit.

8. Release of nutrients from failing septic systems

Conventional on-site wastewater treatment systems, even recently installed systems do not remove phosphorus and remove little nitrogen. If only new construction in Dunes City controlled nutrients from their septic systems, then this may not prevent over eutrophication of lakes in Dunes if existing systems continue to release nutrients at their present rate.

Homeowners with failing systems are already obligated by state law to repair their systems. Repair of a failing on-site wastewater treatment system usually requires replacement of the septic tank and several or more other components of the system. Thus, homeowners with failing systems are in a position similar to that of a developer installing a new system in regard to the opportunity of installing options for removing phosphorus and reducing nitrate levels.

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[66] In a meeting of the Oregon DEQ Technology Review Committee serious interest was expressed in Phosphorus removal systems (letter to Lombardo Associates of 26 July from Michael Kucinski, DEQ Interim Onsite Wastewater Management Program Coordinator).

[67] OAR Chapter 340, Division 071, section 0130(19).

[68] OAR Chapter 340, Division 071, section 0162.

Requiring persons with failing on-site wastewater treatment systems to comply with the performance standard for new systems means that, over time, all onsite wastewater treatment systems in Dunes City would better control the release of nutrients as older systems are replaced.

9. Monitoring of nutrient levels in treated septic system effluent

Monitoring of phosphorus levels in treated effluent is necessary to ensure that phosphorus control options are functioning properly. Therefore, new and repaired systems must have sampling ports with access from the ground surface for the purpose of providing access to treated effluent. Under the draft ordinance, a regular schedule of tests for phosphorus and nitrogen in septic system effluent are to be conducted by property owners.

10. Comparable legislation of other states

It is important for Dunes City to take advantage of the efforts other jurisdictions have made to protect lakes by controlling the release of nutrients. These efforts provide examples that Dunes City may follow.

10.1. Legislation restricting the use of phosphate fertilizer

Under Minnesota law:

> "(a) A person may not apply a fertilizer containing the plant nutrient phosphorus to turf statewide, except under conditions listed in paragraph (b).
>
> "(b) Paragraph (a) does not apply when:
>
> "(1) a tissue, soil, or other test by a laboratory or method approved by the commissioner and performed within the last three years indicates that the level of available phosphorus in the soil is insufficient to support healthy turf growth;
>
> "(2) the property owner or an agent of the property owner is first establishing turf via seed or sod procedures, and only during the first growing season; or
>
> "(3) the fertilizer containing the plant food phosphorus is used on a golf course under the direction of a person licensed, certified, or approved by an organization with an ongoing training program approved by the commissioner.
>
> "(c) Applications of phosphorus fertilizer authorized under paragraph (b) must not exceed rates recommended by the University of Minnesota and approved by the commissioner."[69]

[69] Minnesota Statutes, Chapter 18C, Fertilize, Soil Amendment and Plant Amendment Law, Section 60 - Phosphorus turf fertilizer use restrictions. http://www.revisor.leg.state.mn.us/stats/18C/60.html

The Minnesota Legislature enacted this law in 2004 after 23 cities and counties had enacted similar ordinances restricting the use of phosphorus-containing fertilizers for the purpose of preventing over eutrophication of surface waters.[70]

Dunes City should consider a restriction on the use of phosphate fertilizer as provided by this Minnesota state law.

Other local governments across the country have enacted ordinances restricting the use of phosphorus-containing fertilizers. In 2004, Dane County, Wisconsin (home to Wisconsin's capital city, Madison) enacted an ordinance restricting the use of phosphorus containing fertilizer for the purpose of protecting lakes within the county.[71] This law is substantially the same law as that enacted by the State of Minnesota.

In Oregon, on February 21, 2006, the City Council of Lake Oswego adopted the goal to consider a phosphorus free fertilizer ordinance.[72] Commenting on the forthcoming effort to restrict the use of phosphorus-containing fertilizer, Lake Oswegeo Mayor Judie Hammerstad said, "This is a human action causing pollution and it can be altered. It's part of the stewardship of clean water."[73]

10.2. Legislation prohibiting the use of phosphorus containing detergents

On March 27, 2006, Governor Christine Gregoire signed into law a bill passed by large majorities of both houses of the Washington State Legislature prohibiting the sale and use of phosphorus-containing dishwasher detergents. The law states:

> "A person may not sell or distribute for sale a dishwashing detergent that contains 0.5 percent or more phosphorus by weight: (i) Commencing July 1, 2008, in counties with populations, as determined by office of financial management population estimates: (A) Greater than one hundred eighty thousand and less than two hundred twenty thousand; and (B) Greater than three hundred ninety thousand and less than six hundred fifty thousand; (ii) Commencing July 1, 2010, throughout the state."[74]

Dunes City should consider a prohibition on phosphorus-containing dishwasher detergent as provided in this Washington State law.

10.3. Legislation regulating the release of phosphorus from septic systems

Under Chapter 7080 (Individual Sewage Treatment Systems) of the Minnesota Rules

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[70] Minnesota Department of Agriculture: Local units of government with ordinances restricting the use or sale of phosphorus in lawn fertilizer. http://www.mda.state.mn.us/appd/ace/lawnlugphos.htm

[71] Dane County Code, Chapter 80, Establishing Regulations for Lawn Fertilizer Application and Sale. http://www.co.dane.wi.us/pdfdocs/ordinances/ord080.pdf

[72] Lake Oswego City Council Goals, 2006-2007. http://www.ci.oswego.or.us/council/Goals.htm

[73] The Oregonian (April 19, 2006). http://www.oregonlive.com/printer/printer.ssf?/base/news/1145415334226550.xml&coll=7

[74] Engrossed House Bill 2322, 59th Legislature, 2006 Regular Session. http://www.leg.wa.gov/pub/billinfo/2005-06/Pdf/Bills/House%20Passed%20Legislature/2322.PL.pdf

"Section 7080.0179 – Performance ... Subpart 2 – Performance systems. ... C. Groundwater and surface water protection. ....

"(3) *If the system is located on a lot which adjoins a lake*, the sewage effluent/groundwater plume shall:

"(a) have a total phosphorus concentration of 1 mg/l or less 50 feet or greater from the soil treatment area; or

"(b) have concentrations of total phosphorus less than 1 mg/l above background concentrations 50 feet or greater from the soil treatment area."[75]

It is unclear how pertinent this Minnesota state law is to the problem of phosphorus releases from onsite wastewater systems in Dunes City. Correspondence with staff of the Minnesota Pollution Control Agency indicates that lakeshore homeowners with onsite wastewater treatment systems in Minnesota rely on the capacity of local soils to sequester phosphorus,[76] a situation that may not pertain to Dunes City.

11. The authority of Dunes City to regulate the use of fertilizer

The Oregon Revised Statutes (ORS) contain a chapter on the regulation of feeds, fertilizers, and seeds.[77] There are no provisions of this Chapter that would preempt local governments from further regulating the use of fertilizers.

Another chapter of the ORS regulates pesticides.[78] This Chapter contains the following provision (ORS 634.057) explicitly preempting local governments from further regulating the use of *pesticides*:

"No city, town, county or other political subdivision of this state shall adopt or enforce any ordinance, rule or regulation regarding pesticide sale or use, including but not limited to: (1) Labeling; (2) Registration; (3) Notification of use; (4) Advertising and marketing; (5) Distribution; (6) Applicator training and certification; (7) Licensing; (8) Transportation; (9) Packaging; (10) Storage; (11) Disclosure of confidential information; or (12) Product composition."[79]

Although most fertilizers are not pesticides, some fertilizers contain pesticides (for example, Scott's Weed & Feed). The question arises: Would ORS 634.057 preempt Dunes City from banning the use of phosphorus-containing fertilizer?

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[75] Minnesota Rules 7080.0179 Subpart 2C(3). http://www.revisor.leg.state.mn.us/arule/7080/0179.html

[76] Mark Wespetal, Minnesota Pollution Control Agency. Personal communication.

[77] ORS Chapter 633 — Grades, Standards and Labels for Feeds, Fertilizers and Seeds. http://www.leg.state.or.us/ors/633.html

[78] ORS Chapter 634 — Pesticide Control. http://www.leg.state.or.us/ors/634.html

[79] ORS 634.057 – State preemption of local pesticide regulation.

To answer this question, it is instructive to look at developments in Wisconsin. As discussed above, in 2004, Dane County, Wisconsin enacted an ordinance restricting the use of phosphorus containing fertilizer for the purpose of protecting lakes within the county. Wisconsin has a state law preempting local regulation of pesticide use that is nearly identical to Oregon's law that preempts local regulation of pesticide use. The manufacturers of Weed & Feed went to court seeking to overturn the Dane County ordinance on the basis that Wisconsin state law preempts it.

The case first went to the United States District Court for the Western District of Wisconsin, where, on June 13, 2005, a federal district judge upheld the Dane County ordinance on the following grounds:

> "For their preemption argument, plaintiffs place primary emphasis on their contention that state laws regulating pesticides preempt the city and county ordinances, insofar as those ordinances attempt to regulate fertilizer products that are combined with pesticides. Therefore, I will begin with that contention, anomalous as it may seem to begin a federal question lawsuit with a discussion of a state law question.
>
> "Wis. Stat. § 94.64(1)(e) defines pesticides as including fertilizers that are combined with an herbicide, insecticide or any kind of pesticide. Wis. Stat. § 94.701 forbids the state's political subdivisions from prohibiting the use of pesticides or otherwise regulating their use. Relying on these statutes and the purpose behind them, which was to enact uniform pesticide rules on a matter of statewide concern, plaintiffs argue that defendants lack the authority to enact ordinances that attempt to regulate the sale or use of any fertilizer that contains a pesticide (referred to as "mixed fertilizers" in the ordinances).
>
> "Plaintiffs are attacking a straw man of their own construction. Nothing in the challenged ordinances says anything about pesticide composition, use or sale. The ordinances are directed only to the composition, use and sale of the fertilizers with which the pesticides are mixed. The city and county do not allow lawn fertilizers that contain phosphorus, but neither government has attempted to restrict the nature or composition of the pesticides with which a fertilizer product is combined. So long as those pesticides meet state law requirements, manufacturers can mix them with phosphorus-free fertilizer and meet the city's and county's restrictions.
>
> "It is irrelevant to the legality of the ordinances that the state refers to these mixed fertilizer-pesticide products as "pesticides" for the purpose of its regulations. It does so to insure that manufacturers do not try to evade any of the pesticide regulations by mixing their pesticides with fertilizers, not because it is regulating the fertilizer portion of the mixture.
>
> "The city and county would be barred from enacting regulations on fertilizer use and sale if the legislature had expressly withdrawn defendants' power to regulate fertilizer use or sales or if the challenged ordinances conflicted logically with any state legislation, defeated its purpose or went against its spirit. .... *Plaintiffs have identified no action by the legislature to take away the authority of local units of government to regulate*

fertilizer use or shown any logical conflict between the local ordinances and any state legislation."[80]

The manufacturers of Weed & Feed appealed the decision to the U.S. Court of Appeals for the Seventh Circuit, where, on December 23, 2005, a unanimous, three-judge panel affirmed the lower court ruling on the following grounds:

> "This appeal arises from a suit by producers and suppliers of "weed and feed" products against the City of Madison and the county (Dane) in which Madison is located. Weed and feed products are lawn-care products each granule of which contains both a herbicide and a substance, such as phosphorus, that fertilizes. ...
>
> "To comply with the ordinances, the plaintiffs have had to reconstitute their weed and feed products to eliminate the phosphorus. Invoking a variety of federal and state legal theories, their suit seeks a declaration that the ordinances are invalid. The defendants moved for summary judgment, which was granted. The only claim pressed in this appeal is that the ordinances are preempted by a Wisconsin state statute that, with irrelevant exceptions, forbids a city or county to "prohibit the use of or otherwise regulate pesticides." Wis. Stat. § 94.701(3)(a).
>
> "The statutory definition of pesticides embraces herbicides, see Wis. Stat. § 94.67(25), and a regulation defines pesticide to include "a pesticide-fertilizer mixture." Wis. Admin. Code ATCP (Agriculture, Trade, and Consumer Protection) § 29.01(28). Therefore, the plaintiffs argue, their weed and feed products are pesticides, which Madison and Dane County may not regulate by specifying that the products are not to contain phosphorus, even though phosphorus is a fertilizer rather than a pesticide and there is no state preemption of local regulation of fertilizers.
>
> "Yet the plaintiffs themselves quote the provision of the Wisconsin statute that defines "fertilizer" to include "mixed fertilizers," in turn defined as any combination of "a fertilizer material and any other substance," Wis. Stat. § 94.64(1)(e), (l). And a regulation, parallel to the one that defines "pesticide" to include "a pesticide-fertilizer mixture," defines "combination products containing fertilizer" to include "a fertilizer-pesticide combination," Wis. Admin. Code ATCP §§ 40.02(3), (8), (11)—and, lest there be any doubt, adds that " 'weed and feed' products are fertilizer-pesticide combinations." Wis. Admin. Code ATCP § 40.02(11) Note. So it seems that a weed and feed product is both a pesticide, which only the state can regulate, and a fertilizer, which local government can regulate. (For further confirmation that weed and feed products are both pesticides and fertilizers, see Wis. Admin. Code ATCP § 40.02(29).) How can this be?
>
> "The answer is that the dual definition is necessary to avoid creating a regulatory loophole. If "pesticide" were not defined to include a mixed pesticide-fertilizer product, then a manufacturer of a pesticide might be able to get out from under regulation by

[80] *Croplife America v. City of Madison,* Docket No. 04-C-0949-C (W.D. Wis. 2005) http://www.beyondpesticides.org/documents/P_WeedandFeedBan_6-14-05.pdf (emphasis added)

mixing his pesticide with a fertilizer. And if "fertilizer" were not defined to include a mixed pesticide-fertilizer product, then a manufacturer of fertilizer might be able to get out from under regulation by mixing his fertilizer with a pesticide. *The definition of both "pesticide" and "fertilizer" as including a mixture of the two preserves both state regulation of pesticides and local regulation of fertilizers. The state regulates the pesticide components of the mixed products, local government the fertilizer components.*

"Suppose a weed and feed product sold in Wisconsin contained atrazine, a herbicide, as well as phosphorus, a fertilizer. And suppose the state wanted to ban atrazine and Madison wanted to ban phosphorus. The definition of "pesticide" as including a pesticide mixed with a fertilizer would empower the state to ban atrazine in the product, and the definition of "fertilizer" as including a fertilizer mixed with a pesticide would empower Madison to ban phosphorus in the product because there is no state preemption of local fertilizer regulation. If "pesticide" were defined to exclude mixtures, the state would be helpless to deal with atrazine in a weed and feed product, while if "fertilizer" were defined to exclude mixtures, the city could not deal with the phosphorus in the product because (assuming "pesticide" was defined to include mixtures) the product would just be a pesticide, and not also a fertilizer, and so the city and county would be preempted.

"The plaintiffs complain that unless local regulation is preempted, they cannot sell a weed and feed product in Dane County without reconstituting the product to replace phosphorus with some other fertilizer. They have presented no evidence, however, that such reconstitution is infeasible, or even that it is costly. Indeed, they are selling the reconstituted product in Dane County. No doubt they prefer phosphorus to whatever they have substituted for it in the reconstituted product, or else they would have made the substitution voluntarily. But if phosphorus is indeed a pollutant with serious consequences for lakes (which the plaintiffs have made no effort to confute, although they have made some effort to downplay the polluting effect of their products, as by contending that "the waste from one adult goose contributes 13.76 ounces of phosphorus runoff per year or 68 times more than a typical lawn," though one might suppose that this would depend on where the goose spent his year), the plaintiffs will not be heard to complain. *The defendants point out, without contradiction, that it makes practical sense to allow local regulation of phosphorus because the effects differ from county to county depending on the number and importance of a county's lakes and other bodies of water*, not to mention the number of geese and other contributors to phosphorus pollution.

"So our interpretation of the statute, which is the natural interpretation as a semantic matter and has the further virtue of closing a regulatory loophole, cannot be rejected on the ground that it produces absurd or unreasonable results, which the Wisconsin legislature is unlikely to have intended. Compare Public Citizen v. U.S. Dept. of Justice, 491 U.S. 440, 453-55 (1989); Green v. Bock Laundry Machine Co., 490 U.S. 504, 527 (1989) (Scalia, J., concurring). Quite the contrary, it produces sensible results. See Krzalic v. Republic Title Co., 314 F.3d 875, 879-80 (7th Cir. 2002); United States v. Hilario, 218 F.3d 19, 23 (1st Cir. 2000)."[81]

[81] *Croplife America v. City of Madison*, Docket num. 05-3033, December 2005 (7th Cir. 2006). http://www.vlex.us/generic/descarga/19472931.A_35.Q_.17.pdf (emphasis added).

These opinions are from other jurisdictions and are not binding on courts in Oregon. However, a court in Oregon would look to these opinions as guidance if the authority of Dunes City to regulate phosphate fertilizer use were challenged.

12. Draft Ordinance

Based on the extensive arguments presented above, we propose the following ordinance:

The City of Dunes City Finds:

A. Lakes in Dunes City provide essential benefits to the residents of Dunes City, including a source of drinking water;

B. Lakes in Dunes City are beginning to show early signs of over eutrophication. Both Woahink and Siltcoos Lakes have experienced episodes of rapid phytoplankton population growth (algae blooms) in recent years;

C. The residents of Dunes City depend on the use of onsite wastewater treatment systems to dispose of household liquid wastes. Conventional onsite wastewater treatment systems are not designed to remove phosphorus. Effluent from these systems contains phosphorus that migrates into groundwater and into lakes in Dunes City;

D. Use of phosphate fertilizer adds a substantial amount of phosphorus to lakes in Dunes City

E. The use of high-phosphate detergents makes a substantial contribution to the overall phosphorus levels of onsite wastewater treatment system effluent. Low-phosphate detergents perform just as well as high-phosphate detergents at little additional cost;

F. Tested and validated means of removing phosphorus from onsite wastewater treatment system effluent should become commercially available in the near future;

G. If no action were taken, further release of phosphorus into lakes in Dunes City would cause water quality deterioration to accelerate, potentially leading to their irreversible over eutrophication and loss of vital public benefits;

H. The Background Information Document submitted by the Moratorium Support Committee to the Dunes City Council on September 14, 2006, is hereby incorporated by reference as an aid in the implementation of this ordinance.

1. Definitions

(a) "Fertilizer" means a substance containing one or more recognized plant nutrients that is used for its plant nutrient content and designed for use or claimed to have value in promoting

plant growth. Fertilizer does not include animal and vegetable manures that are not manipulated, marl, lime, and limestone.

(b) "Turf" means non-crop land planted in closely mowed, managed grasses, including, but not limited to, residential and commercial residential property, private golf courses, and property owned by federal, state, or local units of government, including parks, recreation areas, and public golf courses. Turf does not mean pasture, hayland, hay, turf grown on turf farms, or any other form of agricultural production.

(c) The terms "person," "onsite wastewater treatment system," "failing system," and "existing system," shall have the same meaning as these terms are defined in Division 071, Chapter 340, of the Oregon Administrative Rules.

(d) "New system" means any onsite wastewater treatment system installed after the enactment date of this ordinance.

(e) "Repaired system" means any failing system that is repaired after the enactment date of this ordinance.

(f) "Treated effluent" means liquid emanating from a device or system installed with an onsite wastewater treatment system for the purpose of removing phosphorus from septic tank effluent.

(g) "Composite sample" means a sample prepared by combining a series of individual, discrete samples over known time or flow intervals.

(h) "Automatic dishwashing detergent" means any cleaning agent specifically designed for use in automatic dishwashers;

(i) "Cleaning agent" means a laundry detergent, dishwashing compound, automatic dishwashing detergent, household cleaner, metal cleaner, degreasing compound, commercial cleaner, industrial cleaner, phosphate compound, or other substance that is intended to be used for cleaning purposes;

(j) "Nonphosphorus automatic dishwasher detergent" means any automatic dishwashing detergent containing no more than 0.5 % phosphorus.

2. Restrictions on the use of phosphate fertilizer

(a) A person may not apply a fertilizer containing phosphorus to lawn or garden plants except under conditions listed in subsection (b).

(b) Subsection (a) does not apply when:

(1) A residential property owner or an agent of the property owner conducts a soil test (by a laboratory or method approved by the Oregon Department of Environmental Quality) indicating

that the level of available phosphorus in the soil is insufficient to support healthy plant growth; or

(2) A residential property owner or an agent of the property owner is first establishing turf via seed or sod procedures, and only during the first growing season.

(c) Results of soil tests conducted pursuant to subsection (b) shall be submitted to Dunes City prior to application of phosphorus fertilizer by a residential property owner or an agent of the property owner.

(d) Applications of phosphorus fertilizer authorized under subsection (b) must not exceed rates recommended by the Oregon State University Extension Service publication EC 1278 "Fertilizing Home Lawns."

3. Prohibition of the use of phosphorus-containing cleaning agents

(a) After the commencement date of this ordinance, no person may use any cleaning agent that contains more than 0.5 % phosphorus by weight.

4. Consumer and Retailer Information

(a) Each year the City Council shall provide residents of Dunes City with a list, by brand name, of the most common fertilizers that contain and do not contain phosphorus.

(b) The City Council shall contact the managers of retail stores in Dunes City and its proximate environs to: a) inform such stores about the prohibition on the use of high-phosphate dishwasher detergents in Dunes City; and b) request that such stores post signs, labels or other markings that clearly distinguishes brands of fertilizers that contain and do not contain phosphorus.

(c) The City Council shall provide residents of Dunes City with a list, by brand name, of automatic dishwasher detergents and the amount of phosphorus they contain.

(d) The City Council shall contact the managers of retail stores in Dunes City and its proximate environs to: a) inform such stores about the prohibition on the use of high-phosphate dishwasher detergents in Dunes City; and b) request that such stores post signs, labels or other markings that clearly distinguishes brands of phosphorus-containing automatic dishwasher detergents from non-phosphorus automatic dishwasher detergents.

5. Performance standard for onsite wastewater treatment systems

(a) All onsite wastewater treatment systems must by evaluated by a registered inspector according to Dunes City Ordinance 173 including the requirement for submission of an evaluation report.

(b) Any person installing a new onsite wastewater treatment system after the enactment of this ordinance shall insure that the system include:

(1) Sampling ports to monitor system effluent (see Appendix for Specific Design Standards)

(2) Two outflow connections from the septic tank (see Appendix for Specific Design Standards)

(c) Any person installing a new onsite wastewater treatment system after the enactment of this ordinance shall insure that the level of nitrogen in treated effluent does not exceed 30 milligrams per liter (mg/L).

(d) Subsequent to DEQ approval under OAR Division 340 Chapter 71 of an add-on treatment unit for greater than 95% removal of phosphorus from septic tank effluent, any person installing a new onsite wastewater treatment system shall insure that the level of phosphorus in treated effluent does not exceed 1.0 mg/L.

(e) Any person repairing a failing onsite wastewater treatment system after the enactment of this ordinance shall insure, in addition to making the repairs required by OAR 340-071-0215, that the repaired system complies with subsections (a), (b), (c) and (d) above. Homeowners who would suffer excessive economic hardship from the difference in cost of repairing a system such that it complies with the performance standard, and the cost of repairing the system without regard to the performance standard for nitrogen and phosphorus, should make application to Dunes City, which, after assessing the particular need, will seek funding from outside sources to alleviate the cost difference.

6. Determination of compliance

Any person required to comply with the performance standards in Section 6 of this ordinance shall demonstrate compliance by:

(a) Attaching to the permit application required by OAR 340-071-0160 or OAR 340-071-0162 an additional Exhibit prepared by an Oregon registered Professional Engineer describing how the design of the new or repaired onsite wastewater treatment system would result in phosphorus and nitrogen levels that comply with the performance standard. A copy of the additional Exhibit shall be submitted to Dunes City.

(b) Measuring the levels of total phosphorus and total nitrogen in a 24-hour, composite sample of treated effluent at the following intervals coinciding with the anniversary dates of the installation or repair of systems:

(1) Six months after installation or repair of the system;

(2) Twelve months after installation or repair of the system;

(3) Every three years after installation or repair of the system; and

(4) If a sampling result shows a violation of the performance standard, effluent must be resampled within sixty days. If the resampling result also shows a violation of the perfomance standard, the homeowner shall submit to Dunes City within sixty days a plan indicating the measures necessary to improve the system such that it complies with the performance standard.

(c) Homeowners are allowed a period of three months to conduct measurements required by subsections (c)(1)-(3).

(d) Monitoring data collected in accordance with subsection (b) shall be reported to Dunes City.

7. Penalties

(a) Any person who knowingly uses a fertilizer in violation of Section 2 of this ordinance shall be subject to a fine of not more than $500.

(b) Any person who knowingly uses a cleaning agent in violation of Section 3 of this ordinance shall be subject to a fine of not more than $100.

(c) Any person who installs a new of repaired system not designed to comply with the performance standard of Section 5 of this ordinance shall be subject to a fine of $15,000, or an amount equal to the cost of improving the performance of an existing systems in Dunes City such that it complies with the performance standard.

(d) Any person who fails to monitor phosphorus or nitrogen levels of treated effluent as required by Section 6(b) of this ordinance shall be subject to a fine not to exceed $250. Each calendar date on which a violation occurs constitutes a separate violation until the property is in compliance with the requirements of this ordinance.

8. Severability

If any provision of this Act, or the application thereof to any person or circumstance, is held invalid, the invalidity shall not affect other provisions or applications of this Act, which can be given effect without regard to the invalid provision or application and, to this end, the provisions of this Act are severable.

EXHIBIT E
PAGE

Expenses for the Dunes City Temporary Moratorium as of September 14, 2006

Vendor	Item/Service	Cost	Income
Coastal Impressions	Pamphlet	45.00	
LCOG	Mailing list	45.00	
Coastal Impressions	Pamphlet	24.00	
USPS	Mailing	101.99	
Ocean Breeze Motel	Room for Chernaik	96.12	
Mark Chernaik	Ordinance/ harmful products/ critical water	537.50	
Mark Chernaik	Ordinance/phosphorus	1,162.50	
Coastal Impressions	Newsletter	471.00	
Susie Navetta (USPS)	Mailing	242.65	
BJ's Ice Cream	Festival	87.00	
Mark Chernaik	Honorarium - festival	100.00	
Deposit from festival sales			157.75
Coastal Impressions	UPS shipping	36.03	
Susie Navetta	Festival – potato chips	28.77	
Mark Chernaik	Ordinance/ harmful lawn and garden/water resources	737.50	
LCOG	Land use revision – Denise Walters	3,700.00	
Subtotals		7,415.06	157.75
Total	**7,257.31**		

Total budgeted amount for ordinance revision - $8,500

Budget remaining – $1,242.69

EXHIBIT F
PAGE

Sept. 14, 2006

To whom it may concern:

I am Debra Sherman, and have been a resident of D.C. since 1985. (DEBRA SHERMAN) My home is located at 83655 Hwy. 101. on Woahink Lake

I am making this statement to explain how I came to sign the petition regarding the moratorium initiative before the council tonight.

On Easter Day, this year, I and three others were upstairs having a late Easter Lunch at a residence on Clear Lake Road.

To my best recollection someone came to the door. The owner left the table and went downstairs. He returned with a petition. I didn't see or speak to the person who brought the petition.

The host of our Lunch said the petition was in favor of the moratorium so all four of us signed it at that time.

I personally would not have signed any petition that makes it more difficult to get a temporary building moratorium.

Sincerely, Debi Sherman

DEBRA SHERMAN, 83655 Hwy. 101, Florence, OR 97439

EXHIBIT G
PAGE

DUNES CITY ROAD COMMISSION
REGULAR MEETING
AUGUST 21, 2006, 6:30 PM

MINUTES

A. Call to Order and Roll Call

Present: Bob Petersdorf, Keith Herring, David Persons, George McKenzie, Bill Connell, George Burke, Linda Lauck and Susan Scott

Others Present: Gary Cooper, Richard & Ronelle Kuert and Attorney Zack Mittge.

B. Approval of Minutes – July 17, 2006

ACTION: Bill Connell made a motion to approve the July 17, 200 Road Commission Minutes as submitted. George McKenzie seconded the Motion. There were 4 ayes, 0 nays. Motion carried.

C. Guests - None.

D. Citizen Input - None.

E. Unfinished/Old Business

1. **Terrace Homes re-vegetation of the City Right-of-Way clarification.**

Gary Cooper, 83245 Kendall Lane, Florence, OR 97439.
Gary Cooper presented his view and explanation of what his understanding of the requirements for re-vegetation. Cooper discussed the on-site meeting, ditch and culvert and his understanding that the current order superseded the other order to re-vegetate the strip of land between the ditch and the property line. Cooper thought he was done except for the paving. Mr. & Mrs. Parks, the property owners, are strongly concerned about the erosion factor and they know the rain is coming soon. Cooper knows the Parks want a parking area. If we aren't going to have vegetation then we need to have Gary communicate or Dave communicate with the Parks and make sure they should get a plan underway and try to do as much as they can to elevate any rain driven erosion and have Gary put up the water barrier and let the owners re-vegetate the ditch. Gary not responsible for re-vegetation, but he is to leave water fence up. Gary will talk to the owners. Officially Gary was asking for more time to get the paving done. Cannot give us a date due to the back up with Ray Wells, Inc. Cooper is also to fix the culverts.

ACTION: George McKenzie made a motion to release Gary Cooper from the Liability of re-vegetation. Recommendation to City Council that Gary gets an extension on the paving of the street and keep the water barrier up. Write a letter to to the owners they either put concrete or asphalt for parking and apply for a land use permit and the homeowners will have to re-vegetate before the heavy rains around November 1st. Linda Lauck seconded the motion. There were 4 ayes, 0 nays. Motion Carried.

1. **Road Inspector Forms – Linda Lauck**

   Discuss the proposal of an official Inspection Log Sheet, Incident report, and Photo Log.

ACTION: George Burke made a motion to approve the 3 forms for the Inspector of Roads reporting. George McKenzie seconded the motion. There were 4 ayes, 0 nays. Motion Carried.

2. **Agreement for Payment of Land Use Application Fees – Form provided by Gary Darnielle.**

   Discussed the form provided by Gary Darnielle. The form is for a Street Inspection when what Road Commission is actually looking for is a Driveway Inspection form. The Home Owner would have to sign it and it would be a part of the building permit process so that any driveway that is put in and inspected by the City Engineer, the inspection fee will be paid for by the homeowner. Have staff go in and re-do the form in the building permit that has to do with any driveways or driveway permit or special needs were our Engineer has to be paid. Need to make sure the Website is changed and the form is updated.

ACTION: George McKenzie made a motion to approve the forms for any extra expenditure's for inspections that will be paid for by the landowner. Bill Connell seconded the motion. There were 4 ayes, 0 nays. Motion carried.

3. **Master Road Plan Status.**

   Too much going on right now to review the Master Road Plan. Will have Christy bring it back up in January, 2007.

F. **New Business**

1. **Parks & Recreation request that the 60' right-of-way on Ocean Blvd. be designated as a City Park (Lot 1300).**

The City will not vacate the area but we will designate the area as a City Park, will put some Rhododendron bushes and fix it up and get rid of some of the brush, as well as clean up.

ACTION: George Burke made a motion to recommend to the City council That they designate the 60' right-of-way on Ocean Blvd. be designated as a (temporary usage) City Park. Dave Persons seconded the motion. There were 4 ayes, 0 nays. Motion carried.

2. **Temporary Right-of-Way Permit request - Sheldon Meyer, 83694 Rio Drive, Florence, OR**

Discussed the request for parking boat and trailer on right-of-way. If he wants to continue using that part of the right-of-way he will need to pave the area.

ACTION: George McKenzie made a motion to approve the permit request if the right-of-way area is paved. Bill Connell seconded the motion with discussion. Revised motion was made by to include paving the whole section so it's paved were you pull in and out. (I did not here who made the revised motion or who seconded the motion. I do not recognize the voices)There were 4 ayes, 0 nays. Motion carried.

3. **Request for Abatement for Encroachment into the Right-of-Way - Parkway Estates, Homeowners Association of Parkway Estates.** Richard Kuert, Parkway Estates HOA President & Ronelle Kuert, ARC, 83420 Parkway Drive, Florence, OR and Attorney Zack Mittge, Hutchinson & Cox, Eugene, OR. There were numerous discussions not related to the encroachment of the right-of-way. It was discussed that the Hickey's did not obtain a permit for planting in the right-of-way. Bob Petersdorf mentioned that he did talk to the Hickeys and believes he told them that after the excavating they needed to re-vegetate within 2 or 3 days. He will have to check/investigate the excavating permit. The Kuerts were told they could appeal the and to check with the office to see if they have 10 days to do so.

ACTION: George Burke made a motion to table the motion until next month, so Bob Petersdorf has time to check into the excavating and grading permit and see what it says. (Could not hear who seconded the motion). There were 4 ayes, 0 nays. Motion carried.

G. **Unscheduled Items Not Listed on Agenda**

Pete Purdy, 1745 NW Reliable Way, Bend, OR
Wants to know where he can put his driveway. Road Commission went over the information he provided and told him to do a better map and then to call the Road Commission when he's done.

Reports

1. Keith Herring, Road Inspector
   Keith presented his report (see Exhibit A). Keith presented three bills in the amount of $314.50.

ACTION: Bill Connell made a motion to approve payment to Keith Herring for $314.50. Linda Lauck seconded the motion. There were 4 ayes, 0 nays. Motion carried.

2. Sue Scott, Office Assistant - None.

3. Bill Connell, Road Commissioner - Bill brought up the Teri Austin situation. Bob Petersdorf indicated we've done everything we can do. Maybe it's time to do something more drastic. Make recommendation to the City Council that we have written numerous letters to start abatement procedures and start fining him $200.00 a day.

4. Linda Lauck, Road Commissioner - None

5. Bob Petersdorf, Road Chairperson - Discussed the success of the festival.

6. George McKenzie - Road Commissioner - None

7. George Burke, Planning and Road Commissioner - Spoke with (couldn't understand name) regarding a cul-de-sac at the end of Woodland Lane. He's trying to buy property across from the lake; southeast side. If he acquires this property he'd like to come back to the City to work with us on doing the cul-de-sac. Talked about his retaining wall.

8. Dave Persons - None

F. **Adjournment – Meeting adjourned at 9:20 p.m.**

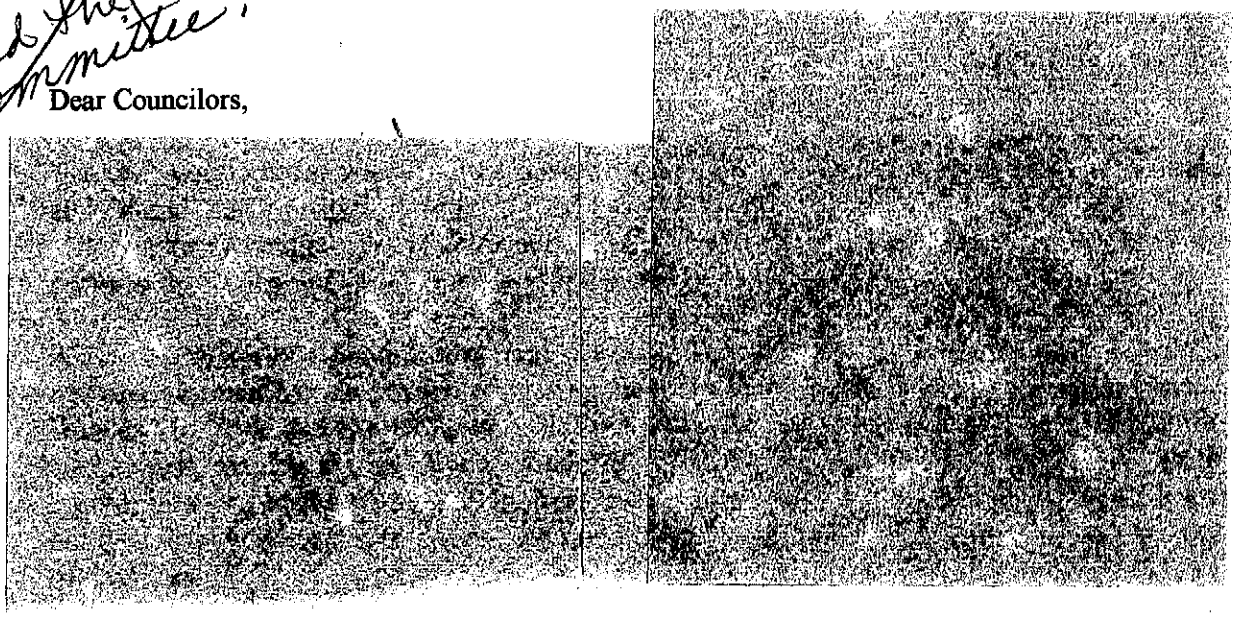
ROBERT PETERSDORF

CHRISTY LEWIS

See do you all have Judy's notes? Judy added Bob the Island Dog did the changes git made? By committee.

EXHIBIT H
PAGE

Dear Councilors,



Dunes City needs sound development. The ordinances that we adopt will be used to guide future development so that ~~it is in~~ accordance with the community's objectives and future plans. The city codes must reflect and conform to our comprehensive plan.

~~The Planning Commission has not asked for the Model Cities 155/156 ordinance to be passed~~. The Planning Commission has dealt with many variations of the code for too many years. I came to the Planning Commission in November 2004 and I cannot tell you how many times we worked on code changes. It is nearly impossible to remember the current city code when you have to also deal with adding changes and editing the new code.

The prososed new ordinances are being prepared the old fashioned way with hard work from the volunteers. Recently we've had two meetings with some of the contractors/builders that work in our area. The meetings have been valuable to our writing the Erosion Control Ordinance and insightful to all those attending. Finishing touches are being made on Erosion Control, Stormwater Runoff, Fertilizer, Higher Septic Standards, and of course the LCOG version of code 155 and 156 that was paid for with Dunes City funds.

Fragmented pieces of the "old" Model Code 155/156 information arrive in my email from time to time. This tells me that the work is not done and that the public has not commented on the finished document. Dunes City can **NOT** pass this incomplete ordinance that is in conflict with the comprehensive plan and Oregon state law. Our city's Land Use attorney Gary Darnielle advised the council of this conflict with the Comprehensive Plan and the State Statutes. This document is **NOT** ready to go to a vote. It's time for the Dunes City Council to step up and do what is best for our community.

Respectfully,

EXHIBIT_I_
PAGE_____

83505 South Cove Way
Dunes City. OR 97439

September 14, 2006

City Council
Dunes City
82877 Spruce Street
Westlake, OR, 97493

RE: Ordinance 182

Mayor Meyer and Councilors,

It is my intention is provide you with information that will assist you in deciding the disposition of Ordinance 182. Perhaps the two most important things I learned in preparing for this evening are:

1. *Comprehensive Plan* and regulations adopted by the City shall be in compliance with Oregon's Statewide Planning Goals within one year after their adoption [ORS 197.250].

2. A comprehensive plan is the controlling land use planning instrument for a city. Upon its passage, the city assumes responsibility to effectuate the plan and conform zoning ordinances, including prior existing zoning ordinances, to it. Baker v. City of Milwaukie, 271 Or 500, 533 P2d 772 (1975). **distinguished in** Green v. Hayward, 275 Or 693, 552 P2d 815 (1976)

That being said, Ordinance 182 is designed to implement the replacement of Subdivision Ordinance 155 and Zoning Ordinance 156 with an amendment known variously as: *Exhibit A; Ordinance 182, Exhibit A; Chapter 155;* and *Chapter 155, Zoning and Development.* I am going to use the term *"Exhibit A"*. Please allow me to assist the Council by pointing out some of the problem areas and associated reasons for my concern over the adoption of Ordinance 182.

1. Since findings of Fact are not available at this time, the council is precluded from making a final decision to adopt. A copy of the approved *Exhibit A* along with the findings adopted by the Council must be submitted to DLCD within five working days after the council's final decision to adopt [ORS 197.615 (1)].

2. Ordinance 182 proposes to combine the City's Zoning and Subdivision ordinances into a single ordinance, as recommended by DOT and DLCD [Planning Commission's *Memoradum to Dunes City Mayor and Council*, January 17, 2005, Page 1]. The recommended format is in conflict with basic City policy. The Comprehensive Plan is a statement of the City's basic policies [Comprehensive Plan II, C, 1, Page 20]. It describes the City's Zoning and Subdivision regulations as two separate and distinct ordinances. [Comprehensive Plan II, C, 2, a. and b., Page 20].

3. The terms, "apparent shoreline", "the point of contact between the normal summer surface water level and the bank or wetland vegetation" [Exhibit A, Page 7] and "Shoreland Area", "For purposes of construction near the shorelines of Woahink Lake, Siltcoos Lake, and Siltcoos River, the shorelands area is the section of land abutting the water and extending from the apparent shoreline 50 feet inland and bounded by tax lot sidelines" [Exhibit A, Page 19] as used in *Exhibit A* are in conflict with the City's Comprehensive Plan. The City's *Comprehensive Plan Shorelands Policy K1.* states, ". . . the ordinary high water line of Siltcoos lake is 12' above mean sea level and the ordinary high water line of Woahink Lake is 39.8' above mean sea level. The shorelands area is 50 feet measured horizontally from these points" [Page 15].

The document in your packet titled *SYNOPSIS OF CHANGES, ADDITIONS, ETC. TO LAND USE ORDINANCE (8-29-06), s*tates in bold type on Page 1, second paragraph, last sentence, **"This would require a change in the Comp Plan – "**, apparently offering agreement that *Exhibit A* is in conflict with the City's Comprehensive Plan.

4. The *Exhibit A*, revised 9/27/05 and mailed to DLCD on November 23, 2005, is significantly different from the *Exhibit A.* dated 8/16/06. As such, a replacement *DLCD Notice of Proposed Amendment* (45 day notice) is required. The notice, mailed per ORS 197.610 was followed, on December 19, 2005, with a letter requesting that *Ordinance 155.2.3.400 Booth Island* be included. The current *Exhibit A* contains a revision of the Booth Island Ordinance [Pages 56 – 58] significantly different from the Booth Island Ordinance sent to DLCD. Also added was *Ordinance155.3.7 Solar Access,* [Pages 87 – 91]. Additional adjustments to *Exhibit A* were being offered as recently as August 28, 2006 [Councilor Martin's e-mail to Teri Tinker].

5. A Red-lined copy of *Exhibit A* is required by DLCD. A copy of the specific language being added to or deleted from the land use regulations must be provided to DLCD at least 45 days prior to the first public hearing [ORS 197.610(1).]

6. Storm Drainage Improvements are inadequate. *Exhibit A,* 155.3.4.4, Page 85, , requires that provisions for stormwater runoff be made in conformance with *Surface Water Management*, § 155.3.5, [Page 87]. That culverts and other drainage facilities are large enough to accommodate the entire upstream drainage area whether inside or outside the development. And that storm water easements conform to the watercourse. The referenced *Surface Water Management* portion is missing. It's absence places *Exhibit A* out of compliance with *Oregon's Statewide Planning Goal 17*, which requires that the City minimize man-induced sedimentation in coastal lakes [OAR 660-015-0010(2)] and the City's *Comprehensive Plan Policy E7* which requires, "The city shall draft city ordinances regulating nonpoint source polluted runoff into lakes and streams . . ."

7. *"Planning Director"* is responsible for giving notice at least *20 days* before the hearing date [*Exhibit A*, Page 100, item D. 2.]. ORS 197.763(2)(f)(B), requires that, "If two or more evidentiary hearings are allowed, [notice must be mailed] 10 days before the first evidentiary hearing."

Oregon Statewide Planning Goal 1 [OAR 660-015-0000(1)] calls for the opportunity for citizens to be involved in all phases of the planning process, as does Dunes City's Comprehensive Plan Policy A1 [Comprehensive Plan. Page 4]. In addition, ORS 92.048(3) specifies that public hearings before the City Council are held **after** a notice has been published in the paper 10 days prior to the hearing [ORS 92.048 (3)]. (Note: The City's and use regulations [ORS 197.015 (11)], are adopted under procedures specified in ORS 92.044.)

The proposal before you must be denied. Thank you very much for your patience.

Respectfully,

John Stead