

BOARD OF YAKIMA COUNTY COMMISSIONERS

ORDINANCE NO. 6-2011

IN THE MATTER OF AMENDING YCC TITLE 16C, THE CRITICAL AREAS ORDINANCE OF YAKIMA COUNTY

WHEREAS, the Washington State Growth Management Act (GMA) requires Yakima County to review and evaluate its development regulations and to take legislative action, if needed, to revise its development regulations to ensure they comply with the requirements of, and time periods in, RCW 36.70A; and

WHEREAS, Yakima County adopted amendments (Ordinance No. 13-2007) to the Yakima County Critical Areas Ordinance (YCC Title 16C) in December 2007 as part of the required seven year plan update requirement of the Growth Management Act; and,

WHEREAS, in February 2008, a number of petitioners appealed the adoption of the ordinance to the Eastern Washington Growth Management Hearings Board (GMHB) in consolidated Case No. 08-1-0008c, alleging that certain provisions of the ordinance failed to comply with certain provisions of the GMA, codified as Chapter 36.70A RCW; and,

WHEREAS, the GMHB issued its Final Decision and Order (FDO) in case No. 08-1-0008c on April 5, 2010, concluding that certain of the provisions of Ordinance 13-2007 appealed by the petitioners failed to comply, including those related critical area exemptions and critical aquifer recharge areas (CARAs) ; and,

WHEREAS, Yakima County appealed the GMHB's FDO to the Superior Court of the State of Washington; and,

WHEREAS, the Superior Court issued its decision on February 8, 2011, holding that the GMHB properly rejected the County's exemption provisions; and,

WHEREAS, Yakima County has proposed text amendments to YCC Title 16C regarding exemptions to comply with the GMHB FDO, the Superior Court decision, and RCW 36.70A; and,

WHEREAS, following the appeal of the 2007 amendments to the YCC Title 16C, Yakima County adopted an amendatory ordinance (Ordinance No. 1-2011) further amending the YCC Title 16C, the Critical Aquifer Recharge Areas (CARA) Chapter in order to comply with the GMHB's FDO interpretation of the provision of the GMA; and,

WHEREAS, in its April 27, 2011, Partial Coordinated Compliance Order the GMHB recognized the County adopted Ordinance 1-2011 amending YCC Title 16C.09 to adopt new designation and protection standards for CARA, yet they found that County has failed to comply with the requirement to designate CARA; and,

WHEREAS, the GMHB found that without a mapping update to include Best Available Science, the pre-existing CARA designation map did not comply with the GMA; and,

WHEREAS, subsequent to the issuance of the Partial Coordinated Compliance Order, Yakima County reviewed the scientific methodology used to create the CARA map and determined that the CARA maps meet Best Available Science; and,

WHEREAS, Yakima County has coordinated with Petitioner Futurewise to draft amendments to the mapping section of 16C.09 which would address the GMHBs concerns and comply with April 27, 2011, Partial Coordinated Compliance Order; and

WHEREAS, Petitioner Futurewise has acknowledged that the proposed CAO amendments adequately address their concerns as originally brought forth in their Petition for Review.

WHEREAS, the Yakima County SEPA Responsible Official issued a Determination of Nonsignificance (SEP11-018) for the proposed edits to Title 16C, on April 15, 2011; and,

WHEREAS, the comment period on the Determination of Nonsignificance and on the proposed amendments closed on April 29, 2011; and, and a Final Determination of Nonsignificance was issued on May 3, 2011 without further comment period; and,

WHEREAS, the Board of Yakima County Commissioners held a properly advertised public hearing on June 7, 2011 at the Yakima City Hall Hearing Room, 129 N. 2nd Street Yakima, WA, for the purpose of taking testimony on the proposed amendments to the Yakima County Critical Areas Ordinance; and,

WHEREAS, the Board, has carefully considered oral and written testimony from the public and recommendations from staff; and,

WHEREAS, the Board is now satisfied that this legislative matter has been sufficiently considered, and that the process leading to the development of the amended Critical Areas Ordinance has been open, extensive, continuous and afforded opportunities to all who wanted to participate or offer testimony; and,

WHEREAS, the Board has, at a properly advertised agenda, deliberated on the proposed amendments, weighed the evidence presented, balanced the goals of the GMA and the desires of the citizens of Yakima County in a final set of amendments to YCC Title 16C; and,

WHEREAS, the Board of Yakima County Commissioners further finds and concludes that adoption and implementation of the amendments to the YCC Title 16C to be in the public interest and essential to direct the future growth and development of Yakima County, consistent with the County's Comprehensive *Plan 2015*: now, therefore,

BE IT HEREBY ORDAINED:

Section 1. Findings. The Board of Yakima County Commissioners finds that all statutory and County prerequisites for the review and evaluation of YCC Title 16C as well as the requirements for ensuring adequate public notification and opportunities for comment and participation in the amendment process, have been met. The Board makes the following findings:

- A. **Legislative Intent.** The Board of Yakima County Commissioners finds that it has fully considered the evidence presented throughout the public process of updating, adopting and amending YCC Titles 16C to fulfill the requirements of State law and to comply with the decisions of Superior Court and the GMHB. The Board reaffirms that it has considered the best available science documentation in its decisions and finds the record to be compelling in its support of the

designation and protection of critical areas and the balancing of the public and private interests as expressed by the adopted Critical Areas Ordinance and the amendments herein contained.

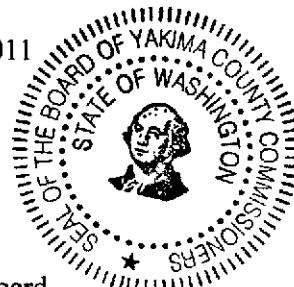
- B. **State Environmental Policy Act (SEPA).** The SEPA Responsible Official has reviewed the potential adverse environmental impacts of the proposed amendments in accordance with the provisions of YCC Title 16, culminating in Final Determinations to retain the *Determinations of Non-significance* issued on May 3, 2011. The Board finds that environmental review is complete and adequate.
- C. The Board finds that the basis for adopting the amendments in Section 2 of this ordinance related to exemptions and Critical Aquifer Recharge Areas designation as documented in staff reports pertaining to and the recitals to this Ordinance substantiate that the action taken is necessary to comply with the decisions of the Court and the GMHB. The Board is satisfied that the CARA mapping as contained in this amendment to Title 16C is consistent with DOE Guidance document 05-10-028 and that the County has used the appropriate measures available to properly designate CARA as provided by Statute and Washington Administrative Code.

Section 2. Adoption. The document attached hereto as **Exhibit A** and entitled *Proposed Amendments to the Critical Areas Ordinance*, is hereby adopted as an official control required by RCW 36.70A. The amendments shall be made to YCC Title 16C and codified as amendatory sections to YCC Title 16C. This Title shall apply to all unincorporated lands under Yakima County's land use jurisdiction, except for lands under jurisdiction of the Shoreline Management Act (RCW 90.58).

Section 3. Severability. If any section, sentence, clause, or phrase of the amended YCC Title 16C as contained in Exhibit A to this ordinance should be held to be invalid or unconstitutional by anybody or court with authority and jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, clause or phrase of the adopted YCC Title.

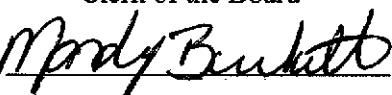
Section 4. Effective Date. This ordinance as amended by Section 2 herein and Exhibit A shall be effective at 12:01 a.m. on July 12, 2011.

Dated this 12th day of July 2011

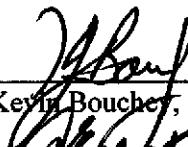


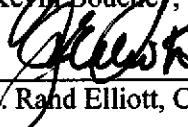
ATTEST:

BY: Tiera Girard
Clerk of the Board


Mandy Burkett

Mandy Burkett
Deputy Clerk of the Board


Kevin Boucher, Chairman


J. Rand Elliott, Commissioner


Michael D. Leita, Commissioner
*Constituting the Board of County Commissioners
for Yakima County, Washington*

EXHIBIT A
to Ordinance 6-2011

Chapter 16C.03
APPLICATION AND REVIEW PROCEDURES

Sections:

General Provisions

16C.03.01 Critical Area Development Authorization Required

Inquiry and Early Assistance

16C.03.02 Critical Area Identification Form and Critical Areas Reports

16C.03.03 Pre-application Conference

16C.03.04 Technical Assistance Conference

Abbreviated Review Alternatives

16C.03.05 Minor Activities Allowed without a Permit or Exemption

16C.03.06 Exemption Procedural Requirements

16C.03.07 Exemptions for Hydrologically Related Critical Areas, Wetlands

16C.03.08 Exemptions for Geologically Hazardous Areas Development Authorizations

16C.03.09 Exemptions for Upland Wildlife Habitat and Habitats of Local Importance Development Authorizations

16C.03.10 Mitigation requirements

General Provisions

16C.03.01 Critical Area Development Authorization Required

1) No new development, construction or use shall occur within a designated critical area without obtaining a development authorization in accordance with the provisions of this title, except for those provided for in section 16C.03.05 (Minor Activities Allowed without a Permit or Exemption). ~~Exemptions, as provided for in sections 16C.03.07 through 16C.03.09, shall be considered as development authorization.~~

Inquiry and Early Assistance

16C.03.02 Critical Area Identification Form and Critical Area Report Requirements.

1) Prior to the review or consideration of any proposed development, construction or use, except those provided under Applicability (16C.01.05), and Minor Activities Allowed Without a Permit or Exemption (16C.03.05), the County shall consider available information to determine if a critical area is likely to be present. The presence of a critical area found on the paper and electronic maps within or adjacent to the property proposed for development is sufficient foundation for the Administrative Official to require preparation of a critical area identification form, provided by the department, and a preliminary site plan. This critical area identification form and preliminary site plan may be one piece of information used to analyze

how a critical area could be affected by a development proposal. To the extent possible, all critical area features must be identified on the critical area identification form and shown on the preliminary site plan prior to the Administrative Official determining whether the development is subject to this title.

16C.03.03 Pre-application Conference

7) Determine whether the project requires a permit, and can be processed as an exemption, or if not, what type of permits or reviews may be needed. Final determination of necessary permits will be made based on the project design and submittal materials;

16C.03.05 Minor Activities Allowed without a Permit or Exemption.

1) The following activities are included under 16C.01.05(1) (Applicability) and are allowed without a permit or exemption:

- a) Maintenance of existing, lawfully established areas of crop vegetation, landscaping (including paths and trails) or gardens within a regulated critical area or its buffer. Examples include, harvesting or changing crops, mowing lawns, weeding, harvesting and replanting of garden crops, pruning, and planting of non-invasive ornamental vegetation or indigenous native species to maintain the general condition and extent of such areas. ~~Cutting down trees and shrubs within a buffer is not covered under this provision, but maybe covered under an exemption.~~ Excavation, filling, and construction of new landscaping features, such as concrete work, berms and walls, are not covered in this provision and are subject to review;
- b) Minor maintenance and/or repair of lawfully established structures that do not involve additional construction, earthwork or clearing. Examples include painting, trim or facing replacement, re-roofing, etc. ~~Construction or replacement of structural elements is not covered in this provision, but may be covered under an exemption.~~ Cleaning canals, ditches, drains, wasteways etc. without expanding their original configuration is not considered additional earthwork, as long as the cleared materials are placed outside the stream corridor, wetlands, and buffers;
- c) Low impact activities such as hiking, canoeing, viewing, nature study, photography, hunting, fishing, education or scientific research;
- d) Creation of unimproved private trails that do not cross streams or wetlands that are less than two (2) feet wide and do not involve placement of fill or grubbing of vegetation;
- e) Planting of native vegetation;
- f) Noxious weed control outside vegetative buffers identified in Chapter 16C.06.16, except for area wide vegetation removal/grubbing;
- g) Noxious weed control within vegetative buffers, if the criteria listed below are met. Control methods not meeting these criteria may still apply for a ~~restoration~~ exemption, or other development authorization as applicable:
 - i) Hand removal/spraying of individual plants only;
 - ii) No area wide vegetation removal/grubbing.
- h) Agricultural and other accessory uses or structures that maintain the existing natural vegetation (rangeland, grazing, stock fences, outdoor recreation, etc.)

16C.03.06 Exemption Procedural Requirements

Certain activities and uses are exempt from some permit processes and shall instead be reviewed using the procedures below, except that Flood Hazard exemptions provided in 16C.05.20.06, shall follow procedures established to administer Chapter 16C.05 (Flood Hazard Areas).

- 1) Any exempted development shall be consistent with the policies and provisions of this title.
- 2) Only those developments that meet the precise terms of one or more of the listed exemptions may qualify for review under these provisions.
- 3) If any part of a proposed development is not eligible for exemption, then a development permit is required for the entire proposed development project.
- 4) When a development or use is proposed that does not comply with the bulk, dimensional and performance standards of this title, such development must also obtain an Adjustment (16C.03.23).
- 5) All exempted activities shall use reasonable methods to avoid impacts to critical areas. To be exempt from this title does not give permission to degrade a critical area or ignore risk from natural hazards. Any incidental damage to, or alteration of, a critical area that is not a necessary outcome of the exempted activity shall be restored, rehabilitated, or replaced at the responsible party's expense, according to section 16C.06.23 (Reclamation).
- 6) The proponent of an exempt activity shall submit a written request for permit exemption to the Administrative Official that describes the activity and states the exemption requested. The applicant shall submit to the Administrative Official a written description of the project that demonstrates compliance with applicable standards.
- 7) The Administrative Official shall review the exemption request to verify that it complies with this title.
- 8) The Administrative Official shall approve or deny the exemption.
- 9) A formal letter of exemption shall be provided where an exempt activity is approved under this title. A copy of the exemption shall be kept on file by the Administrative Official. If an exemption cannot be granted, the Administrative Official shall notify the applicant in writing of the reason, at which time the applicant may pursue other permit processes under this title.
- 10) Conditions may be attached to the approval of exempted developments and/or uses as necessary to assure continued consistency of the project with this title.
- 11) Exempt activities are identified in the following locations. Such activities are stated as exempt from the standard development permits or flood hazard permits. However, this provision does not exempt an activity from other permits or reviews that may be required under this title.
 - a) Those activities listed in sections 16C.03.07 (Exemptions from HRCA, and Wetlands) are exempt from the standard development permit requirements for Wetlands (16C.07), and Hydrologically Related Critical Areas Features (16C.06.03);
 - b) Those activities listed in sections 16C.03.09 (Exemptions for Upland Wildlife Habitat Conservation Areas) are exempt from the standard development permit requirements for Upland Wildlife Habitat Conservation Areas (16C.06.11);
 - c) Those activities listed in sections 16C.03.08 (Exemptions for Geologically Hazardous Areas) are exempt from the standard development permit requirements for Geologically Hazardous Areas (16C.08);

d) Those activities listed in sections 16C.05.20.060 are exempt from the Flood Hazard Permit requirements for Flood Hazard Areas (16C.05).

16C.03.07 Exemptions for Hydrologically Related Critical Areas, and Wetlands

The following development activities are exempt from standard development permits that are required within Wetlands designated in chapter 16C.07.02 (Designation and Mapping) and Hydrologically Related Critical Areas features designated in section 16C.06.03 (HRCA Features):

- 1) Construction or practices normal or necessary for farming, irrigation, and ranching activities, including agricultural service roads and utilities, construction of a barn or similar agricultural structure, and the construction and maintenance of irrigation structures including but not limited to head gates, pumping facilities, and irrigation channels; provided, that a feedlot of any size, all processing plants, other activities of a commercial nature, and/or alteration of the contour of the land by leveling or filling other than that which results from normal cultivation, shall not be considered normal or necessary farming or ranching activities. A "feedlot" shall be an enclosure or facility used or capable of being used for feeding livestock hay, grain, silage, or other livestock feed, but shall not include land for growing crops or vegetation for livestock feeding and/or grazing, nor shall it include normal livestock wintering operations;
- 2) Normal maintenance or repair of existing structures or developments, including damage by accident, fire, or elements. "Normal maintenance" includes those usual acts to prevent a decline, lapse, or cessation from a lawfully established condition. "Normal repair" means to restore a development to a state comparable to its original condition, including but not limited to its size, shape, configuration, location and external appearance, within a reasonable period after decay or partial destruction, except where repair involves total replacement which is not common practice or causes substantial adverse effects to the environment. Replacement of a structure or development may be authorized as repair where such replacement is the common method of repair for the type of structure or development and the replacement structure or development is comparable to the original structure or development including but not limited to its size, shape, configuration, location and external appearance, and the replacement does not cause additional substantial adverse effects to the environment. The need for replacement resulting from a neglect of maintenance and repair is not considered a common method of repair. Replacement of non conforming uses or facilities may also be subject to section 16C.03.26 (Non conforming Uses and Facilities);
- 3) Emergency construction necessary to protect property from damage by the elements. An "emergency" is an unanticipated and imminent threat, which requires immediate action or response within a time period too brief to allow full compliance with this title. The following criteria must exist to qualify any action under an emergency provision:
 - a) There must be an immediate threat to life, public or private property, or an immediate threat of serious environmental degradation arising from a natural condition or technical incident;
 - b) The emergency response must be confined to the action necessary to protect life or property from damage;
 - c) The scope of the emergency response must be limited to the work necessary to relieve the immediate threat;

- d) The emergency response applies only to the period of time in which the actual emergency exists;
- e) The request must be accompanied by a paid permit application or a request for a non-emergency exemption. Submittal requirements beyond normal exemption submittal requirements are waived until after the emergency is deemed abated. As soon as the emergency is deemed abated by appropriate authorities, compliance with the requirements of this title is required, and may include removal of the emergency construction if non structural construction measures can adequately deal with site issues.

- 4) The operation, maintenance or construction of canals, waterways, drains, reservoirs, or other manmade facilities that now exist or are hereinafter created or developed as a part of an irrigation system;
- 5) Operation and maintenance of any system of dikes, ditches, drains, or other facilities existing on July 12, 1994, effective date of this Critical Areas Ordinance, for land not within Shoreline jurisdiction, which were created, developed, or utilized primarily as a part of an agricultural drainage and diking system;
- 6) Any project with a certification from the governor pursuant to chapter 80.50 RCW (Energy facilities—site locations);
- 7) Site exploration and investigation activities that are prerequisite to preparation of an application for development authorization under this chapter, if:
 - a) The activity will have no significant adverse impact on the environment including but not limited to fish, wildlife, fish or wildlife habitat, water quality, and aesthetic values;
 - b) The activity does not involve the installation of any structure, and upon completion of the activity the vegetation and land configuration of the site are restored to conditions existing before the activity;
- 8) The process of removing or controlling aquatic noxious weeds, as defined in RCW 17.26.020 (control of spartina and purple loosestrife), through the use of an herbicide or other treatment methods applicable to weed control that are recommended by a final environmental impact statement published by the Department of Agriculture or the Department of Ecology jointly with other state agencies under chapter 43.21C RCW (SEPA);
- 9) The removal of trees that are hazardous, posing a threat to public safety, or posing an imminent risk of damage to private property, from critical areas and buffers, provided that:
 - a) A dead tree within a buffer may be shortened to the point that the tree will not strike a structure or defined vehicle parking area. The remainder shall be maintained to provide wildlife habitat, nesting locations and perch sites. A remainder less than ten (10) feet tall may be removed completely;
 - b) A diseased or damaged tree may be removed as determined appropriate by the Administrative Official;
 - c) The removed portion of trees should be placed within the vegetative buffer area as wildlife habitat, unless it will interfere with a maintained vegetation area identified in section 16C.03.05(a) (Minor Activities), or unless the Administrative Official determines otherwise. Portions of trees to be removed from the buffer area should be felled to the outer edge of a vegetative buffer and dragged out. Heavy equipment is not allowed within the buffer, except within areas identified in 16C.03.05(a) (Minor Activities). Damaged riparian vegetation must be repaired;
 - d) Each tree that is felled or topped shall be replaced in a manner acceptable to the Administrative Official.

16C.03.08 — Exemptions for Geologically Hazardous Areas

The following development activities are exempt from standard development permits that are required for Geologically Hazardous Areas designated in chapter 16C.08:

- a) Additions to or alteration of existing single family residences;
- b) Uses and surface disturbances (clearing and grubbing) that do not include excavation, fill or irrigation;
- c) Structures less than 200 square feet that are not used as a place of employment or residence (fences, sheds, gazebos, etc.);
- d) Oil, gas, wind or other exploration that does not include explosions, roads, excavation or fill.

16C.03.09 — Exemptions for Upland Wildlife Habitat and Habitats of Local Importance

The following development activities are exempt from standard development permits that are required for Upland Wildlife Habitat Conservation Areas designated in section 16C.06.11:

- a) Agricultural and other accessory uses or structures that maintain the existing natural vegetation (rangeland grazing, stock fences, outdoor recreation, etc.);
- b) Any development and associated facilities with less than a 1/2 acre of disturbance area on existing lots;
- c) New driveways or roads less than 1/2 mile in length;
- d) Additions to or alteration of existing single family residences and associated facilities;
- e) Subdivision consistent with zoning districts, with roads totaling less than a 1/2 mile in length or less. Clustering to reduce infrastructure is encouraged;

Table 3-1

General Permits or Reviews

Standard Development. Standard development projects include any development not subject to RCW Chapter 90.58, the Shoreline Management Act.

Exemptions. Exemptions are generally minor activities that do not need to go through the permit process.

Specific Permits

Adjustment. Administrative Adjustments are used outside Shoreline jurisdiction when a project needs to reduce or adjust a development standard.

Non-conforming Use or Facility Alteration. Non-conforming Use or Facility Alterations are necessary when an existing legal use that currently does not conform to this title is to be altered.

Minor revisions to an Existing Permit. Minor Revisions to an Existing Permit allow simplified review of certain changes to a project that has previously received a permit.

Reasonable Use Exceptions. Reasonable Use Exceptions provide an alternative to landowners when all reasonable use of a property has been prohibited.

Flood Hazard Permit. A Flood Hazard Permit is required for activities within floodplains. It is different in that it has special administrative provisions, and may include many of the specific permit types noted above within it, which are described in chapters 16C.05.20 through 16C.05.72. It is focused mainly on construction methods, but may include site design to minimize impacts to adjacent properties or resources, or to locate the proposed development in areas where depth and velocity of floodwaters during the base flood do not exceed the current standards for construction of human occupied structures or safe access.

16C.03.26 Non-Conforming Uses and Facilities

Non-Conforming Uses and Facilities are classified as either conforming uses with non-conforming structures or areas, or as non-conforming uses, as described in subsection 1 below. Both types have different review processes and decision criteria, as provided below in subsections 2 and 3.

- 1) **Classification Criteria** – There may be situations that do not conform to the standards or regulations of this title. These situations are characterized as:
 - a) **Non-conforming Uses.** Uses of a structure or land that were lawfully established at the time of their initiation but are currently prohibited by this title are non-conforming uses, and may utilize structures or land areas that are also non-conforming. A non-conforming use that is discontinued for any reason for more than one year shall have a presumption of intent to abandon, shall not be re-established, and shall lose its non-conforming status, unless an Adjustment (16C.03.23) is obtained to extend the length of time, based on documentation showing that an intent to abandon did not exist during the period of discontinuance. An Adjustment request may be submitted after the deadline has passed. In the case of destruction or damage where reconstruction costs exceed 50% of the assessed value, the structure shall not be rebuilt;
 - b) **Conforming Uses with Non-conforming Structures or Areas** are structures or areas for conforming uses that were lawfully established at the time of their initiation, but currently do not conform to the bulk, dimensional or other development standards of this title. Structures or areas in locations approved under a permit shall not be considered non-conforming. Non-conforming outdoor areas that have not been used or maintained for 5 consecutive years shall lose their non-conforming status and may not be reestablished;
 - c) Any non-conforming structure, area, or use may be maintained with ordinary care according to the provisions in 16C.01.05 (Applicability) and 16C.03.05 (Minor Activities Allowed without a Permit or Exemption) and 16C.03.06 (Exemptions – Procedural Requirements), and do not require additional review under these non-conforming provisions.

16C.06.12 Use Classifications

For purposes of this chapter, the components of any development, construction, or use requiring a critical area development authorization shall be classified as provided below, and shall conform with the development standards applicable to the classification provided in 16C.06.13 through 16C.06.15, except for those activities listed in Section 16C.03.05 (Minor Activities Allowed without a Permit or Exemption):

16C.09.03 Mapping

Mapping Methodology – The CARA are depicted in the map titled “Critical Aquifer Recharge Areas of Yakima County”. The CARA map was developed through a geographic information system (GIS) analysis using the methodology outlined in the Washington Department of Ecology “Critical Aquifer Recharge Area- Guidance Document” (Publication 05-10-028). This map depicts the general location of the critical aquifer recharge areas designated in YCC 16C.09.02. Yakima County has developed a GIS database of the CARA map that shows the location and extent of critical aquifer recharge areas. This database will be used by the County to determine whether proposed developments could potentially impact CARA. All applications for

development within the County that are located within a mapped CARA will be required to follow the performance standards of this chapter. The CARA map estimates areas of moderate, high and extreme susceptibility to contamination, in addition to wellhead protection areas. To characterize hydrogeologic susceptibility of the recharge area to contamination, the GIS analysis used the following physical characteristics:

- a) Depth to ground water;
- b) Soil (texture, permeability, and contaminant attenuation properties);
- c) Geologic material permeability;
- d) Recharge (amount of water applied to the land surface, including precipitation and irrigation).