Attachment B

CENTRAL OREGON LANDWATCH

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October 14, 2015

Deschutes County Board of Commissioners
117 NW Lafayette Ave.
Bend, OR 97701
Delivered by hand

re: File Nos: 247-15-000035-CU; 237-15-000403-A.

Dear Commissioners,

On behalf of Central Oregon LandWatch, thank you for the opportunity to comment on the above-referenced application for a nonfarm dwelling on an 18.08-acre parcel in the county's Exclusive Farm Use (EFU) Zone. The Hearings Officer correctly held applicants have not sustained their burden of proof that a 1.2-acre proposed home site in the NE quadrant of the property is the "least suitable" for farming.

In fact, the Hearings Officer could not find that the proposed site for a nonfarm dwelling under DCC 18.16.040(A)(3) was the least suitable site, i.e. the most unsuitable site, because according to the Hearings Officer's decision, the NE quadrant of the property is irrigated by a pivot, has been irrigated for decades, and has consistently been used both to produce hay, a farm crop, and to graze livestock in the past.[1] Land that is irrigated by a pivot now (if only the farmer chose to turn the pivot on), that has been irrigated for decades, and that has consistently been used to produce hay, a farm crop, in the past, is not unsuitable for farm use at all: therefore the site cannot be the most unsuitable, or least suitable, for the production of farm crops or livestock. The applicants' October 17, 2014 and September 10, 2015 soils reports do not follow the protocol of the NRCS land capability classification system but ignore fundamental assumptions underlying accurate soil capability classifications. The reports violate OAR 660-033-0030(5)(a), which requires the applicants' soils reports to relate to the NRCS land capability classification system. Therefore we urge the Board to ignore both of the applicants' soils reports. The proposed site for the NFD in the NE quadrant is composed of Class III soils, according to NRCS, while soils in the SE quadrant are Class VII soils, according to NRCS. The proposed site is not, by any definition, the least suitable site for a nonfarm dwelling. The area of

[1] See Attachments 1 and 2, summaries of comments from neighboring farmers; see Attachment 2, p. 2, photographs of horses and cattle grazing in the NE quadrant of the subject property, the area proposed for a nonfarm dwelling.

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The applicants' October 17, 2014 and September 10, 2015 soils reports do not follow the protocol of the NRCS land capability classification system but ignore fundamental assumptions underlying accurate soil capability classifications. The reports violate OAR 660-033-0030(5)(a), which requires the applicants' soils reports to relate to the NRCS land capability classification system. Therefore we urge the Board to ignore both of the applicants' soils reports.

The proposed site for the NFD in the NE quadrant is composed of Class III soils, according to NRCS, while soils in the SE quadrant are Class VII soils, according to NRCS. The proposed site is not, by any definition, the least suitable site for a nonfarm dwelling. The area of

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Class VII soils in the SE corner of the site is clearly the least suitable site on the subject property as well as within the eastern portion. DCC 18.16.040(A)(3). If any land on the subject site were unsuitable for agriculture, which is not the case, the SE quadrant is without question the least suitable site. If any NFD could legally be approved on this farm that is 93.5% Class III soils in agricultural use for production of farm crops or livestock, it could only be placed in the SE corner. DCC 18.16.040(A)(3). We respectfully urge the Board to deny the application for the reasons outlined below.

General Comments

The subject property is not unsuitable for farm use. The subject property, as shown in attached Figures 1, 2, and 3, is a farm. The subject property has been cultivated for decades for the production of alfalfa, a farm crop, and the grazing of livestock. See Attachments 1 and 2 (letters from neighboring farmers regarding the use of the subject property for farm use; Attachment 2 shows photographs of horses and cattle grazing in the NE quadrant of the property.)

The subject property is surrounded by farms in active farm use. The subject property has the same soils as and is visually indistinguishable from the surrounding lands that are also in use for irrigated agriculture. See Figures 3 and 4.

The subject property's soils are composed almost exclusively (93.5%) of NRCS soil type 36A, which is NRCS Class III when irrigated and Class VI when not irrigated. Hearings Officer Decision at 3,4. The subject property is thus presumptively suitable for the production of farm crops and livestock. DCC 18.16.050(G)(2)(b). The applicants have not sustained their burden of proof that the subject property is suitable for the production of farm crops and livestock and failed to establish that any portion of it is so unsuited for farming that it may be used as the location for a nonfarm dwelling on an irrigated portion of a productive farm parcel in the middle of the county's exclusive farm use zone. DCC 18.16.040(A)(3).

In *Smith v. Clackamas County*, the Court of Appeals held that statutes governing nonfarm dwellings were not intended to facilitate nonfarm dwellings on agricultural land. 103 Or. App. 370 (1990) *decision aff'd* 313 Or. 519 (1992). Rather, the statutes create "rigorous criteria" for nonfarm dwelling approvals which are so difficult to meet that sites which can qualify for nonfarm dwellings in EFU zones will probably be "few and far between." *Id.* Approval of

nonfarm dwellings should be reserved for the rare occasions when a site can meet the county's rigorous criteria. This is not one of those occasions.

Here, the proposed site for a nonfarm dwelling is composed of Class III soils, which are presumed suitable for production of farm crops and livestock. Therefore the proposed site cannot be found to be the most unsuitable (i.e. least suitable) site for production of crops and livestock under DCC 18.16.040(A)(3).

The central argument in this appeal was resolved by LUBA over two decades ago in *Moore v. Coos County*. As LUBA explained:

> "An applicant carries the burden to demonstrate that a parcel is generally unsuitable for the production of farm crops and livestock. The question to be answered is whether the subject land, rather than a particular farmer, can produce crops or livestock." *Moore v. Coos County*, 31 Or LUBA 347, 350 (1996).

Where, as here, the overwhelming weight of evidence in photographs, aerial photographs, NRCS soil types data, and testimony from neighboring farmers, including farmers who have profitably farmed the land themselves, is that the land proposed for a nonfarm dwelling has been used to produce farm crops and livestock for at least 38 years, then the site is not the most unsuitable (least suitable) site - for it is not unsuitable at all.[2]

Figures 1 and 2 show the NE quadrant of the subject property, the proposed "least suitable" site for a nonfarm dwelling. Contrary to the Hearings Officer's description, the proposed home site area manifestly does not include a visible "lava rock ledge" but appears to have typical pasture and grass for an area of land from which water and fertilizer have been deliberately withheld.[3] Figure 3, an aerial photograph of the site, shows that contrary to the Hearings Officer's description, the gas line on the eastern portion of the property visibly does not

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[2] See *infra*, letter from neighboring farmer Donald Barbin of September 8, 2015 ("Dana chose not to water the land in the upper field due to his plan to claim it doesn't produce any hay. The land has an automatic pivot that waters daily and can go for a week or more without being managed by a person. Instead of watering with the pivot Dana would run the wheel lines day after day in the west side of the property, rarely operating the pivot on the eastern parcel including the pipeline and the CUP area. Dana chose not to manage the east portion of the property. The only portion of the fields that he ever fertilized was the west portion of the field irrigation with the wheel lines."); see also letter from neighbor of February 16, 2015 ("We have lived neighboring the Clough's and this property for six years. The property has always been groomed to grow multiple cuttings of hay year after year. The crop will only be as good as the effort the farmer puts into the soil and the land. With that being said, the Clough's have stopped watering and fertilizing the property. They bring in large fertilizer trucks to fertilize the lower portion of this property but neglect to care for the rest of the soil. There is an irrigation pivot that used to provide the land water that they no longer put to use.")

[3] *Id.*

dry out the land or retard the growth of the pasture and crops on the subject property. On the contrary the land over the gas line appears to be darker green, and thus more robust, than the grass on the rest of the eastern portion. Figure 4 shows that the soil types on the subject property are identical to the soil types in active agricultural use in all directions: soils are 36A within farm field boundaries, and 58C where soils are unimproved by irrigation and fertilizer. The applicant erroneously argues that the soils within the boundaries of the applicants' farm field, alone, are not Class III, although visually there is no difference between Class III soils on applicants' property and on surrounding lands.

Figure 5 is a photograph of NRCS Class VIII soils: a simple comparison between Figures 1, 2 and 5 should suffice to make clear that contrary to applicants' assertions, there do not appear to be soils of Class VIII on the Clough farm. Figure 6 shows that the widespread 36A and 58C soils in this agricultural area closely follow the boundaries of irrigated farm fields. First of all, Figure 6 shows that NRCS soils maps are not, as applicant alleges, inaccurate: on the contrary they appear to be exact to within a few feet of the edges of farm fields. As discussed in detail below, Figure 6 clearly demonstrates that soils can be improved by good agricultural management. Just because a farmer deliberately chooses to withhold water or fertilizer, that does not mean the land is of a low *capability* class under the NRCS land capability classification system.

The applicants' complaints of plantain are indicative of a self-created problem: plantain is easily removed from irrigated soil, but can only be removed with difficulty from dry soil.[4] The applicants appear to have created their own difficulty in removing plantain when applicants deliberately chose to withhold water from the NE quadrant of their farm. The application does not meet county criteria governing nonfarm dwellings and should be denied. Our specific comments are below.

Specific Comments

1. *OAR 660-033-0030(5)(a); Applicants' soils report is not related to the NRCS land capability classification system*

The applicants' soils reports ignore the fundamental assumptions underlying NRCS land capability classifications. In particular, the soils reports: 1) fail to assume that the soils on the

[4] See i*nfra* discussion of plantain.

subject property are managed at the level of management commonly used by reasonable farmers in the community; and 2) fail to begin the subject property land classification with the specific farm crop and livestock production capability information available from farmers in the area. Therefore the applicants' soils reports results are based on an approach that is unrelated to the NRCS land capability classification system.

Contrary to the applicants' position, a proposed nonfarm dwelling site such as the proposed site in the NE quadrant here is not "least suitable" because it has Class VII soils: the exact opposite is true. A site that has been successfully farmed, irrigated, and improved for decades to produce alfalfa and to graze livestock, does not have Class VII soils.

The applicants' soils reports have been reviewed for completeness according to OAR 660-033-0030, -0045, however the state of Oregon has made no determination as to the accuracy of the soils assessment. In fact, the state of Oregon reviewer noted "the web soil survey shows the tested area to be irrigated and cropped, an indication of its suitability for farm use." Applicants' soils report October 17, 2014, cover page. The applicants' soils report is based on more soil samples than the NRCS soil survey, but that does not mean it is more accurate, or more correct than the NRCS soil survey.

Oregon administrative rules guiding detailed soil classifications permit more detailed soils data than the NRCS has mapped, but only if the more detailed soils data are related to the NRCS land capability classification system. OAR 660-033-0030(5)(a) ("However, the more detailed soils data shall be related to the NRCS land capability classification system.")

According to NRCS, the soils on the proposed NFD site in the NE quadrant are Class III when irrigated; because they are irrigated, the soils are Class III. The applicants' soils report concludes that the soils on the proposed NFD site are Class VII. But because the applicants' soils reports do not follow the protocol for classifying soil that NRCS has followed since the Dust Bowl Era, the applicants' Class VII determination does not relate to that system. See SCS (NRCS), Land-Capability Classification, Agricultural Handbook No. 210, 5,6, (1961) Attachment 3. The reports violate OAR 660-033-0030(5)(a), which requires the applicants' soils reports to relate to the NRCS land capability classification system. The applicants' reports are not comparable to the NRCS determinations that the soils are Class III, therefore we urge the Board to ignore the applicants' soils reports.

The proposed site for the NFD is not, by any definition, the least suitable site for a nonfarm dwelling. If any site on the property could meet the county's criteria for a nonfarm dwelling, it would be the SE corner of the property. Therefore this application for a nonfarm dwelling on the irrigated farmland of the NE quadrant shown in Figures 1 and 2 should be denied. DCC 18.16.020(A)(3).

The applicant's soils report does not constitute substantial evidence on which the Board can rely in determining whether the proposed nonfarm dwelling site is the least suitable, or most unsuitable, site on the subject property. Just because a site is more intensively sampled than the NRCS Deschutes soil survey does not mean the resulting report is more accurate. Accuracy in correctly classifying soils depends on the assumptions made and the accuracy of the interpretation of sampling results.

The applicants' soil study of the subject property recharacterizes the soils on the eastern portion of the subject property in their current unwatered and unfertilized state.[5] Though NRCS finds the soils are Class III, the applicant claims they are Class VII. The applicants' soils report ignores that soils in the eastern portion of the property have both inherent capacity based on innate or inherited soil properties, and dynamic capacity based on how soil is used and managed. That is, the applicants' soils report ignores that soil capability can be dramatically changed by regular watering and fertilizing. As NRCS director Richard Arnold wrote in a report on the NRCS soil survey:

> "Modern society is becoming aware that soil quality is the capacity of a specific soil to function for a specific use, and that there is both an inherent capacity based on the innate or inherited properties of soils, and a dynamic capacity based on the changing conditions influenced by use and management."[6]

The values in the NRCS land capability classification system, such as Class III and Class VI, are based on several fundamental assumptions. If those assumptions are not a shared basis for an applicant's soils report, then the soils report cannot be related to the NRCS land capability system. Failure of a soils report to relate to the NRCS land capability classification system violates OAR 660-033-0030(5)(a) which provides:

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[5] According to uncontroverted testimony in the record the soils on the eastern portion of the subject property have been unwatered and unfertilized for several years.
[6] Richard Arnold, Soil Survey- Past, Present, and Future, NRCS, 1999.

> "OAR 660-033-0030(5)(a)- More detailed data on soil capability than is contained in the USDA Natural Resources Conservation Service (NRCS) soil maps and soil surveys may be used to define agricultural land. However, the more detailed soils data shall be related to the NRCS land capability classification system."

Here, according to NRCS, the subject property, including the NE quadrant, is 93.5% composed of 36A soils that are Class III irrigated, and Class VI nonirrigated.[7] The NRCS classification is based on several fundamental assumptions, the most important of which are:

> "4. A moderately high level of management is assumed—one that is practical and within the ability of a majority of the farmers and ranchers. The level of management is that commonly used by the "reasonable" men of the community. The capability classification is not, however, a grouping of soils according to the most profitable use to be made of the land. For example, many soils in class III or IV, defined as suitable for several uses including cultivation, may be more profitably used for grasses or trees than for cultivated crops.
> 14. Research data, recorded observations, and experience are used as the bases for placing soils in capability units, subclasses, and classes. In areas where data on response of soils to management are lacking, soils are placed in capability groups by interpretation of soil characteristics and qualities in accord with the general principles about use and management developed for similar soils elsewhere. SCS (NRCS), Land-Capability Classification, Agricultural Handbook No. 210, 5,6, Attachment 3"

The significance of these fundamental NRCS Land Capability Classification assumptions cannot be overstated. Here, the applicants' soils report cannot be reconciled with the NRCS land capability system, because: 1) the applicants' soils report does not begin with the assumption of a moderately high level of management for the soils on the eastern portion; and 2) the applicants' soils report ignores the most essential data, that of the experiences of surrounding farmers, as the point of beginning for land capability classification. In striking contrast to the approach on which the NRCS land capability classification system is based, the applicants' report is based on samples of soils that have been unwatered and unfertilized for years, and ignores that on all the surrounding lands 58C soils are outside farm fields, and 36A soils are inside farm fields, as explained below.

The applicants' soils report has the relationship between soils and farm use completely backward: a proposed nonfarm dwelling site is not a least suitable site because it has Class VII soils, rather a site that has been successfully used for decades to produce alfalfa, a farm crop, and

[7] Hearings Officer Decision 3,4.

to graze livestock, does not meet the definition of Class VII soils. As one farmer who has successfully farmed the subject property in the past put it:

> "This parcel is high valued farmland and when properly watered this parcel will yield at a minimum 4-5 tons per acre easily. Property like this will yield a tremendous amount of good quality hay and sell at a rate of $240/per ton, generating substantial revenue and profit for the limited hours it takes to accomplish baled hay. This Class 7 soil can be farmed, and farmed well, I successfully farmed this year on the property seeking a CUP, including over the gas pipeline." Donald Barbin, letter of September 8, 2015.

This farmer is specifically stating that the soils on the eastern portion of the subject property do respond to farm management practices, "they can be farmed, and farmed well." That is, he is observing that if, as the applicant claims, these soils are Class VII, they nevertheless respond to farm management as thought they are of greater capability.

The NRCS soils capability classification handbook explains that the definition of Class VII soils is that they are not capable of returning inputs from seeding, fertilizing, or irrigating:

> "Soils suitable for range but not for common cultivated crops may be placed in capability classes V and VI if they are capable of returning inputs from such management practices as seeding, fertilizing, or irrigating and in class VII if they are not. If these soils do not give economic returns under any kind of management when used for cultivated crops, pasture, woodland or range, they fall in class VIII." SCS (NRCS), Land-Capability Classification, Agricultural Handbook No. 210, 12 (Attachment 3).

Here, the applicants' soils report ignores the difference between Class VI and Class VII soils in the NRCS land capability classification system. The overwhelming weight of evidence from neighboring farmers, as well as the incontrovertible evidence in the attached aerial photographs, shows that the soils including the NE quadrant *are* capable of returning inputs under proper farm management practices. Therefore, the soils on the proposed nonfarm dwelling site belong exactly where NRCS placed them, as Class III when irrigated and Class VI when unirrigated, and as presumptively suitable for production of farm crops and livestock.

There is no evidence in the record that the soils in the NE quadrant do not return inputs under proper management, and there is extensive evidence to the contrary. The applicants' soils report does not follow the same protocol as the NRCS. Rather than considering what the tested soils capability would be under proper management, the applicants' soils report characterizes the tested soils as all Class VII, as though their current or inherent capability in their unwatered and unfertilized state was immutable even under good farm management. This approach is

irreconcilable with the photographic evidence and neighbor reports of the historic productivity of these soils. Because the applicants' soils report does not proceed from the same fundamental assumptions as the NRCS land capability system, it does not relate to that system. The report therefore violates OAR 660-033-0030(5)(a), and no reasonable decision maker could rely on it.

Distribution of 58C and 36A soils in surrounding irrigated agricultural area

All of Deschutes County, except the extreme southeastern edge, is part of the Mazama Ecological Province. Soils across Deschutes County are unusually uniform over large areas because the soils originated at the same time when Mount Mazama erupted several thousand years ago, and were deposited across the county by the wind: [8]

> [S]oil series in Mazama Province are based primarily on relatively uniform physical characteristics of the overall aeolian pumice mantle. The primary parent material of these soil series is unusually uniform over large areas because of its origin as an aeolian deposit.[9]

Therefore in Deschutes County it is perhaps easier than elsewhere to see what NRCS director Richard Arnold meant when he wrote that soils have both an inherent capacity based on their innate or inherited properties, and a dynamic capacity based on the changing conditions influenced by farm use and farm management.[10] Deschutes County soils in a given area share the same inherent capacity from their origin in the winds from Mount Mazama, and their deposition in a given part of the county, but the dynamic capacity of each soil changes, depending on the water and nutrients added by farmers.

Here, in aerial photographs of the subject property and surrounding farmlands, the influence of farming on soil capability class can clearly be seen. As shown in Figures 4 and 5,[11] NRCS soil capability classes 36A and 58C are present not just on the subject property but throughout the surrounding agricultural area.

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[8] Lindsay Hollinger, Mazama Ecological Province, OSU, 2015. "Mazama Ecological Province, in central Oregon, is entirely within the state. It is the area covered by an aeolian deposit of pumice and other volcanic materials spewed over the countryside when Mt. Mazama erupted explosively about 6,500 years ago. Due to prevailing southwesterly winds, the pumice mantle lies primarily north and east of Crater Lake, which is in the caldera of Mt. Mazama. The mantle extends about 120 miles north from Crater Lake to the area north of Sisters and Redmond in northern Deschutes County, about 110 miles northeast to the vicinity of Brothers in northeast Deschutes County, and about 60 miles southeast to Gearhart Mountain in western Lake county. The pumice mantle extends only about 6 miles southwest of Crater Lake. Also, the western edge of the mantle is about 10 miles west of Crater, Diamond, Crescent, and Odell lakes and continues northerly about 5 miles west of the Cascade crest."
[9] *Id.*
[10] Richard Arnold, Soil Survey- Past, Present, and Future, NRCS, 1999.
[11] DIAL, last accessed October 11, 2015.

The aerial photographs show that the NRCS soil types 36A and 58C follow the outlines of the irrigated fields. This is not a coincidence: all of the soils originated in the same aeolian deposits from Mount Mazama-[12] but the soils were not somehow distributed into the rectangles and pivot circles of irrigated agriculture. Rather, over time the soils in the region are improved by cultivation. The 58C soils, which are Class VII, are mapped by NRCS along the edges of the farm fields, while the higher capability class 36 A soils, which are Class VI when not irrigated and Class III when irrigated, are mapped by NRCS within the farm fields. The distribution of 36A soils inside the farm fields, traced by irregular areas of the unimproved 58C soils in between the farm fields, indicates the dynamic capacity of soils: soils in this area that start out with some limitations for agricultural use can be transformed over time to become higher quality soils.

Here on the subject property NRCS showed the same delineation it shows for the entire region and indeed across most of the county. NRCS classifies the soils on the subject property as 36A, with a small amount of 58C in the southeast corner. The series of historical aerial photographs in the record shows the southeast corner was selected early on as the area for farm buildings. The series of photographs also shows the continuous use of the entire property for farm use.

Here the applicant has a heavy burden of proof to show that NRCS erred in determining that the soils within the farm fields of the subject property are 36A, as are the soils in the farm fields surrounding the property in every direction. DCC 22.24.050 ("Throughout all local land use proceedings, the burden of proof rests on the applicant.") The applicant has not met that burden. The overwhelming weight of evidence in the record is that the NE quadrant and all other quadrants cannot be the most unsuitable (least suitable) because they are not unsuitable at all. Rather, outside of part of the SE quadrant they are Class III, irrigated soils that are suitable for the production of farm crops and livestock.

The overwhelming evidence that no quadrant is unsuitable at all includes 1) the county's own aerial photographs showing that the property in its entirety is used for irrigated agriculture; 2) the observation by Katherine Daniels, Farms and Forest Specialist of DLCD, that the subject

[12] *See supra* note 1 and accompanying text.

property is clearly "irrigated and cropped, an indication of its suitability for farm use;"[13] and 3) the repeated testimony by neighboring farmers that the subject property has historically been used for agricultural production of hay, a farm crop, and for production of livestock. Testimony from neighboring farmers includes the following:

> I have lived adjacent to this property for 35 years and even farmed this particular parcel for 3 or 4 years while Ron Robinson owned it in the 80's. I used a wheel line and handline for irrigation, it now has a center pivot which should make it even more productive. I cut hay off the entire 18 acres and then used it for pasture in the fall until the cows cleaned it up. The entire parcel is productive central Oregon hay and pasture land if responsible land stewardship is employed.
> Richard Wyman, February 19, 2015
>
> We have lived neighboring the Clough's and this property for six years. The property has always been groomed to grow multiple cuttings of hay year after year. The crop will only be as good as the effort the farmer puts into the soil and the land. With that being said, the Clough's have stopped watering and fertilizing the property. They bring in large fertilizer trucks to fertilize the lower portion of this property but neglect to care for the rest of the soil. There is an irrigation pivot that used to provide the land water that they no longer put to use.
> Neighbors, February 16, 2015
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> We have lived in our residence directly across Erickson Road from this property for nearly 40 years. It has been our observations that this land is farmable and has been for all the years we have lived here. Large quantities of hay have been raised on this land by previous owners and renters. We have purchased hay raised on this land from previous owners. With adequate fertilizer and water this land is capable of growing ample forage crops.
> Joseph and Linda Worlein, February 19, 2015
>
> We have lived 2 drive ways east of this corner property for 19 years and watch the activity on this land. This property has constantly been a prime piece of farm land, It has been manicured to grow hay and/or alfalfa, getting 2 to 3 cuttings per year. Central Oregon Irrigation District confirmed that this property currently has 16.82 acres of water rights. Please see the attached aerial photo of the property (outlined in red) showing the green fields, the irrigation line tracks, irrigation pond, and horse loafing shed. This is clearly a level, productive hay field in Deschutes County.
> Brad and Carol Davis, February 16, 2015.
>
> I would like to submit the MLS listing for 22075 Erickson Road when the Cloughs were advertising this 18 acre property a "horse property"... In fact these pictures show both

[13] See the cover sheet for applicant's soils test report, dated November 26, 2014, an email from Katherine Daniels to Nick Lelack (Attachment XXX) ("I note that the web soil survey shows the tested area to be irrigated and cropped, an indication of its suitability for farm use.")

> horse and cows grazing on the grasses that the Cloughs were able to grow at 22075 Erickson Road. Even along the east side which they are claiming as "the soils are so poor."... I feel the Cloughs want it "both ways." They would sell these 18 acres for top dollar as a "fabulous parcel ready for your horses" but now claim that part of the property is not productive. I didn't see anything in their real estate listing about an unproductive area when the property was for sale. I urge you to hold your line on your first decision which was denial to a home on this EFU property. Since my home ownership at 22121 Erickson Road in 1997, 22075 Erickson Road always has been productive for some type of grazing practice, either raising or grazing. I feel the Cloughs want to build a home on this land because of the mountain view and will try any means to persuade the county to allow them to do so. 22075 Erickson Road is valuable farm land in Deschutes County and should remain so.
> Carol Davis, September 18, 2015

> We have lived at 22125 Erickson Rd, Bend for thirty-nine years ... and appeared and spoke at the last hearing on this item. I would hope that whoever is in charge of this would take the time to come and look at said property. It has had pristine, beautiful crops in this area before and has beautiful crops all around it. If this property were treated with fertilizer and the care it needs there is no reason it couldn't produce decent crops. It seems to me that the Cloughs are trying to turn a piece of property worth $180,000 into a $300,000 dollar property by saying it is not good grown to grow crops. It doesn't take a mind reader to realize that this property is not different from all the adjoining property in this same area. We will not be attending this hearing again because of health reasons but we would like to see it denied. If this property is treated as other property in this area by fertilizing it correctly there is no reason it could not produce wonderful crops. Donald and Sharon McHone, September 8, 2015

The same theme appears repeatedly in the neighbors comments: the land has been successfully used for the production of farm crops and livestock in the past, and all that is required is for the applicants to farm the land in the same manner as all the other farms in the area by adding fertilizer and watering regularly.

As LUBA explained in *Ploeg v. Tillamook County*:

> The focus under the unsuitability standard is the land's capacity to produce crops or livestock under appropriate agricultural management. Evidence that land once maintained as pasture but neglected for 20 years currently does not produce much forage says little about its capacity for producing forage, particularly where there is evidence that forage production would dramatically improve if the land were appropriately managed. *Ploeg v. Tillamook County*, 50 Or LUBA 608 (2005).

When the NRCS finds that farmers in an area are successfully using a soil for the production of farm crops and livestock, such as soil 36A which covers 93.5% of the subject property, the NRCS bases the soil's capability on that specific information:

> "Capability groupings are based on specific information when available—information about the responses of the individual kinds of soil to management and the combined effect of climate and soil on the crops grown. It comes from research findings, field trials, and experiences of farmers and other agricultural workers. Among the more common kinds of information obtained are soil and water losses, kinds and amounts of plants that can be grown, weather conditions as they affect plants, and the effect of different kinds and levels of management on plant response." SCS (NRCS), Land-Capability Classification, Agricultural Handbook No. 210, 13(Attachment 3).

Again, the applicants' soils report has the relationship between soils and farm use completely backward: a proposed nonfarm dwelling site is not a least suitable site because it has Class VII soils; rather a site which has been successfully used for decades to produce alfalfa, a farm crop, and to graze horses, which are livestock, does not meet the definition of Class VII soils. There is no evidence here that the soils have changed since the last time they were used in productive farm use. As LUBA explained in *Adams v. Jackson County*:

> "Where property has been used for grazing and growing of hay in the past and there is no evidence that anything about the land has changed to make it generally unsuitable for those purposes, there is substantial evidence to support a finding that the property is not generally unsuitable for the production of livestock." *Adams v. Jackson County*, 20 Or LUBA 398 (1991).

2. *DCC 18.16.040(A)(3); DCC 18.16.050(G)*

As a matter of public policy both DCC 18.16.050(G) and DCC 18.16.040(A)(3) must be met before a nonfarm dwelling may be approved. The "least suitable" standard, DCC 18.16.040(A)(3), provides:

> "Conditional uses permitted by DCC 18.16.030 may be established subject to ORS 215.296 and applicable provisions in DCC 18.128 and upon a finding by the Planning Director or Hearings Body that the proposed use:
>
> 3. That the actual site on which the use is to be located is the least suitable for the production of farm crops or livestock"

The applicant erroneously argued at the October 7, 2015 hearing that DCC 18.16.040(A)(3) makes sense where land is suitable for farm use, but does not make sense where land is unsuitable for farm use. Implicit in the applicant's argument is the assumption that the two criteria DCC 18.15.050(G)(2) and DCC 18.16.040(A)(3) are related, for which there is no evidence in the county's code. The county's requirement that a nonfarm dwelling be placed only on the least suitable portion of a parcel is not surplusage: the county used separate terms, in a

separate section, to create a distinct and independent criterion that is highly protective of the county's agricultural land base.

DCC 18.16.040(A)(3) is unambiguous. The provision simply requires, in addition to the county's generally unsuitable standard, that the least suitable land on a parcel in the county's exclusive farm use zone is the land that must be used for a nonfarm dwelling. However if it were ambiguous, it would nevertheless have to be interpreted in the manner that is most protective of agricultural land in accordance with Goal 3, as explained in detail below. *White v. Lane County*, 68 Or LUBA 423 (2013); *Central Oregon LandWatch v. Deschutes County*, 52 Or. LUBA 582, 599-600 (2006); *Historical Development Advocates,* 27 Or LUBA 617, 623 (1994).

3) *DCC 18.16.040(A)(3); Where a code provision is subject to two or more reasonable interpretations, one of which is consistent with Goal 3 and the other not, the county cannot choose an interpretation that is contrary to Goal 3*

The Deschutes County Comprehensive Plan (DCCP) is acknowledged by the Land Conservation and Development Commission as in compliance with Statewide Planning Goal 3. That acknowledgement is based in part on DCCP farmland protection policies adopted to implement Goal 3, including the county's requirement to only permit nonfarm dwellings on the site least suitable for production of farm crops of livestock.

Deschutes County's provision DCC 18.16.040(A)(3) requiring that nonfarm dwellings in the county's EFU zone must be placed on the least suitable site is unambiguous. However if it were ambiguous, as applicant suggests in this appeal, the County would need to interpret the provision in the way that is consistent with Goal 3. If language in the Deschutes County code is subject to two or more reasonable interpretations, one of which is consistent with Goal 3 and the other not, the county cannot choose the interpretation that is inconsistent with Goal 3. As LUBA explained in *White v. Lane County*:

> "[I]f the terms of a local code provision implementing a goal are ambiguous, and that ambiguity can be interpreted consistently with the applicable goals and rules, ORS 197.829(1)(d) dictates that the county cannot instead choose an interpretation that is contrary to the applicable goals and rules." *White v. Lane County*, 68 Or LUBA 423 (2013); *Central Oregon LandWatch v. Deschutes County*, 52 Or. LUBA 582, 599-600 (2006); *Historical Development Advocates,* 27 Or LUBA 617, 623 (1994).

The applicant's interpretation of DCC 18.14.040(A)(3), the county's least suitable standard, would allow a nonfarm dwelling to be placed on a portion of irrigated farmland that

has been used to produce alfalfa, an irrigated farm crop, and livestock, for at least the last 38 years, until the applicant decided to stop farming the eastern portion of the property. The history of the parcel for productive farm use is conclusively demonstrated by the overwhelming balance of evidence in the record. It is clear from the following excerpts of neighbor comments (Attachments 1 and 2) that the proposed site is not the least suitable:

> "Dana chose not to water the land in the upper field due to his plan to claim it doesn't produce any hay. The land has an automatic pivot that waters daily and can go for a week or more without being managed by a person. Instead of watering with the pivot Dana would run the wheel lines day after day in the west side of the property, rarely operating the pivot on the eastern parcel including the pipeline and the CUP area. Dana chose not to manage the east portion of the property. The only portion of the fields that he ever fertilized was the west portion of the field irrigation with the wheel lines. Excelerite and then followed a year or more later by Beer water. The East portion of the field seeking the CUP was never managed with Beer water, fertilizer, Excelerite or water.
> Based on my own physical hands on labor and observations as well as the contract to farm said parcel to cut rake and bale I now have a wide body of knowledge that refutes all the information in the prior two letters. I successfully baled and sold hay over the TransCanada pipeline on the Clough property and all parts around the line.
> This parcel is high valued farmland and when properly watered this parcel will yield at a minimum 4-5 tons per acre easily. Property like this will yield a tremendous amount of good quality hay and sell at a rate of $240/per ton, generating substantial revenue and profit for the limited hours it takes to accomplish baled hay. This Class 7 soil can be farmed, and farmed well, I successfully farmed this year on the property seeking a CUP, including over the gas pipeline."
> Donald Barbin, Concerned Central Oregon Farmer, letter of September 8, 2015.

> "I would hope that whoever is in charge of this would take the time to come and look at said property. It has had pristine beautiful crops in this area before and has beautiful crops all around it. If this property were treated with fertilizer and the care it needs there is no reason it couldn't produce decent crops. ... If this property is treated as other property in this area by fertilizing it correctly there is no reason it could not produce wonderful crops."
> Mr. and Mrs. Donald R. McHone, adjacent landowners, letter of September 8, 2015.

> "We oppose the building of this home on this property. We understand they are saying the land is not able to grow crops. We have been in our home for 38 years and have seen great hay crops harvested on this land. Our understanding is the property was NOT to be divided and should be maintained as Exclusive Farm Use Zone."
> Mr. and Mrs. Donald R. McHone, adjacent landowners, letter of February 12, 2015.
> Attachment 2, page 2, shows horses grazing on the NE quadrant of the subject property.

The realtor advertisement reads:

> "Spectacular mountain views from this 18.08 acre horse property."

and
"[T]his fabulous parcel is ready for your horses!'"

Horses are livestock, therefore this is evidence that the NE quadrant can be used for the production of livestock. As LUBA explained in *Moore v. Coos County*:

> An operation that requires land for grazing horses employs that land for the production of livestock within the meaning of ORS 215.284(2)(b); therefore, a county errs when it concludes that consideration of the potential use of a parcel for grazing horses is not required in determining whether the parcel is generally unsuitable for farm use. *Moore v. Coos County*, 31 Or LUBA 347 (1996).[14]

Therefore based on the above and similar evidence in the record, the applicant's interpretation of DCC 18.16.040(A)(3), the least suitable standard, would permit the placement of a nonfarm dwelling on land that has been consistently used to produce farm crops and livestock, including by the present applicant, who grazed horses on the NE quadrant. The applicants themselves advertised the property for sale as a horse farm, with photographs showing horses grazing on the portion of the property where applicant interprets DCC 18.16.040(A)(3) to permit placement of a nonfarm dwelling.[15] As the Oregon Supreme Court explained most recently in *Wetherell v. Douglas County*:

> "Or. Rev. Stat. § 215.243 provides in part that open land used for agricultural use is an efficient means of conserving natural resources that constitute an important physical, social, aesthetic and economic asset to all of the people of this state. The preservation of a maximum amount of the limited supply of agricultural land is necessary to the conservation of the state's economic resources and the preservation of such land in large blocks is necessary in maintaining the agricultural economy of the state and for the assurance of adequate, healthful and nutritious food for the people of this state and nation. Expansion of urban development into rural areas is a matter of public concern. Exclusive farm use zoning as provided by law, substantially limits alternatives to the use of rural land." *Wetherell v. Douglas county*, 342 Or 666, 675-676 (2007).

Applicant's suggested policy change to a new interpretation of the county's least suitable standard would permanently disrupt this farm field for future production of farm crops and livestock, fragmenting the agricultural land base here and across Deschutes County's exclusive farm use zone. Such an interpretation is inconsistent with the legislature's policy to protect the

[14] Where, as here, the proposed nonfarm dwelling site shares essential characteristics with land LUBA has determined to be not even generally unsuitable for farm use, it follows that the proposed dwelling site cannot be the *most* unsuitable (least suitable) land on the property.
[15] See Attachment 2, p. 2, photo of horse grazing in NE quadrant of subject property.

maximum amount of agricultural land in large blocks, and with Goal 3's requirement that county zoning applied to agricultural land "shall limit uses which can have significant adverse effects on agricultural and forest land, farm and forest uses or accepted farming or forest practices." OAR 660-015-00003.

By contrast, the interpretation that the generally unsuitable and least suitable standards are distinct, separate requirements designed to protect the county's exclusive farm use zone is consistent with Goal 3. Because the latter interpretation is consistent with Goal 3 while the applicant's interpretation is not, the County cannot adopt applicant's interpretation of DCC 18.16.040(A)(3). Rather, the least suitable standard is a stand-alone requirement that the proposed nonfarm dwelling site must be the least suitable, or most unsuitable, site. Because the proposed site is not unsuitable at all, the application should be denied.

3. *Proposed NFD site in NE quadrant has been used as part of an operation to obtain a profit in farm use and is therefore not the least suitable site*

There is no evidence in the record that the applicants obtained low yields of hay from the eastern portion of the property when the land was being managed in accordance with usual, prudent farm management practices in the area, which require regular application of water and fertilizer. It is unclear why all neighboring farmers in the area, including farmers who have farmed the subject property, continue to grow and sell alfalfa hay year after year in multiple cuttings, if, as applicants contend, there is no profit to be obtained by doing so. It is also unclear why applicants installed an irrigation pivot at great expense that extends over the NE quadrant of the land, if the NE quadrant is so poor that irrigation water cannot improve its quality.

Neighbor Jennifer Bomke testified at the October 7, 2015 hearing that Mr. Robinson, a previous farmer on the Clough farm, obtained yields of 150 to 200 tons of alfalfa hay annually for many years. According to the October 9, 2015 Oregon Weekly Hay Report from the U.S. Department of Agriculture, alfalfa hay is selling in Deschutes County for between $240 and $250 per ton, FOB, and demand for all types of hay "continues to be good." See Attachment 3, USDA Weekly Oregon Hay Report, October 9, 2015. Conservatively, this means the property would yield at least $36,000 per year (150 tons at $240 per ton) under proper management

Neighbor Mr. Barbin, who has harvested hay off the property, submitted testimony that alfalfa hay sells for $240 per ton, and that the 18 acre parcel will yield 4-5 tons of hay per acre

when managed as neighboring farmers do and as past farmers on this property did, applying both water and fertilizer.

> "This parcel is high valued farmland and when properly watered this parcel will yield at a minimum 4-5 tons per acre easily. Property like this will yield a tremendous amount of good quality hay and sell at a rate of $240/per ton, generating substantial revenue and profit for the limited hours it takes to accomplish baled hay." Mr. Donald Barbin, September 18, 2015 letter.

According to a report from OSU on the principles of alfalfa production in Central Oregon, it is possible to obtain much higher yields than 4-5 tons of alfalfa annually when a farmer pays attention to proper fertilization and watering. The authors of the OSU report explain:

> "Alfalfa varieties with high yielding capacity reach their full potential only when growing on fertile soils. Fertilizer applied to alfalfa can return as much on investment as cultivated crops do. When alfalfa is harvested, nutrients are removed from the soil...Few soils can supply large amounts of required nutrients for very long without fertilizer applications. If maintenance fertilizers are not applied, sooner or later yields decrease, and run-down alfalfa stands full of grass and weeds [plantain, perhaps?] will result."
> W.M. Murphy and M.J. Johnson, Principles of Alfalfa Production in Central Oregon, Special Report 483 from the OSU Agricultural Experiment Station in Redmond, Oregon, 1 (1977).

OSC agricultural scientists explain the importance of watering alfalfa in Central Oregon:

> "Plants require adequate moisture for normal growth; water deficiency for any length of time reduces yield and promotes early maturity. Central Oregon soils generally are shallow and have low water-holding capacities..." *Id* at 8.

Contrary to assertions by the applicant's soil expert at the October 7, 2015 hearing, there is nothing unusual about the low water holding capacity of the soils in the NE quadrant of the subject property: all Central Oregon soils share this limitation. OSU agricultural scientists who wrote the report *Principles of Alfalfa Production in Central Oregon* echo the common sense observations of the neighboring farmers to the subject property, who testified that when fertilizer and water are applied to this property as a whole, including the eastern portion, the yields of alfalfa are high. There is no mystery to the applicants' inability to obtain a profit from the NE quadrant of the property if the applicants choose not to farm it.

The NE quadrant cannot be the most unsuitable i.e. least suitable portion of the subject property because it is not unsuitable at all. Suitability of land for producing farm crops and livestock has nothing to do with a particular farmer's ability or willingness to farm, but with the capacity of the land to produce farm crops and livestock under normal farm management. See *Moore v. Coos County*, 31 Or LUBA 347 (1996).

5. ***Plantain in NE quadrant is self created difficulty***

The applicant's challenge with plantain in the NE quadrant of the subject property, as summarized by the Hearings Officer (at 22), appears to be self created. Plantain reportedly loves moist, fertile places. Thus the presence of plantain is an indication that the NE quadrant has been irrigated in the past. Moreover, plantain is reportedly extremely difficult to remove from unwatered soils, but "pops out easily" from irrigated soils:

> "Plantain: This weed loves moist, fertile places. They have a very short root system, but hold their ground tenaciously, making it almost impossible to pull out if the soil is on the dry side. Watering the area and using a weed digger pops them out."[16]

Therefore the applicants appear to have created their own plantain problem when, according to applicants' own testimony, they removed water from the NE quadrant, causing the soil to become dry and making the plantain difficult to remove.

> As LUBA explained in *Moore v. Coos county*:
> "An applicant carries the burden to demonstrate that a parcel is generally unsuitable for the production of farm crops and livestock. The question to be answered is whether the subject land, rather than a particular farmer, can produce crops or livestock." *Moore v. Coos county*, 31 Or LUBA 347 (1996).

Plantain in a field can be managed by farmers who correctly apply water and fertilizer. Therefore plantain in the NE quadrant is not evidence that the land is the least suitable site for production of crops or livestock. Rather it is the applicant, a particular farmer, who is not capable or chooses not to produce crops or livestock on the subject property or portions thereof.

Conclusion

We urge you to deny the proposed nonfarm dwelling for the reasons outlined above. Thank you for your attention to these views. Please consider this a formal request under ORS 197.615(2) for written notification of any decision in this matter.

Best regards,

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[16] Sierra Worm Compost, Soil Fertility and What Weeds Can Tell Us (2015) ("Plantain: This weed loves moist, fertile places. They have a very short root system, but hold their ground tenaciously, making it almost impossible to pull out if the soil is on the dry side. Watering the area and using a weed digger pops them out.")
Sierra Worm Compost is a website devoted to teaching "how to put life back" into farm soils, http://www.sierra-worm-compost.com, last accessed October 10. 2015.

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Best regards,

Carol Macbeth

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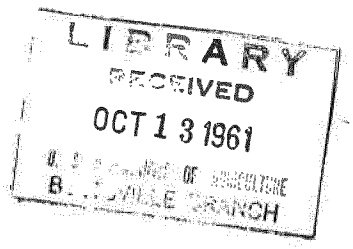
LAND-CAPABILITY CLASSIFICATION



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FOREWORD

Since soil surveys are based on all of the characteristics of soils that influence their use and management, interpretations are needed for each of the many uses. Among these interpretations the grouping of soils into capability units, subclasses, and classes is one of the most important. This grouping serves as an introduction of the soil map to farmers and other land users developing conservation plans.

As we have gained experience in this grouping, the definitions of the categories have improved. It is the purpose of this publication to set forth these definitions. In using the capability classification, the reader must continually recall that it is an interpretation. Like other interpretations, it depends on the probable interactions between the kind of soil and the alternative systems of management. Our management systems are continually changing. Economic conditions change. Our knowledge grows. Land users are continually being offered new things, such as new machines, chemicals, and plant varieties.

The new technology applies unevenly to the various kinds of soil. Thus the grouping of any one kind of soil does not stay the same with changes in technology. That is, new combinations of practices increase the productivity of some soils more than others, so some are going up in the scale whereas others are going down, relatively. Some of our most productive soils of today were considered poorly suited to crops a few years ago. On the other hand, some other soils that were once regarded as good for cropping are now being used more productively for growing pulpwood. These facts in no way suggest that we should not make interpretations. In fact, they become increasingly important as technology grows. But these facts do mean that soils need to be reinterpreted and regrouped after significant changes in economic conditions and technology.

Besides the capability classification explained in this publication, other important interpretations are made of soil surveys. Examples include groupings of soils according to crop-yield predictions, woodland suitability, range potentiality, wildlife habitat, suitability for special crops, and engineering behavior. Many other kinds of special groupings are used to help meet local needs.

CHARLES E. KELLOGG
Assistant Administrator for Soil Survey
Soil Conservation Service

CONTENTS

Issued September 1961

LAND-CAPABILITY CLASSIFICATION

By A. A. Klingebiel and P. H. Montgomery, *soil scientists, Soil Conservation Service*

The standard soil-survey map shows the different kinds of soil that are significant and their location in relation to other features of the landscape. These maps are intended to meet the needs of users with widely different problems and, therefore, contain considerable detail to show important basic soil differences.

The information on the soil map must be explained in a way that has meaning to the user. These explanations are called interpretations. Soil maps can be interpreted by (1) the individual kinds of soil on the map, and (2) the grouping of soils that behave similarly in responses to management and treatment. Because there are many kinds of soil, there are many individual soil interpretations. Such interpretations, however, provide the user with all the information that can be obtained from a soil map. Many users of soil maps want more general information than that of the individual soil-mapping unit. Soils are grouped in different ways according to the specific needs of the map user. The kinds of soil grouped and the variation permitted within each group differ according to the use to be made of the grouping.

The capability classification is one of a number of interpretive groupings made primarily for agricultural purposes. As with all interpretive groupings the capability classification begins with the individual soil-mapping units, which are building stones of the system (table 1). In this classification the arable soils are grouped according to their potentialities and limitations for sustained production of the common cultivated crops that do not require specialized site conditioning or site treatment. Nonarable soils (soils unsuitable for longtime sustained use for cultivated crops) are grouped according to their potentialities and limitations for the production of permanent vegetation and according to their risks of soil damage if mismanaged.

The individual mapping units on soil maps show the location and extent of the different kinds of soil. One can make the greatest number of precise statements and predictions about the use and management of the individual mapping units shown on the soil map. The capability grouping of soils is designed (1) to help landowners and others use and interpret the soil maps, (2) to introduce users to the detail of the soil map itself, and (3) to make possible broad generalizations based on soil potentialities, limitations in use, and management problems.

The capability classification provides three major categories of soil groupings: (1) Capability unit, (2) capability subclass, and (3) capability class.

TABLE 1.—Relationship of soil-mapping unit to capability classification

Soil-mapping unit	Capability unit	Capability subclass	Capability class
A soil mapping unit is a portion of the landscape that has similar characteristics and qualities and whose limits are fixed by precise definitions. Within the cartographic limitations and considering the purpose for which the map is made, the soil mapping unit is the unit about which the greatest number of precise statements and predictions can be made. The soil mapping units provide the most detailed soils information. The basic mapping units are the basis for all interpretive groupings of soils. They furnish the information needed for developing capability units, forest site groupings, crop suitability groupings, range site groupings, engineering groupings, and other interpretive groupings. The most specific management practices and estimated yields are related to the individual mapping unit.	A capability unit is a grouping of one or more individual soil mapping units having similar potentials and continuing limitations or hazards. The soils in a capability unit are sufficiently uniform to (a) produce similar kinds of cultivated crops and pasture plants with similar management practices, (b) require similar conservation treatment and management under the same kind and condition of vegetative cover, (c) have comparable potential productivity. The capability unit condenses and simplifies soils information for planning individual tracts of land, field by field. Capability units with the class and subclass furnish information about the degree of limitation, kind of conservation problems and the management practices needed.	Subclasses are groups of capability units which have the same major conservation problem, such as— e—Erosion and runoff. w—Excess water. s—Root-zone limitations. c—Climatic limitations. The capability subclass provides information as to the kind of conservation problem or limitations involved. The class and subclass together provide the map user information about both the degree of limitation and kind of problem involved for broad program planning, conservation need studies, and similar purposes.	Capability classes are groups of capability subclasses or capability units that have the same relative degree of hazard or limitation. The risks of soil damage or limitation in use become progressively greater from class I to class VIII. The capability classes are useful as a means of introducing the map user to the more detailed information on the soil map. The classes show the location, amount, and general suitability of the soils for agricultural use. Only information concerning general agricultural limitations in soil use are obtained at the capability class level.

The first category, capability unit, is a grouping of soils that have about the same responses to systems of management of common cultivated crops and pasture plants. Soils in any one capability unit are adapted to the same kinds of common cultivated and pasture plants and require similar alternative systems of management for these crops. Longtime estimated yields of adapted crops for individual soils within the unit under comparable management do not vary more than about 25 percent.[1]

The second category, the subclass, is a grouping of capability units having similar kinds of limitations and hazards. Four general kinds of limitations or hazards are recognized: (1) Erosion hazard, (2) wetness, (3) rooting-zone limitations, and (4) climate.

The third and broadest category in the capability classification places all the soils in eight capability classes. The risks of soil damage or limitations in use become progressively greater from class I to class VIII. Soils in the first four classes under good management are capable of producing adapted plants, such as forest trees or range plants, and the common cultivated field crops[2] and pasture plants. Soils in classes V, VI, and VII are suited to the use of adapted native plants. Some soils in classes V and VI are also capable of producing specialized crops, such as certain fruits and ornamentals, and even field and vegetable crops under highly intensive management involving elaborate practices for soil and water conservation.[3] Soils in class VIII do not return on-site benefits for inputs of management for crops, grasses, or trees without major reclamation.

The grouping of soils into capability units, subclasses, and classes is done primarily on the basis of their capability to produce common cultivated crops and pasture plants without deterioration over a long period of time. To express suitability of the soils for range and woodland use, the soil-mapping units are grouped into range sites and woodland-suitability groups.

ASSUMPTIONS

In assigning soils to the various capability groupings a number of assumptions are made. Some understanding of these assumptions is necessary if

[1] Yields are significant at the capability-unit level and are one of the criteria used in establishing capability units within a capability class. Normally, yields are estimated under the common management that maintains the soil resource. The main periods for such yield estimates are 10 or more years in humid areas or under irrigation and 20 or more years in subhumid or semiarid areas. The 25 percent allowable range is for economically feasible yields of adapted cultivated and pasture crops.

[2] As used here the common crops include: Corn, cotton, tobacco, wheat, tame hay and pasture, oats, barley, grain sorghum, sugarcane, sugar beets, peanuts, soybeans, field-grown vegetables, potatoes, sweet potatoes, field peas and beans, flax, and most clean-cultivated fruit, nut, and ornamental plants. They do not include: Rice, cranberries, blueberries, and those fruit, nut, and ornamental plants that require little or no cultivation.

[3] Soil and water conservation practices is a general expression for all practices including but not limited to those for erosion control.

the soils are to be grouped consistently in the capability classification and if the groupings are to be used properly. They are:

1. A taxonomic (or natural) soil classification is based directly on soil characteristics. The capability classification (unit, subclass, and class) is an interpretive classification based on the effects of combinations of climate and permanent soil characteristics on risks of soil damage, limitations in use, productive capacity, and soil management requirements. Slope, soil texture, soil depth, effects of past erosion, permeability, water-holding capacity, type of clay minerals, and the many other similar features are considered permanent soil qualities and characteristics. Shrubs, trees, or stumps are not considered permanent characteristics.
2. The soils within a capability class are similar only with respect to degree of limitations in soil use for agricultural purposes or hazard to the soil when it is so used. Each class includes many different kinds of soil, and many of the soils within any one class require unlike management and treatment. Valid generalizations about suitable kinds of crops or other management needs cannot be made at the class level.
3. A favorable ratio of output to input [4] is one of several criteria used for placing any soil in a class suitable for cultivated crop, grazing, or woodland use, but no further relation is assumed or implied between classes and output-input ratios. The capability classification is not a productivity rating for specific crops. Yield estimates are developed for specific kinds of soils and are included in soil handbooks and soil-survey reports.
4. A moderately high level of management is assumed—one that is practical and within the ability of a majority of the farmers and ranchers. The level of management is that commonly used by the "reasonable" men of the community. The capability classification is not, however, a grouping of soils according to the most profitable use to be made of the land. For example, many soils in class III or IV, defined as suitable for several uses including cultivation, may be more profitably used for grasses or trees than for cultivated crops.
5. Capability classes I through IV are distinguished from each other by a summation of the degree of limitations or risks of soil damage that affect their management requirements for longtime sustained use for cultivated crops. Nevertheless, differences in kinds of management or yields of perennial vegetation may be greater between some pairs of soils within one class than between some pairs of soils from different classes. The capability class is not determined by the kind of practices recommended. For example, class II, III, or IV may or may not require the same kind of practices when used for cultivated crops, and classes I through VII may or may not require the same kind of pasture, range, or woodland practices.

[4] Based on longtime economic trends for average farms and farmers using moderately high level management. May not apply to specific farms and farmers but will apply to broad areas.

6. Presence of water on the surface or excess water in the soil; lack of water for adequate crop production; presence of stones; presence of soluble salts or exchangeable sodium, or both; or hazard of overflow are not considered permanent limitations to use where the removal of these limitations is feasible.[6]
7. Soils considered feasible for improvement by draining, by irrigating, by removing stones, by removing salts or exchangeable sodium, or by protecting from overflow are classified according to their continuing limitations in use, or the risks of soil damage, or both, after the improvements have been installed. Differences in initial costs of the systems installed on individual tracts of land do not influence the classification. The fact that certain wet soils are in classes II, III, and IV does not imply that they should be drained. But it does indicate the degree of their continuing limitation in use or risk of soil damage, or both, if adequately drained. Where it is considered not feasible to improve soils by drainage, irrigation, stone removal, removal of excess salts or exchangeable sodium, or both, or to protect them from overflow, they are classified according to present limitations in use.
8. Soils already drained or irrigated are grouped according to the continuing soil and climatic limitations and risks that affect their use under the present systems or feasible improvements in them.
9. The capability classification of the soils in an area may be changed when major reclamation projects are installed that permanently change the limitations in use or reduce the hazards or risks of soil or crop damage for long periods of time. Examples include establishing major drainage facilities, building levees or flood-retarding structures, providing water for irrigation, removing stones, or large-scale grading of gullied land. (Minor dams, terraces, or field conservation measures subject to change in their effectiveness in a short time are not included.)
10. Capability groupings are subject to change as new information about the behavior and responses of the soils becomes available.
11. Distance to market, kinds of roads, size and shape of the soil areas, locations within fields, skill or resources of individual operators, and other characteristics of land-ownership patterns are not criteria for capability groupings.
12. Soils with such physical limitations that common field crops can be cultivated and harvested only by hand are not placed in classes I, II, III, and IV. Some of these soils need drainage or stone removal, or both, before some kinds of machinery can be used. This does not imply that mechanical equipment cannot be used on some soils in capability classes V, VI, and VII.
13. Soils suited to cultivation are also suited to other uses such as pasture, range, forest, and wildlife. Some not suited to cultivation are suited to pasture, range, forest, or wildlife; others are suited only to pasture or

[6] Feasible as used in this context means (1) that the characteristics and qualities of the soil are such that it is possible to remove the limitation, and (2) that over broad areas it is within the realm of present-day economic possibility to remove the limitation.

range and wildlife; others only to forest and wildlife; and a few suited only to wildlife, recreation, and water-yielding uses. Groupings of soils for pasture, range, wildlife, or woodland may include soils from more than one capability class. Thus, to interpret soils for these uses, a grouping different from the capability classification is often necessary.

14. Research data, recorded observations, and experience are used as the bases for placing soils in capability units, subclasses, and classes. In areas where data on response of soils to management are lacking, soils are placed in capability groups by interpretation of soil characteristics and qualities in accord with the general principles about use and management developed for similar soils elsewhere.

CAPABILITY CLASSES

Land Suited to Cultivation and Other Uses

Class I—Soils in class I have few limitations that restrict their use.

Soils in this class are suited to a wide range of plants and may be used safely for cultivated crops, pasture, range, woodland, and wildlife. The soils are nearly level [6] and erosion hazard (wind or water) is low. They are deep, generally well drained, and easily worked. They hold water well and are either fairly well supplied with plant nutrients or highly responsive to inputs of fertilizer.

The soils in class I are not subject to damaging overflow. They are productive and suited to intensive cropping. The local climate must be favorable for growing many of the common field crops.

In irrigated areas, soils may be placed in class I if the limitation of the arid climate has been removed by relatively permanent irrigation works. Such irrigated soils (or soils potentially useful under irrigation) are nearly level, have deep rooting zones, have favorable permeability and water-holding capacity, and are easily maintained in good tilth. Some of the soils may require initial conditioning including leveling to the desired grade, leaching of a slight accumulation of soluble salts, or lowering of the seasonal water table. Where limitations due to salts, water table, overflow, or erosion are likely to recur, the soils are regarded as subject to permanent natural limitations and are not included in class I.

Soils that are wet and have slowly permeable subsoils are not placed in class I. Some kinds of soil in class I may be drained as an improvement measure for increased production and ease of operation.

Soils in class I that are used for crops need ordinary management practices to maintain productivity—both soil fertility and soil structure. Such practices may include the use of one or more of the following: Fertilizers and lime, cover and green-manure crops, conservation of crop residues and animal manures, and sequences of adapted crops.

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[6] Some rapidly permeable soils in class I may have gentle slopes.

Class II—Soils in class II have some limitations that reduce the choice of plants or require moderate conservation practices.

Soils in class II require careful soil management, including conservation practices, to prevent deterioration or to improve air and water relations when the soils are cultivated. The limitations are few and the practices are easy to apply. The soils may be used for cultivated crops, pasture, range, woodland, or wildlife food and cover.

Limitations of soils in class II may include singly or in combination the effects of (1) gentle slopes, (2) moderate susceptibility to wind or water erosion or moderate adverse effects of past erosion, (3) less than ideal soil depth, (4) somewhat unfavorable soil structure and workability, (5) slight to moderate salinity or sodium easily corrected but likely to recur, (6) occasional damaging overflow, (7) wetness correctable by drainage but existing permanently as a moderate limitation, and (8) slight climatic limitations on soil use and management.

The soils in this class provide the farm operator less latitude in the choice of either crops or management practices than soils in class I. They may also require special soil-conserving cropping systems, soil conservation practices, water-control devices, or tillage methods when used for cultivated crops. For example, deep soils of this class with gentle slopes subject to moderate erosion when cultivated may need one of the following practices or some combination of two or more: Terracing, stripcropping, contour tillage, crop rotations that include grasses and legumes, vegetated water-disposal areas, cover or green-manure crops, stubble mulching, fertilizers, manure, and lime. The exact combinations of practices vary from place to place, depending on the characteristics of the soil, the local climate, and the farming system.

Class III—Soils in class III have severe limitations that reduce the choice of plants or require special conservation practices, or both.

Soils in class III have more restrictions than those in class II and when used for cultivated crops the conservation practices are usually more difficult to apply and to maintain. They may be used for cultivated crops, pasture, woodland, range, or wildlife food and cover.

Limitations of soils in class III restrict the amount of clean cultivation; timing of planting, tillage, and harvesting; choice of crops; or some combination of these limitations. The limitations may result from the effects of one or more of the following: (1) Moderately steep slopes; (2) high susceptibility to water or wind erosion or severe adverse effects of past erosion; (3) frequent overflow accompanied by some crop damage; (4) very slow permeability of the subsoil; (5) wetness or some continuing waterlogging after drainage; (6) shallow depths to bedrock, hardpan, fragipan, or claypan that limit the rooting zone and the water storage; (7) low moisture-holding capacity; (8) low fertility not easily corrected; (9) moderate salinity or sodium; or (10) moderate climatic limitations.

When cultivated, many of the wet, slowly permeable but nearly level

soils in class III require drainage and a cropping system that maintains or improves the structure and tilth of the soil. To prevent puddling and to improve permeability it is commonly necessary to supply organic material to such soils and to avoid working them when they are wet. In some irrigated areas, part of the soils in class III have limited use because of high water table, slow permeability, and the hazard of salt or sodic accumulation. Each distinctive kind of soil in class III has one or more alternative combinations of use and practices required for safe use, but the number of practical alternatives for average farmers is less than that for soils in class II.

Class IV—Soils in class IV have very severe limitations that restrict the choice of plants, require very careful management, or both.

The restrictions in use for soils in class IV are greater than those in class III and the choice of plants is more limited. When these soils are cultivated, more careful management is required and conservation practices are more difficult to apply and maintain. Soils in class IV may be used for crops, pasture, woodland, range, or wildlife food and cover.

Soils in class IV may be well suited to only two or three of the common crops or the harvest produced may be low in relation to inputs over a long period of time. Use for cultivated crops is limited as a result of the effects of one or more permanent features such as (1) steep slopes, (2) severe susceptibility to water or wind erosion, (3) severe effects of past erosion, (4) shallow soils, (5) low moisture-holding capacity, (6) frequent overflows accompanied by severe crop damage, (7) excessive wetness with continuing hazard of waterlogging after drainage, (8) severe salinity or sodium, or (9) moderately adverse climate.

Many sloping soils in class IV in humid areas are suited to occasional but not regular cultivation. Some of the poorly drained, nearly level soils placed in class IV are not subject to erosion but are poorly suited to intertilled crops because of the time required for the soil to dry out in the spring and because of low productivity for cultivated crops. Some soils in class IV are well suited to one or more of the special crops, such as fruits and ornamental trees and shrubs, but this suitability itself is not sufficient to place a soil in class IV.

In subhumid and semiarid areas, soils in class IV may produce good yields of adapted cultivated crops during years of above average rainfall; low yields during years of average rainfall; and failures during years of below average rainfall. During the low rainfall years the soil must be protected even though there can be little or no expectancy of a marketable crop. Special treatments and practices to prevent soil blowing, conserve moisture, and maintain soil productivity are required. Sometimes crops must be planted or emergency tillage used for the primary purpose of maintaining the soil during years of low rainfall. These treatments must be applied more frequently or more intensively than on soils in class III.

Land Limited in Use—Generally Not Suited to Cultivation [7]

Class V—Soils in class V have little or no erosion hazard but have other limitations impractical to remove that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Soils in class V have limitations that restrict the kind of plants that can be grown and that prevent normal tillage of cultivated crops. They are nearly level but some are wet, are frequently overflowed by streams, are stony, have climatic limitations, or have some combination of these limitations. Examples of class V are (1) soils of the bottom lands subject to frequent overflow that prevents the normal production of cultivated crops, (2) nearly level soils with a growing season that prevents the normal production of cultivated crops, (3) level or nearly level stony or rocky soils, and (4) ponded areas where drainage for cultivated crops is not feasible but where soils are suitable for grasses or trees. Because of these limitations cultivation of the common crops is not feasible but pastures can be improved and benefits from proper management can be expected.

Class VI—Soils in class VI have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Physical conditions of soils placed in class VI are such that it is practical to apply range or pasture improvements, if needed, such as seeding, liming, fertilizing, and water control with contour furrows, drainage ditches, diversions, or water spreaders. Soils in class VI have continuing limitations that cannot be corrected, such as (1) steep slope, (2) severe erosion hazard, (3) effects of past erosion, (4) stoniness, (5) shallow rooting zone, (6) excessive wetness or overflow, (7) low-moisture capacity, (8) salinity or sodium, or (9) severe climate. Because of one or more of these limitations these soils are not generally suited to cultivated crops. But they may be used for pasture, range, woodland, or wildlife cover or for some combination of these.

Some soils in class VI can be safely used for the common crops provided unusually intensive management is used. Some of the soils in this class are also adapted to special crops such as sodded orchards, blueberries, or the like, requiring soil conditions unlike those demanded by the common crops. Depending upon soil features and local climate the soils may be well or poorly suited to woodlands.

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[7] Certain soils grouped into classes V, VI, VII, and VIII may be made fit for use for crops with major earthmoving or other costly reclamation.

RECEIVED
BY: Paul Blikstad

FEB 19 2015

DELIVERED BY:
Via mail

Deschutes County Community Development Dept

PO Box 6005

Bend OR 97708-6005

This is in regard to the conditional use permit for a nonfarm dwelling at 22075 Erickson rd, Bend. Your file number is 247-15-000035-CU.

I have lived adjacent to this property for 35 years and even farmed this particular parcel for 3 or 4 years while Ron Robinson owned it in the 80's. I used a wheelline and handline for irrigation, it now has a center pivot which should make it even more productive. I cut hay off the entire 18 acres and then used it for pasture in the fall until the cows cleaned it up. The entire parcel is productive central Oregon hay and pasture land if responsible land stewardship is employed.

Richard Wyman

22170 Erickson Rd

Bend OR 97701

RECEIVED
BY: _____
FEB 17 2015
DELIVERED BY:
_____

February 12, 2015

TO: The Deschutes County Planning Commission

RE: File # 247-15-000035-CU

We oppose the building of this home on this property. We understand they are saying the land is not able to grow crops.

We have been in our home for 38 years and have seen great hay crops harvested on this land.

Our understanding is the property was NOT to be divided and should be maintained as Exclusive Farm Use Zone. We have already had homes built on 3 corners of our property. This is suppose to be Farm Property Only and we wish it could stay this way.

Thank you for your consideration in this matter.

Mr. and Mrs. Donald McHone

Danny Sheridan
62664 Erickson Rd
Bend OR

To Paul Blikstad, Deschutes county planning division:

This is regarding the application of Dana Clough for a non farm dwelling on 22075 Erickson Rd. I request more time to review the application. As I have currently looked at it there are several factual errors. The description of Plantain as a weed on pg 3(it is a nutritious herb used commonly for improving grazing land), pg 11 description of water rights on 17 13 30 400 as 30 acres (there are 28.51 acres). This is what I have been able to ascertain in a short period of time allowed by my work schedule. I have a relationship with Liz Fancher regarding property development through my ownership of land in partnership with my father and will be unable to ask her legal advice as she has prepared this application. I am planning on examining the application in more detail before the planned public hearing.

The claim that there will be no influence on accepted farm practices is without basis, as it is dependent on the people that will live on that property and their reaction to farming practices and uses of EFU land. As a large parcel landowner very close to the subject property I have had inconveniences on my farming practices regarding the neighbors already, specifically complaints about field burning, burning in general for land clearing, driving tractors at night, loud noises from irrigation pipe digging (hydra hammer and using explosives). With the parcel in questions being a relatively small size (19 acres) and not being able to produce a live able income using established farming practices the typical future residents will be hobby farmers or "gentleman" farmers, typically with an outside income and not tolerant of general farming practices.

Until the State changes its land use laws, I am in opposition to this application for the reasons listed above and reserve the opportunity to bring up other reasons and errors in the application as I have time to read it. I am saying this in the knowledge that there is a public hearing planned.

Sincerely,

Danny Sheridan

RECEIVED
BY:
FEB 20 2015
DELIVERED BY:

Paul Blikstad

From: Danny S <tovaholwen@hotmail.com>
Sent: Thursday, February 19, 2015 11:50 AM
To: Paul Blikstad
Subject: DANA CLOUGH NON FARM DWELLING ON ERICKSON

Hi Mr. Paul Blikstad,

As the property owner with a common corner to Dana Clough (although it was his south 19 acre parcel) I am affected by the exemption he is seeking. I am planning on submitting a written statement before the end of day tomorrow. I talked to a planner and he said there will be a public hearing. I am an interested party to this proceeding and would like notifications of all public hearings and decisions as well as deadlines. This email is fine for notification.

Thank you,

Danny Sheridan,

62664 Erickson Rd

mailing address
837 NE 9th St.
Bend OR 97701

phone 541-410-0984

Paul Blikstad

From: Cheryl Trachsel <ctrachsel@comcast.net>
Sent: Thursday, February 19, 2015 3:11 PM
To: Paul Blikstad
Subject: Regards to file number: 247-15-000035-CU/Dana and Karen Clough

Mr. Blikstad,

We are responding to the application by Dana and Karen Clough for a conditional Use Permit for a nonfarm dwelling on an 18.08-acre parcel in the Exclusive Farm Use zone.
We object to the exemption because it would open the door to others in the same zone to want the same consideration. We chose to live in this area because of the farm use stipulation and the ability to keep large acres of land from being built on with more homes.

Sincerely,

Fred and Cheryl Trachsel

Dated this 19th day of February, 2015 E-mailed this 19th day of February, 2015

Sent from my iPad

Paul Blikstad

From: S S <ericksonroad@yahoo.com>
Sent: Monday, February 16, 2015 8:16 PM
To: Paul Blikstad
Subject: File Number 247-15-000035-CU Erickson Road

Deschutes County Planning Department

Re: File #: 247-15-000035-CU

Attn: Paul Blikstad
Senior Planner

Dear Mr. Blikstad:

We were notified by Deschutes County that the property at 22075 Erickson Road, Bend, Tax Lot 200 has applied for a permit to build a nonfarm dwelling on said property. The current land is in the Exclusive Farm Use zone.

We have lived neighboring the Clough's and this property for six years. The property has always been groomed to grow multiple cuttings of hay year after year. The crop will only be as good as the effort the farmer puts into the soil and land. With that being said, the Clough's have stopped watering and fertilizing the property. They bring in large fertilizer trucks to fertilize the lower portion of this property but neglect to care for the rest of the soil. There is an irrigation pivot that used to provide the land water that they no longer put to use.

Erickson Road is a narrow, rural road that is home to many families with children, often found riding bikes or out for walks. It has come to our attention that the Clough's intend to operate an equestrian boarding facility once a dwelling is built. Along with this will come an increase in traffic on a daily basis with horse owners coming and going to see their animals.

We choose to live on Erickson Road because of the quiet farming lifestyle like many other neighboring residents do. We do not agree with taking a prime piece of irrigated farmland to place a home and other outbuildings on.

Thank you for your consideration.

RECEIVED

BY: _____

FEB 1 9 2015

DELIVERED BY:

_____

Community Development Department

P.O. Box 6005

Bend, Oregon 97708

RE: File Number: 247-15-000035-CU

Applicant: Dana and Karen Clough

To Whom it May Concern:

We are writing this in regards to the Conditional Use Permit for a nonfarm dwelling that the above-named applicants have filed. We are opposed to this Conditional Use Permit based on the applicants statements that this is not farmable land. We have lived in our residence directly across Erickson Road from this property for nearly 40 years. It has been our observations that this land is farmable and has been for all the years we have lived here. Large quantities of hay have been raised on this land by previous owners and renters. We have purchased hay raised on this land from previous owners. With adequate fertilizer and water this land is capable of growing ample forage crops.

Sincerely,

Joseph L. Watkins

Linda S. Watkins

Joseph and Linda Watkins

RECEIVED
BY: Paul Blikstad
FEB 0 6 2015
DELIVERED BY:
C Davis

To Deschutes County Planning Department

Re: file # 247-15-000035-CU

Atten :Paul Blikstad, Senior Planner

We were notified by Deschutes County that the property at TM 17-13-30 TL 200 has applied for a permit to build a nonfarm dwelling on this property.

Currently this land is zoned EFU 20. The land is only 18 acres in size.

We have lived 2 drive ways east of this corner property for 19 years and watch the activity on this land. This property has constantly been a prime piece of farm land. It has been manicured to grow hay and /or alfalfa, getting 2 to 3 cuttings per year. Central Oregon Irrigation District confirmed that this property currently has 16.82 acres of water rights. Please see the attached aerial photo of the property (outlined in red) showing the green fields, irrigation line tracks, irrigation pond and horse loafing shed. This is clearly a level, productive hay field in Deschutes County.

Erickson is a small rural road, families with small children wait for the school bus at the end of their drive ways. Neighbors walk their dogs and ride bicycles along the east/ west and the north/south stretches of Erickson Road. A new nonfarm dwelling would create additional unwanted and unsafe car and truck traffic on this narrow country road.

In the past 19 years we have seen the original 60 acre property be carved into smaller and smaller private pieces. The new people have built accessory buildings or riding arenas right up on the property lines. This stirs up dust and flies as the horses, pigs and chickens move around. In fact these applicants, the Cloughs, are one of the biggest offenders. See the attached aerial with the large grey square in the SE corner. That riding arena is in the neighbor's front yard, the neighbor's house was there first. We are afraid they will do the same thing again in the new location offending another family.

We bought our property for the quiet, rural life style. We feel this applicant is trying to cash in on the "land rush" in Deschutes County. Their gain should not be at the expense of the rural neighborhood on Erickson Road, or by taking any part of that prime piece of irrigated farm land and placing a home, and all of the other hard surfaces that support that new nonfarm dwelling ,out of farm production.

Thank-you for your attention,

Brad & Carol Davis

Brad and Carol Davis 22121 Erickson Road Bend, OR 97701 02/16/15

Community Development Department
Planning Division Building Safety Division Environmental Soils Division

P.O. Box 6005 117 NW Lafayette Avenue Bend, Oregon 97708-6005
(541)388-6575 FAX (541)385-1764
http://www.co.deschutes.or.us/cdd/

February 4, 2015

Deschutes County Assessor
1300 NW Wall St.
Bend, OR 97701

The Deschutes County Planning Division has received the attached applications. Your agency may be affected or have concerns about this proposal.

Application Number:	247-15-000035-CU
Applicant:	Dana and Karen Clough
Request:	Conditional Use Permit for a nonfarm dwelling on an 18.08-acre parcel in the Exclusive Farm Use Zone
Location:	22075 Erickson Road, Bend; County Assessor's Map 17-13-30, Tax Lot 200

In order for the Planning Division to consider your comments they must be received by February 20, 2015. If there are significant questions or problems with this application, a meeting with the applicant and Planning Division may be necessary. This meeting should be requested as soon as possible.

List facts, adopted policies, or any other comments you feel may apply to this application (feel free to attach a separate sheet or email comments).

Currently under deferral

Suggested action by Deschutes County:

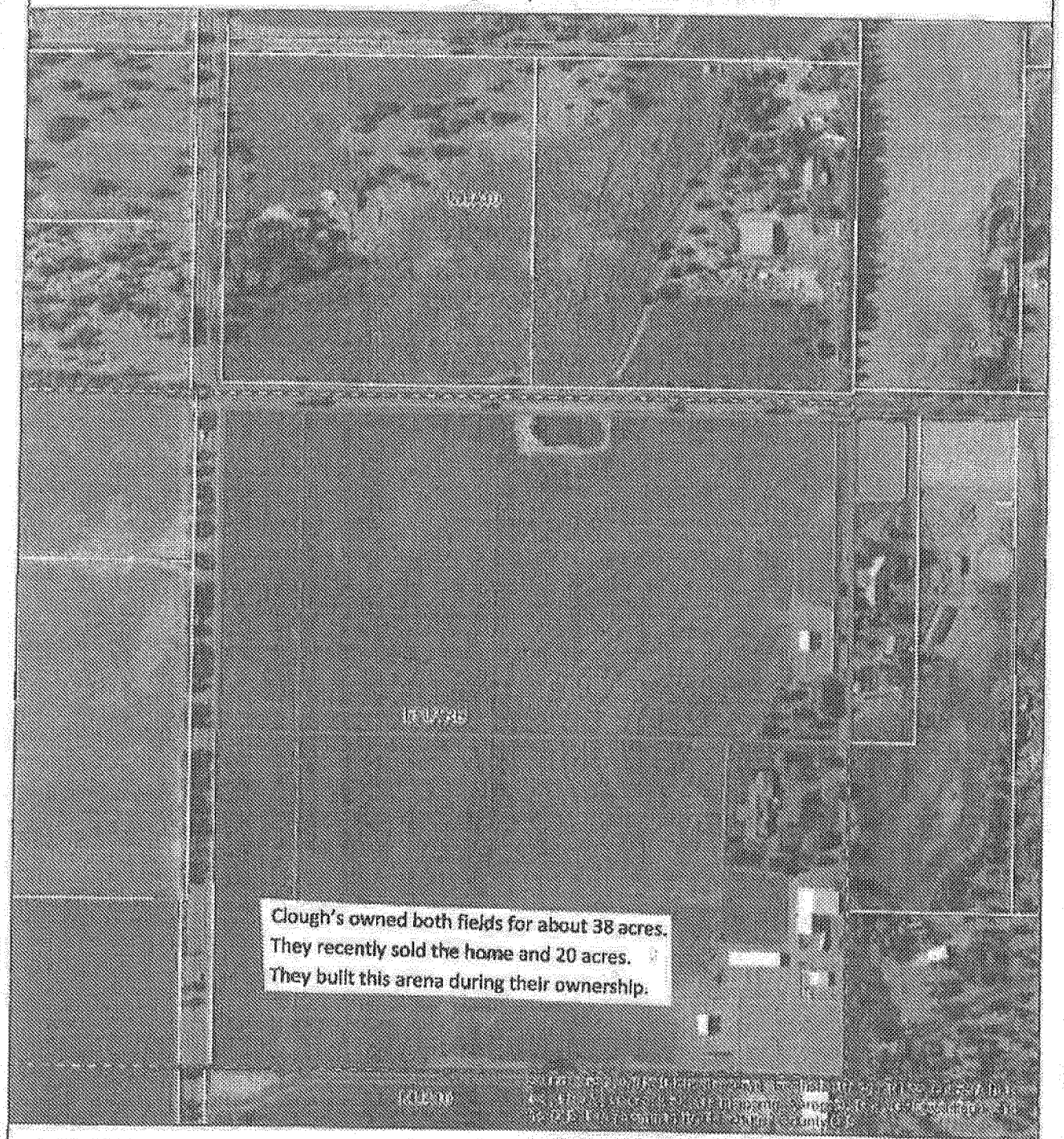
___ No Comments
_✓_ Check if you would like a copy of the Staff Report or Findings and Decision.

Agent Thomas Mann Date 2/13/15

Please email or telephone Paul Blikstad at Paul.Blikstad@deschutes.org or (541) 388-6554, if you have any questions. Thank you.

Deschutes County Property Information - Dial

Zoning Map for account 109384



Map and Taxlot: 1713300000200

Community Development Department
Planning Division Building Safety Division Environmental Soils Division

P.O. Box 6005 117 NW Lafayette Avenue Bend, Oregon 97708-6005
(541)388-6575 FAX (541)385-1764
http://www.co.deschutes.or.us/cdd/

PEB

LAND USE ACTION SIGN AFFIDAVIT

STATE OF OREGON)
) ss.
COUNTY OF DESCHUTES)

FILE NUMBER 247-15-000035-CU

I, DANE ECOLOGH (name), being first duly sworn, depose and state as follows:

I placed a Notice of Land Use Action sign on the Applicant's property on 3ED 2/13/15 (date), 2013, where it can be clearly seen from ERICKSON RD (name of road).

If the land use sign notices a hearing, the hearing is to be held on N/A (date), 2015.

Dated this 3 day of FEBRUARY, 2015.

Affiant

Subscribed and sworn to before me this 3 day of February, 2015.

OFFICIAL SEAL
JUDY K HACKETT
NOTARY PUBLIC-OREGON
COMMISSION NO. 466222
MY COMMISSION EXPIRES FEBRUARY 27, 2018

Notary Public for Oregon
My Commission Expires: 2-27-18

Updated 3/13

Paul Blikstad

From: Peter Russell
Sent: Monday, February 09, 2015 3:54 PM
To: Paul Blikstad; Chris Doty; George Kolb
Cc: Peter Russell
Subject: Non-farm by Erickson/Dickey (247-15-000035-CU)

Paul,
I have reviewed the transmittal materials for 247-14-000035-CU to develop a non-farm dwelling on 18.1 acres in the Exclusive Farm Use (EFU) zone at 22075 Erickson Road, aka 17-13-30, Tax Lot 200.

The most recent edition of the Institute of Traffic Engineers (ITE) Trip Generation Handbook indicates a single-family residence (Land Use 210) generates an average of approximately 10 daily weekday trips. Deschutes County Code (DCC) at 18.16.310(C)(3)(a) states no traffic analysis is required for any use that will generate less than 50 new weekday trips. The proposed land use will not meet the minimum threshold for additional traffic analysis.

Board Resolution 2013-020 sets a transportation system development charge (SDC) rate of $3,758 per p.m. peak hour trip. County staff has determined a local trip rate of 0.81 p.m. peak hour trips per single-family dwelling unit; therefore the applicable SDC is $3,044 ($3,758 X 0.81).

Please let me know if you have any questions. Thanks.

Peter Russell
Senior Transportation Planner
Deschutes County
peter.russell@deschutes.org
(541) 383-6718

Project #: 247-15-000035-CU
Subject: CUP for nonfarm dwelling in EFU
From: Larry Medina
Date: February 9, 2015

FIRE APPARATUS ACCESS ROADS:

- Approved fire apparatus access roads shall be provided for every facility, building or portion of a building hereafter constructed or moved into or within the jurisdiction. **The fire apparatus access road shall comply with the requirements of this section and shall extend to within 150 feet of all portions of the facility and all portions of the exterior walls of the first story of the building** as measured by an approved route around the exterior of the building or facility. **2014 OFC 503.1.1**
- **Fire apparatus roads shall have an unobstructed width of not less than 20 feet**, exclusive of shoulders, except for approved security gates in accordance with Section 503.6, and an unobstructed vertical clearance of not less than 13 feet 6 inches. Where a fire hydrant is located on a fire apparatus road, the minimum width shall be 26 feet, exclusive of shoulders. Traffic calming along a fire apparatus road shall be approved by the fire code official. Approved signs or other approved notices or markings that include the words NO PARKING-FIRE LANE shall be provided for fire apparatus roads to prohibit parking on both sides of fire lanes 20 to 26 feet wide and on one side of fire lanes more than 26 feet to 32 feet wide. **2014 OFC 503.2.1, D103.1, 503.4.1, 503.3**
- **Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus (60,000 pounds GVW) and shall be surfaced (asphalt, concrete or other approved driving surface) as to provide all weather driving capabilities.** Inside and outside turning radius shall be approved by the fire department. All dead-end turnarounds shall be of an approved design. Bridges and elevated surfaces shall be constructed in accordance with AASHTO HB-17. The maximum grade of fire apparatus access roads shall not exceed 10 percent. Fire apparatus access road gates with electric gate operators shall be listed in accordance with UL325. Gates intended for automatic operation shall be designed, constructed and installed to comply with the requirements of ASTM F 2200. A Knox® Key Switch shall be installed at all electronic gates. **2014 OFC D102.1, 503.2.4,**

FIRE PROTECTION WATER SUPPLIES:

- **An approved water supply capable of supplying the required fire flow for fire protection shall be provided** to premises upon which facilities, buildings or portions of buildings are hereafter constructed or moved into or within the jurisdiction.

OTHER FIRE SERVICE FEATURES:

- **New and existing buildings shall have approved address numbers**, building numbers or approved building identification placed in a position that is plainly legible and visible from the street or road fronting the property. These numbers shall be Arabic numbers or alphabetical letters. Numbers shall be a minimum 4 inches high with a minimum stroke width of 0.5 inch. Where access is by means of a private road and the building cannot be viewed from the public way, a monument, pole, or other sign or means shall be used to identify the structure. Address numbers shall be visible under low light conditions and evening hours. Provide illumination to address numbers to provide visibility under all conditions. Address signs are available through the Deschutes Rural Fire Protection District #2. An address sign application can be obtained from the City of Bend Fire Department website or by calling 541-388-6309 during normal business hours.

, WA Fri Oct 09, 2015 USDA Market News

kly Hay Report

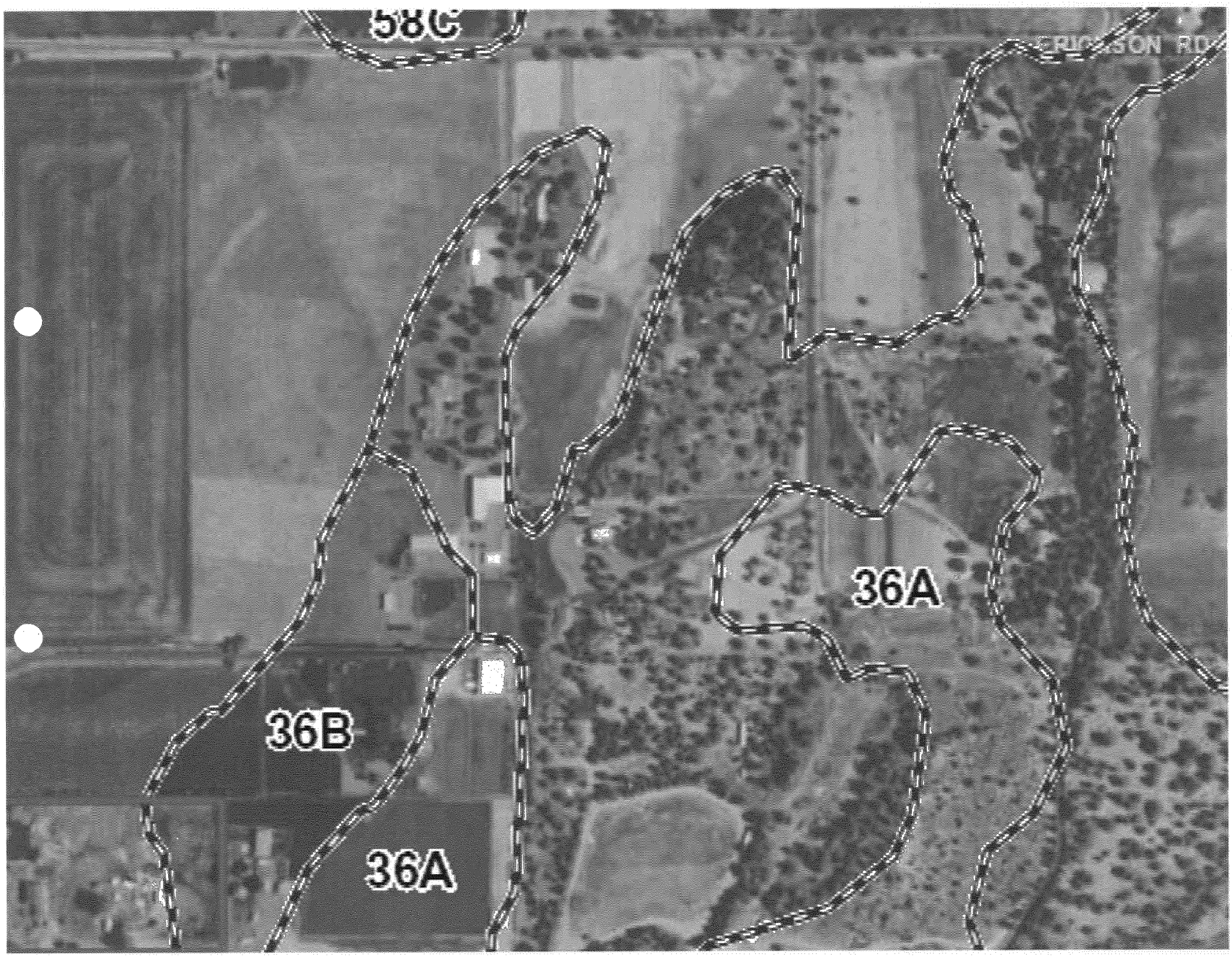
780 Last Week: 7013 Last Year: 7304

d to October 2: Prices trended generally steady compared to week
. Export sales continue to be slow. Retail/Stable demand for all
a from Crook, Deschutes, Jefferson, Wasco counties continues to be
y producers have decided to hold on to their hay for now, in hopes
prices. Some producers are having their water rights cut off due
ught. All prices are in dollars per ton and FOB unless otherwise

chutes, Jefferson, Wasco Counties:

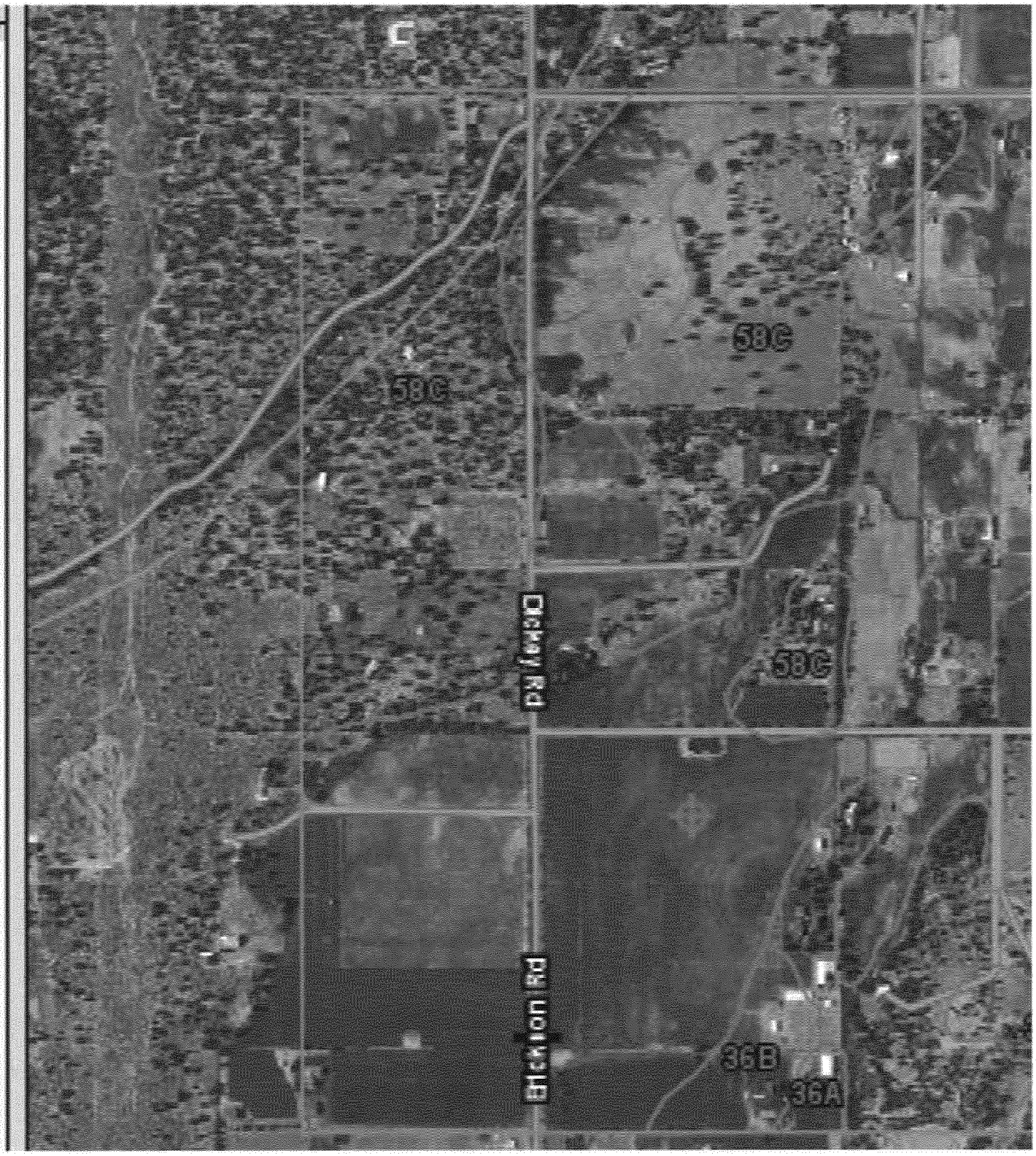
	Tons	Price Range	Wtd Avg	Comments
Square i n	95	240.00-250.00	242.21	Retail/Stable
Grass Square ium	143	240.00-280.00	256.99	Retail/Stable
ass Square ium	5	285.00-285.00	285.00	Retail/Stable
Bluegrass Square ium	60	250.00-250.00	250.00	Retail/Stable

RECEIVED BY: Paul B OCT 14 2015 DELIVERED BY: Email from COLW


58C
ERICKSON RD
36A
36B
36A

on, Parts of
ith

Acres in AOI	Percent of AOI
367.2	59.3%
6.4	1.0%
226.0	36.5%
19.3	3.1%
618.9	100.0%



To Paul Blikstad, Senior Planner

Re: 22075 Erickson Road, Bend AKA TM 17-13-30 TL 200

File# 247-15-000035-CU (247-15-000403-A)

Hello Paul Blikstad,

I am sorry that this appeal hearing will be during the middle of a work day. I did not feel that I could take time off of work to speak against the Cloughs appeal, although I do feel strongly against a new home being built on this prime farm property located at 22075 Erickson Road. I signed in and spoke out at the original public hearing held in the evening.

I read most of the "Applicants Final Argument" and was interested in how many times the reference to "not being able to make money due to the low yield of hay on this part of the field "was pointed out. And that they" have tried for many years to make profit growing hay here".

I sell real estate for a living and have watched what the Cloughs have done with this property over their ownership in regards to commercial value. I would like to submit the MLS listing for 22075 Erickson Road when the Cloughs were advertising this 18 acre property as "horse property" (growing of hay for profit not mentioned). In fact these pictures show both horses and cows grazing on the grasses that the Cloughs were able to grow at 22075 Erickson Road. Even along the east side which they are claiming as "the soils are so poor".

In reading the MLS sheet you will see that they wanted to sell this parcel in 2007- 2009. Their listing price started at $499,000 then dropped to $450,000 without a taker after 421 days. So, I feel that the Cloughs want it "both ways". They would sell these 18 acres for top dollar as a "fabulous parcel ready for your horses" but now claim that part of the property is not productive. I didn't see anything in their real estate listing about an unproductive area when the property was for sale.

I urge you to hold your line on your first decision which was denial to a home on this EFU property. Since my home ownership at 22121 Erickson Road in 1997, 22075 Erickson Road always has been productive for some type of farming practice, either raising or grazing. I feel the Cloughs want to build a home on this land because of the mountain view and will try any means to persuade the county to allow them to do so. 22075 Erickson Road is valuable farm land in Deschutes County and should remain so.

Thank-you for your attention to this matter,

Carol Davis

Carol Davis 9/18/15

Map and Ta: 171330OO00200
22075 Erickson Road, Bend OR 97701

Listing #: 2715077 Picture History

Expired (12/03/2009)

Listing Agent: Debra Tebbs

Listing Office: Cascade Sotheby's International Realty

Listing Price: 450,000

Listing Date: 12/03/07

Expiration Date: 12/03/2009

DOM/CDOM: 421/421

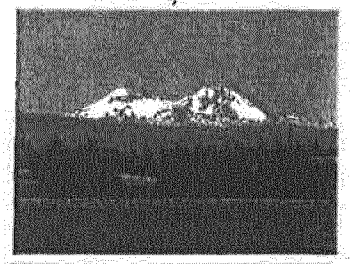
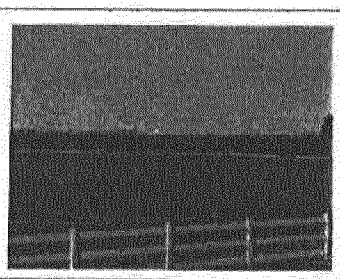
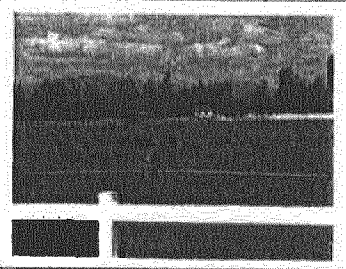
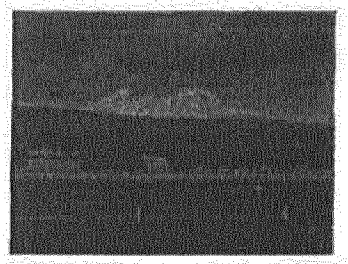
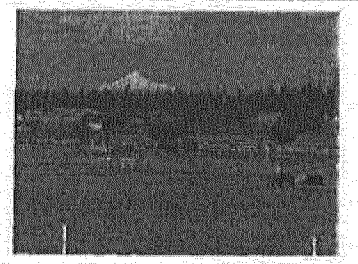
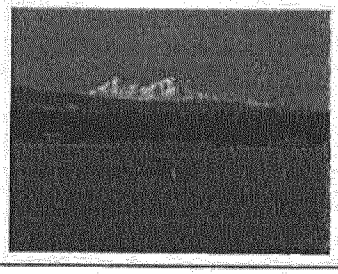
Date	Time	New Status	Old Status	New Price	Old Price	Selling Date	DOM	Change Type	Changed By
12/04/09	12:05:51 am	Expired	Withdrawn	450,000	450,000		421	Status	Rapattoni Staff (rapstaff)
01/27/09	4:58:41 pm	Withdrawn	Active	450,000	450,000		421	Status	Lynnea Miller (5989)
05/05/08	9:40:39 am	Active	Active	450,000	499,000		154	Price	Deborah Morrill (9402)
12/03/07	3:01:42 pm	Active		499,000	0		0	New	Deborah Morrill (9402)

Client Detail with Addl Pics Report

Listings as of 09/18/15 at 12:22pm

Expired 12/03/09 **Listing # 2715077** **County: Deschutes** **22075 Erickson Road Bend, OR 97701** **Cross St: Dickey** Map **Listing Price: $450,000**

Property Type	Land	**Property Subtype**	Lots 1 acre or more
Area/Addition	B-M&BB		
Section	NE	**Price/Acre**	$24,889.38
Map and Ta	171330OO00200	**Lot Sq Ft (approx)**	787565 ((Measured))
		Acreage	18.0800

Marketing Remark Spectacular Mountain Views from this 18.08 acre horse property. Private setting in an area of Nice Estates just minutes to downtown Bend. The property has 17 acres of COI. Already in place is white vinyl fencing & cross fence, irrigation pond (1 gun & 2 stations), MD barn with 2 Nelson water heaters. Located across from UGR this fabulous parcel is ready for your horses! Ready to go for agricultural building or RV pad. Broken Top, Bachelor, & Sisters views and Washington & Jefferson views from SE corner.

Zoning	EFU	**Elementary School**	Buckingham
Jr. High School	Sky View	**Sr. High School**	Mountain View
Irrigation	Yes	**Irrigation District**	Avion
Irrigated Acres	17.00	**Irrigation Comments**	1) undergr line(E.-W.)entire prop 2)CLA
Electric Company	CEC	**HOA**	No
Taxes	$62.96	**Tax Year**	2007
Farm Deferral	Yes	**Additional Buildings**	Barn
View	Cascade Mountain, Terrain	**Existing Water**	Private/Community
Sewer/Septic	Septic FS Approved	**Community**	Paved Street, Gas Available, Horse Property
Road	Paved	**Terms**	Cash

RECEIVED
SEP 11 2015
Deschutes County CDD

September 8, 2015

To: The Deschutes County Board of Commissioners
And Paul Blikstad, Senior Planner with the County Planning Division

We have received another letter in regards to Dana and Karen Clough regarding property at 22075 Erickson, Road, Bend, OR.

We have lived at 22125 Erickson Rd, Bend for thirty-nine years and appeared and spoke at the last hearing on this item.

My first question is: Why is this even taking up time and money of our system when it has already been denied??

I would hope that whoever is in charge of this would take the time to come and look at said property. It has had pristine beautiful crops in this area before and has beautiful crops all around it. If this property were treated with fertilizer and the care it needs there is no reason it couldn't produce decent crops.

It seems to me that the Cloughs are trying to turn a piece of property worth $180,000 into a $300,000 dollar property by saying it is not good ground to grow crops. It doesn't take a mind reader to realize that this property is not different from all the adjoining property in this same area.

We will not be attending this hearing again because of health reasons but we would like to see it denied. If this property is treated as other property in this area by fertilizing it correctly there is no reason it could not produce wonderful crops.

Sincerely,

Donald R. McHone and
Sharon L. McHone

P.O. Box 7976
97708

RECEIVED
AUG 14 2015
Deschutes County CDD

Hand Delivered and U.S. Certified Mail

Paul Blikstad
Community Development Building
117 NW Lafayette Avenue
Bend, OR 97701

CC: Alan Unger, Tammy Baney, Tony DeBone, Tom Anderson, Erik Kropp

Re: Clough Application 247-15-000035-CU

Dear Mr. Blikstad:

As you may recall, letters dated March 12, 2014 and May 6, 2015 bearing my signature and relating to the issues in the above-referenced appeal were submitted for consideration. The purpose of this correspondence is to make material changes to my opinions expressed in those letters. I request that this correspondence be included in the public record and considered as part of the County record in the event the County elects to proceed with the appeal.

When I signed the March 12, 2014 and May 6, 2015 letters, I did not have a full understanding of the entire situation involving the property at issue. I was coerced into signing the letters submitted by the applicants. I now have more information and have reread all the letters, and based on my new, more accurate understanding of the true facts, I wish to set the record straight.

After review of the letter and many hours spent at the site in question, I have come to a vastly different conclusion. I have a wider body of evidence and I can see how the prior letters were critically flawed. I now have additional knowledge and information regarding the parcel in question by doing my own independent research.

I would like to state on record that the prior letters were prepared in their entirety by Dana and Karen Clough. The letters contain several statements, errors and omissions. Dana was not truthful in the statements that he wrote or the photographs of the rocks.

Dana chose not to water the land in the upper field due to his plan to claim it doesn't produce any hay. The land has an automatic pivot that waters daily and can go for a week or more without being managed by a person. Instead of watering with the pivot Dana would run the wheel lines day after day in the west side of the property, rarely operating the pivot on eastern parcel including the pipeline and CUP area. Dana chose not to manage the east portion of the property. The only portion of the fields that he ever fertilized was the west portion of the field irrigated with the wheel line. Excelerite and then followed a year or more later by Beer water. The

East portion of the field seeking the CUP was never managed with Beer water, fertilizer, Excelerite or water.

Based on my own physical hands on labor and observations as well as the contract to farm said parcel to cut rake and bale I have now a wide body of knowledge that refutes all the information in the prior two letters. I successfully baled and sold hay over the Transcanada pipeline on the Clough property and all parts around the line.

This parcel is high valued farmland and when properly watered this parcel will yield at minimum 4 to 5 tons per acre easily. Property like this will yield a tremendous amount of good quality hay and sell at a rate of $240/per ton, generating substantial revenue and profit for the limited hours it takes to accomplish baled hay. This Class 7 soil can be farmed, and farmed well. I successfully farmed this year on the property seeking a CUP, including over the gas pipeline.

When I met with Paul Blikstad to disavow the statements in my prior letters and explain my true, non-coerced opinions, I also submitted an aerial photo of the Neighbor; James Bauchman at 62690 Erickson Rd, Bend Oregon; property showing excellent hay growth over the exact pipeline that runs through the Clough property. The Gas pipeline has no negative effect to grow hay or any other livestock commodity when properly watered and fertilized. I have validated the aerials by physical eye contact with on the ground verification. These aerials are excellent support of actual growth, quality and health.

Based on thorough research and after carefully evaluating this situation in its entirety I feel strongly that this is high quality, farmable land and that this parcel should not be changed. We successfully farmed this parcel. A homesite is not needed to successfully farm this parcel. I'm requesting the precedence of the land to stay EFU. The CUP application should be denied and the land in its entirety should continue to be farmed and the EFU laws need to be upheld.

This is the letter I want to stand as my professional opinion. Again, I ask that this letter be included in the file for this matter and that it be considered in any proceedings affecting this issue.

Regards,

Don Barbin
Concerned Central Oregon Farmer

October 2015

To County Commissioners;

I observed more than one ton of hay being baled on the NE corner of the applicant property. This is irrigated farmland and I am in support of its continued use as irrigated EFU. I personally purchase hay from Mr. Davis on Erickson Rd. His management skills are excellent and year after year he grows and sells a reliable crop.

Sarah Doriek

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

[Typo text]

Please see exhibits from previous submission. I do believe to discuss least suitable the balance has to be set by what created generally unsuitable.

FILE # 247-15-000035-CU
Updated10/9/15

All of these pieces of evidence are to support that the least suitable is a viable option for the county to pursue. Given that all of these facts support a generally unsuitable site; I believe those with a desire to farm would like to have an option to farm in Deschutes County, just as this applicant farmer had chosen. Just as Deschutes County is building apartments to accommodate a particular lifestyle and income earner; likewise for EFU land.

I opine that the planners at the county would only be doing their job by maximizing the EFU space. I Would love to know if the planners felt they did their job by allowing and supporting a home site on EFU land that looks like this?

SE Corner has no prior historical Irrigation water rights
SE Corner has no prior farm or livestock use
SE Corner was claimed by soil scientist to be too small for a home site
SE Corner has room for building envelope including a home site, septic and drain field
SE Corner has a history of being the only non-producing piece of the property
SE Corner allows for the entire existing pivot and hay field to be farmed.
SE Corner has no history of making profit in farming
SE Corner is a buildable site contrary to what the soil scientist states
SE Corner home site is the least intrusive on agriculture EFU. Existing farming could continue.
SE Corner was said not to large enough for a building envelope and home during the hearing.
SE Corner has no allocation for crops designated from the applicants initial application to County
SE Corner provided no resource for the adjacent horse facility continuing to 2015
SE Corner in applicant documents does not mention farming of any kind. Only 6 tons hay which is not possible there because of decorative fence.

NE Corner has not had water rights sold as Applicant claims in his testimony
NE Corner had intentionally removal of Irrigation Rights in 2014. Water is "in stream" & not removed.
NE Corner did not have water sold to COI as applicant states
NE Corner has had a history of growing Alfalfa hay for profit
NE Corner has made profit in hay and livestock both recently and historically
NE Corner has recently had horses pastured making profit of $7600
NE Corner has a letter stating that the land is farmable and is making profit
NE Corner has had a conscious effort to make it appear it wasn't farmable.
NE Corner has produced when irrigated supporting irrigated lands remain in farm use.
NE Corner has a letter stating that the site is farmable and grew more than one ton of hay at a profit.
NE Corner grew hay that was used on the applicants adjoining horse property generating high income
NE Corner has huge implications of existing farm use. A home site would dramatically alter existing farming. Even according to applicant entire east side would come out of farm production because of class 3 soils, according to the applicant, are not farmable in his testimony. The existing wheel lines make it to the pond from West to East and there would no longer be a way to deliver water to the East If a home is put into place.
NE Corner did supply a resource to the Applicants horse training and boarding farm that the applicant claims she shut down 7 years ago. Horse farm continued into 2015

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

- Applicant claimed in appeal to the commissioners the SE corner was not large enough for a home site. Not the truth. SEE EXHIBIT AK
- Applicant claimed that the horse operation of the adjoining property has been "shut down" since 2008. Not the truth. SEE EXHIBIT DD and BB
- Applicant claimed the NE Corner could never produce more than a half ton, nor had a history of producing. Not the truth. SEE EXHIBIT AA

All of these pieces of talking points are to provide support that the least suitable location has merit in Deschutes County. Least suitable is located in the SE corner:

WE are in an appeal hearing because the Attorney mislead the commissioners stating that the site was not eligible to be built on. This is not the truth. It is large enough. Even in a recent Newell case the Hearings Officer has several facts to support that the entire remaining portion of the property is producing farm crops. The only factor given as a reason by the applicants in this case is that the site was mislead to be too small; given the identical soil class as the NE. The SE Corner has never produced a crop. Even in the Application the "crops produced section" it only states Hay. Has no history of irrigation.

The hearings officer was right on with her decision. That the hearings officer simply said she was wanting more quantitative analysis for this area as rocks have been buried in the SE location and the entire testimony from the applicants is that the entire east side of the property does not produce hay. This is a non-resource area! The County hearing officer is upholding Goal #3!

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

QUOTES FROM CODE AND ADDITIONAL REPUTABLE AGENCIES

A) Mrs. Katherine Daniels quote Oregon Department of Land Conservation and Development: (Exhibit A3)

> **"The county may make its own determination as to the accuracy and acceptability of the soils assessment. I note that the web soil survey shows the tested area to be irrigated and cropped, an indication of its suitability for farm use."**

B) 18.16.010. Purpose. A. The purpose of the Exclusive Farm Use zones is to preserve and maintain agricultural lands **and to serve as a sanctuary for farm uses**. B. The purposes of this zone are served by the land use restrictions set forth in the Comprehensive Plan and in DCC 18.16 and by the restrictions on private civil actions and enforcement actions set forth in ORS 30.930 through 30.947. (Ord. 95-007 §9, 1995; Ord. 92-065 §3, 1992; Ord. 91-038 §§1 and 2, 1991) **(Exhibit X)**

C) OREGON STATEWIDE PLANNING GOALS & GUIDELINES
GOAL #3 OAR 660-015-0000(3)

To preserve and maintain agricultural lands. Agricultural lands shall be preserved and maintained for farm use, consistent with existing and future needs for agricultural products, forest and open space and with the state's agricultural land use policy expressed in ORS 215.243 and 215.700.

B. IMPLEMENTATION

1. **Non-farm uses** permitted within farm use zones under ORS 215.213(2) and (3) and 215.283(2) and

(3) **should be minimized to allow for maximum agricultural productivity.** (According to the testimony applicant would stop farming 10 plus acres with the home site)

D) "PRIME FARM LANDS have an adequate and dependable water supply from precipitation or irrigation." (Exhibit T www.ars.usda)

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

QUOTES CONT....

E) Tom Bennett's from NRCS:
" it becomes the land owners decision on the potential they (the owner) would want out of the land."

Mr. Clough states that he can only grow 6tons of hay on 16 Acres of High quality farmland? Irrigated farmland (pg. 69/117Land Use Application). Including his "Westside soils". Compare this to Mr. Robinson former farmer for the property. (Exhibit B2)

F) Mylen Bohle OSU EXTENSION Office:

"If land can be irrigated land can be farmed" The NE site has a history of water rights. The SE corner has not had a history of irrigation. More importantly it has never been used for crops or livestock according to the applicant.

G) Oregon law, as implemented by the Deschutes County Comprehensive Plan and Zoning Code, places strict limits on the siting of nonfarm dwellings in EFU zones. **The Oregon courts have stated that under Oregon law, nonfarm dwellings should be the exception and that approval for them should be difficult to obtain.** http://www.deschutes.org/sites/default/files/fileattachments/community_development/page/781/supplemental_application_for_nonfarm_dwelling_or_partition_in_efu_zone.pdf 4/2013 (Exhibit Z)

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

H) Executive order from governor/Office Order 12-07 **Even the governor of Oregon in an Executive order writes "Central Oregon's irrigated lands are high value crop lands." (Exhibit Y)**
Why then is the applicant allowed to build a home here when it is and has been irrigated? Curious what high valued farmland is then? A generally unsuitable site has been farmed and made profit. This is exactly why the least suitable is so important as that site would most likely not have irrigation and an opportunity to make profit.

The Governor writes: "Oregon is a great place for growing food and fiber. There are, however, significant variations between different regions of the state in terms of the types of farming and forest uses that are best suited for the landscape, and in the economic returns from farming, forestry and ranching. The flat, fertile fields of the Willamette Valley differ from lands in the Rogue and Umpqua valleys and lands along Oregon's coast. **High value crop areas in parts of Central Oregon irrigated from the Crooked and Deschutes** Rivers differ from the high plateau wheat fields in the northern part of the state. Office of the Governor State of Oregon "

I) The laws need to be upheld. Hold the line firm for keeping farmlands a **"sanctuary" in Deschutes County**. (Exhibit X)
(CODE 18.16.010. Purpose. A. The purpose of the **Exclusive Farm Use zones is to preserve and maintain agricultural lands and to serve as a sanctuary for farm uses.** B. The purposes of this zone are served by the land use restrictions set forth in the Comprehensive Plan and in DCC 18.16 and by the restrictions on private civil actions and enforcement actions set forth in ORS 30.930 through 30.947. (Ord. 95-007 §9, 1995; Ord. 92-065 §3, 1992; Ord. 91-038 §§1 and 2, 1991)

J) The role of EFU is to protect farming. EFU is not in place to provide best and most suitable home sites.

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

K) Current Land Discussions in Bend 2014 Agricultural Lands Program | Deschutes County Oregon How does Irrigated and making profit $7600 per year fit into the program?

> Agricultural Lands Program | Deschutes County Oregon
>
> The Community Development Department recently analyzed the County's agricultural lands program to determine if changes are needed. This analysis included community outreach with six public meetings held throughout the County during the month of May 2014. These meetings ...

Supporting EFU land and the SE corner is the least suitable amongst generally unsuitable land: If these facts support generally unsuitable then we believe least suitable has incredible merit:

L) **Airstrip is not on the least suitable. Application denied because it is high valued farm land.**
County Hearings Officer Karen Green denied the application on Sept. 14, 2004. noting that it could not be shown that the airstrip would be located on the portion of the land deemed least suitable for farm crops or livestock use – a requirement under county, not state, land use rules. Dense filed the appeal 10 days later.
http://www.bendbulletin.com/news/1502238-151/private-airstrip-application-sparks-debate-on-land-use

APPLICANTS DENIAL OF PRIOR HORSE RAISING OPERATION

1) In a quote prepared by Karen Clough she states that in 2008 she stopped raising horses. Karen is distancing herself from her farm operation. Cloughs realize that they cannot sell half and then claim they cannot farm the remaining portion. The Cloughs ran a training and raising operation. Horses would be brought to the property, raised and resold. Customers would come and go every day down the driveway and we could see and hear lessons and training going on in the arena with clients directly in front of the McHones. In fact the McHones were so bothered by the dust and constant commotion at the stables that they would never go outside on their back yard. Sharon McHone who's back yard is adjacent to the riding arena would state that she would start at 8 and go til 9p at night with the horses and lessons.

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

(See Exhibit DD and BB)

2) GENERALLY UNSUITABLE IS BETTER THAN LEAST SUITABLE
(See Supportive letters EXHIBITS AA and GG):
A)The land owner relied on Don Barbin and now their hired expert realizes that the Clough manipulated the land to get the homesite. Don asked for his letters to be removed and this should be granted. Don also states that it is farmable and the pipeline does not affect the growth. Don Barbin submitted pipeline aerials that were not considered in the HO decision but the Applicants arguments were.

3)HOME SITE IN THE SE CORNER

A)The portion in the SE corner of the property where the applicants and soil scientist claim there is not room for a home site is not truthful. There is room for a home site and septic tank and drain field (10ft easement). This is the same area that the hearings officer denied the application on because as she states that this is the least suitable.
The drain field does not have the same easement requirements as a home site and **the minimum under state law fits into this area.** The structure that is currently in this location is temporary/portable and is identical in structure(only smaller) to a barn they sold and moved off the property they previously owned. Applicants told us that the small shed would be moving with them. They are currently storing trailer and mower so they could use it for a garage. There is additional room for a non-farm dwelling next to the structure.

Thus there being a structure in the existing area is not reason to overlook that it is the least suitable for a home site. Now that the soil scientist submitted data it is now affirmed that the site is suitable for a drain field and septic as well as a home site. Just because the applicants wants to build a large house and and it doesn't fit into the designated "least suitable" area they should not be granted a site of their choosing; or defer an error in judgement on the hearings officer. This site is the least suitable as there is no previous farming history or irrigation The structure could remain in place if they choose as the home site and septic and drain field would be to the south of this structure. There is room for a home site. There is more than enough room for a drain field towards the Carroll property. The Code for least suitable has been put to good use in this case as it did determine a site that would allow for continued farming.

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

If this is the new generally unsuitable farm ground with these facts I would encourage the county to adopt a third option:

4)SOILS

A) The premeditated idea to create a home site is exactly why we are here today. The data points do not add up and it is an attempt to create a least suitable location on generally suitable ground. At points in the testimony Mr. Borine would suggest that only the west side is farmable and then later contradict himself by saying "why would I test good soils found in the west side." The east side has equally good soils rating class 3. **Half of the property and dividing the property North and South there are "west side" soils that this farmer has not farmed! Look closely at the map.** He did not farm all of the west side lands as a good portion of the land has not been baled when they claimed they do farm it.

B)"Why wouldn't a farmer farm the "good soils?" A Portion of the West side class 3 soils are irrigated by the pivot and did not produce because the pivot was turned off.

C) According to DLCD "**soil assessments should not solely be used by local governments when making these types of findings." (Exhibit S)**

D) Mr. Barbins letter dated 8/14/2015 coincides with the hearings officer and staff findings and Mr. Borine that the land has greater than 10-inch depth of soil allowing the land to be farmed. Mr. Cloughs letter that was said to be statements of the farmer was purely all wishful thinking. This letter was clearly put together by Mr. Clough and Mr. Barbin wanted the letters removed from the record. All class 7 soils have a depth of less than 10inches. **This brings into question the actual classification of the soils on the proposed home site are even really and truly class 7. Also would note that class 3 soils are intermixed within the class**

E) **The home site includes class 3 soils.** With the lack of water, stripping the soil of nutrients from being hayed it is suggested that these soils are actually class 6 or better. For this reason the land is not the least suitable as it relates to the generally unsuitable because the soils are farmable.

F) Also in the final arguments from the applicant "Class 7 soils are not suitable for farm use when irrigated. Raising hay on the Eastern half is clearly not

profitable." Well then it clearly must not be class 7 soils. If the farmer Don Barbin cut hay this year, made a profit then the soil must be better than class 7 soils because it was farmed after being succumbed to years of drought from the applicant. Pretty amazing results. I argue that it is possible the soils are class 3 and as all of Mr. Borines literature states they are class 6 when not irrigated. **Oregon Department of Land does not state that the soil test is accurate. (Exhibit A3)**

With 26 of the 29 soils were 10 inches deep and 11 of the 29 test pits were 17" deep to basalt. Where is it mentioned anywhere that Mr. Borine advised the applicant to improve soil content. It's clear that additional soil amendments and harrowing could have been done to improve these lands with the soil depth.

Mr. Borine speaks specifically that Plantain thrives in poor shallow soils. Mr. Borine claims are on the other adjoining areas of the property that "there is no need to test these soil areas" are infested and thriving with Plantain.

According to Mr. Borine
"Plantain thrives in arid shallow soils like over the gas pipeline"; how is it possible that these same Plantain species are infested and have consumed the West portion where the wheel line is irrigating and has deep soils found in the West area that Mr. Borine claims.

One test site in the area of recorded class 3 cannot be indicative of the entire area. OR can it? There are class 3 soils recorded by Mr. Borine in the home site that the applicant is requesting. How much land does the one good soil site rating cover? Clearly plantain will grow in any soil type. After talking with NRCS a soil scientist can create an entire line of recorded soil ratings by testing only one site.

This also give much support and evidence that the other areas of the property have identical and in some cases worse scenarios because they have not been farmed at all for revenue or profit. A soil expert cannot rely on one test site for suitability and gives the hearings officer every right to make her application denial.

5)EFU FARM DEFFERRAL

A) Last reported farm use for profit from the Cloughs during their ownership was "running livestock" according to the County assessor office Sept 30, 2015. The Cloughs make no mention of historical activity of the land in question when asked on their own application packet. County Tax assessor has been told that the farm practice was "running livestock."

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

6)HAY FOR BOARDING OPERATION

A) One ton of hay feeds a horse 100days. (2000lbs/20lb consumed= 100 days)
Interestingly **you** would not see any tax documents from the Cloughs for the nonfarm dwelling in question or perhaps the entire lot. They would use their hay to feed the horses in training, boarding and their own sale horses on the adjacent tax lot. At incomes of 680 per month like maybe in September of 2014 one ton of hay brings in $2,240 (Exhibit DD and Exhibit BB).
The applicants state it is full of weeds, well lets remember horses are herbivores and they eat weeds, and they even eat wood. Weeds is all Perspective. What we call grass, horses call dinner. When we call clover a weed, horses call it delicious. All hay has weeds unless you are a certified "weed free" grower. Low quality hay is often used in animals that become laminitic easily. Remember more than one ton was grown on the .58 Acre home site and was baled and sold off the field in 2015. A letter from Don Barbin supports this. We Personally counted the number of bales and more than 1 ton was in baled.

It is common practice to mix hay for farm animals. Ranchers offer a high nutrient hay as well as a lower energy hay for the animals to create heat in the winter months and to keep their ruminant and non-ruminant stomachs moving. This keeps stalled animals from being bored.

But lets just use the Cloughs non fertilized and **drought hay crop**(remember according to the applicant statement they only irrigated to control dust and erosion) would be at a half ton as they claim has been the historic yield (Clough response to staff pg. 5)

On Applicant horse Farm: The applicant feeds less than 10lbs of cured hay because she also turns out the horses in 12-hour rotations on the south fields, which are identical fields to the North East(I was asked to work for the applicant).

Given the above information, then the one-half ton of hay would feed a horse 100 days. Profit of $2,240.00 Just in 3 months to applicant. (1000lb/10lb=100days @680/month).

Given that profit can be made on a "generally unsuitable site" that is equal or greater in profit to the high value farm land on the "west side" it is incredibly clear that the position needs to be held that any land with a history of irrigation is EFU and is not eligible for a non farm dwelling. May we submit that this exact example of this

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

application be used for the counties future plans in the **Agriculture Lands Program**. As well as this case might be considered for review by COI.

B) Furthermore; According to Mr. Borine Soils are class 3 when irrigated and class 6 when not irrigated; Deschutes County should consider employing a revision for class 7 soils with depths of 10 to 17 inches that are surrounded by class 3 soils. Irrigation changes the entire soil structure as proven by the hay crop this year. This knowledge is an excellent teaching for all of us. The Agriculture Lands program could benefit greatly by employing this information. And lastly **"soil should not solely be used as the key defining point for a home site." (exhibit s)**

7)KEEPING LEAST SUITABLE AS CODE:

A) With this new information it was important to continue to make a "home dwelling **difficult** to obtain" (Application for nonfarm dwelling Exhibit Z) on the least suitable site so that all the truths may surface. Least suitable is not the same as generally unsuitable as shown by how quickly High Quality farmlands will produce product on any given year. This is supported by Mother Nature with the drier climates in Bend Oregon and how easily an applicant can create a negative situation by purposefully not supplying water. Not supplying water at the proposed non-farm dwelling is Incredibly easy to do and only offer water on the west side. This statement is supported by the fact the applicant has several ways to supply water to the other areas.

B) The applicant had an opportunity to study the SE location further but chose not to do so. **Even though it is non-resource area of the property**. otherwise the tricks of temporary farm structures(which look permanent) on a "lesser preferred location" or purposely not irrigating would be endless. Remember Mr. Borine(soil specialist) made a visit in March 2008 with Mr. Clough. This entire non-farm dwelling was premeditated. I believe the least suitable has merit.

C) Statements from the Applicants Lawyer "The entire east side contains class 7 soils." NOT TRUE! Class 3 soils are on the East side (Pg. 7/16 final arguments). There are class 3 soil samples in the homesite envelope. Mr. Borine maps do not coincide with each other. The recent map has included the asphalt driveway with the property line and has sites 5,4,3. Down by site 39 has full exposure of the asphalt driveway outside of the property demensions.

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

D) Cloughs watered the entire field through and watered bad soils through 2014; The home site was also watered all throughout 2015. The water is "off" not removed from the site. The water is "in stream." Very different from not having irrigation allocation! **(Exhibit MM)**

E) Page 26/117 where soil class 3 is found labeled for the East side; but Mrs. Fancher states that the entire east side is class 7; not true.

These statements support that the SE corner is the least suitable and the least suitable has merit amongst these facts allow for a generally unsuitable designation:

F) The least suitable site has generated more that $7200 a year using the pasture. Making all profit. Even according to Mrs. Clough Testimony she pastured horses on the proposed home site. The land was used for both grazing and exercising. Mrs. Clough denied running a horse operation since 2009 in her testimony. **(SEE Exhibit G5, DD and BB)**

The fact that the field is near the road and used as pasture is absurd as a reason. Horses everywhere in Central Oregon have horses pastured along roads including 4 surrounding neighbors with animals; including(not limited to) horses, cattle and llamas pastured quietly and safely along Erickson Rd. This proposed home site has a history of making a profit and for this reason it is crucial that finding a least suitable site is important. The pasture over the home site where these horses grazed is complete with vinyl fencing and electric fence capacity. Now lets remember the horses were near the road because the neighbor dogs. No discussion that the horses were ever moved to the SE location. Furthermore stating that the non-farm dwelling is being asked to be on top of Irrigated High Valued Farm Land. And even if a horse never grazed on a piece of grass, just trotted around would you give a home site because the animal didn't eat anything? Arenas, Paddocks, Feedlots don't grow anything but are a major contributor of the income that is generated because they are a resource area.

I was asked to feed her horses on the property that is now owned by Mr. Carroll and the fields with identical aerial, irrigation and forage content and she would graze them and supplement them with additional hay when they would be brought in on a rotation schedule. Mrs. Clough claimed in her written testimony that because she had to supplement the horses with hay is not the truth as to why she pulled them off. This was a chess move in the game of hiding the true use of the property. She already fed 5 up to 10 horses in this same pattern of pasture and baled hay for meals. Mrs. Clough would charge each horse over 350 to be boarded, not including fees to ride in the arena.

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

8) FROM APPLICANT "TERRIBLE FARMING" LAND DURING TESTIMONY

- Applicant Claim that no prudent farmer would farm the eastern half. (Page 6)
- Mr. Boring states that the entire East portion of the property is equally unsuitable(remember this is on class 3 irrigated soil and irrigated (Page2)
- Cloughs experience a prudent farmer would stop irrigating the entire East portion of the property. **(This advice and recommendation given on soils that are class 3 and Irrigated)**

9) NOT FARMABLE BECAUSE ITS ROCK and ALONG THE DESCHUTES RIVER

(Applicant used a specific location for a reason it was not farmable. This goes against county code that specific location cannot be a reason not to farm).

A) According to the Applicants lawyer the idea that a landowner cannot build because the least suitable area is along the Deschutes River meets the current code and board hearing just held in May 2015. The applicants implied that a hearing should be held with the commissioners because "what if" A rock out cropping existed along the Deschutes River zoned EFU. This type of surface has many farm uses:

- This EFU land can be used as a "sacrifice area" when grazing animals and making a profit. This allows the fertile lands to rest after heavy grazing thus being a resource use. It should be noted that the area along the Deschutes River is considerably colder making the East side of Bend superior farming land with an area already comprised with a short growing season.
- The storage abilities for tractors, hay farm equipment, animal shelters are endless and are used in conjunction with farm use as resource areas. "If" the Cloughs have all Class 3 soils for farming they would have to put resource buildings on good soil as well. Fortunately those properties on the Deschutes River have an area that they can put this type of farm use without feeling disappointed about using good farm soil for storage or renting a place to store equipment because the land is just too good.

By allowing this type of change in the decision it **goes directly against that the soil type is only one component to receiving a home site. (Exhibit S)** Just because a site has rocks on an easement goes against the code that location is not a viable reason for a CUP. Either is the location along the Deschutes. We are here today to decide least suitable as it relates generally unsuitable and now by the applicants

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

appeal for the Deschutes River we are also going to **change the Code about a "location"** Mrs. Fancher used a specific location to give an example for the appeal "Deschutes River."

Oregon Department of Land Conservation and Development Agricultural Soils Capability Assessment

Local Governments

Soils assessments provided by soils professionals can provide more detailed and valuable information on agricultural lar ratings. However, soils ratings are only one part of the definition of agricultural land. Local governments have the respc soils ratings together with other information, to determine whether land is "suitable" for farm use, "necessary" to permi farming, or intermingled as part of a "farm unit." Similarly, only local governments can ultimately determine whether sc considered for nonfarm dwellings or nonfarm land divisions are "generally unsuitable" for the production of farm crops, merchantable tree species. Soils assessments should not solely be used by local governments when making these types

Supporting that the least suitable is a viable option:

10) ONLY FARMED TO SET UP THE NE CORNER FOR A SITE. HAS NO INTEREST IN FARMING.

A) No Second or third cutting of hay was farmed in 2015 on the entire property. And No Hay was baled in the SE lower area in 2014 or 2015.

The southeast portion and the area even headed towards the west from behind the temporary structure **was not farmed at all in 2015 or in 2014.** Bearing the fact that the southeast location is possibly the least suitable site; which is not the purposed home site. Supporting that it is imperative that the county upholds its codes because the least suitable area was the southeast portion comprising of at least 25%of the land. Also supporting why the hearings officer denied the application. If the applicant is truly interested in farming why did he not take a second and third cutting of hay? Was it just to farm as a set up for the non-farm dwelling site?
All the attention has been placed on the home site. There has been no discussion that the remaining South and to the East have ever produced anything with class 3 soils.

11) FARMED IN CONJUNCTION W OTHER LAND:

A) DCC 18.16.050 A parcel shall not be considered unsuitable solely because of size or location if it can reasonably be put to farm use in conjunction with other land.

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

18.16.050(g)(2)(a). There are adjoining sites Code **18.16.050(g)(2)(a).** There is more than ONE non-Exclusive Farm Use properties receiving special assessment that adjoin the applicant property that have not been sought out. The applicant only sought out one property. Thus not making the home site the least suitable.

Additionally the applicants argument that EFU land along the Deschutes River should receive a home site was their key supporting appeal on the application. Thus stating that it wouldn't be fair not to give them a home site just because their soil is the least suitable in a location they can not build on. Being located on the Deschutes River with outcroppings speaks to the disqualification that location need not to be a reason for a non-farm dwelling site.

Additionally owners could make property line adjustments onto lands that are farmable just to receive a dwelling at a better location near their property. Or rather pulling in a piece of a neighboring land by a lot line adjustment that has generally unsuitable soil for their home site when they have a lesser home site available on their property for which they don't prefer its location or view. A change would go against this additional county code (DCC 18.16.050) as well that based on location does not render the site unsuitable. Thus opening up a can of worms and putting a huge financial burden on the county to sift through these legal cases.

These facts are only to support the generally unsuitable site and I'd like to encourage the county to give merit to the least suitable classification. The SE Corner is the least suitable based on water, crop history and soil.

12) THE PIPE THAT DRIES OUT THE SOIL:

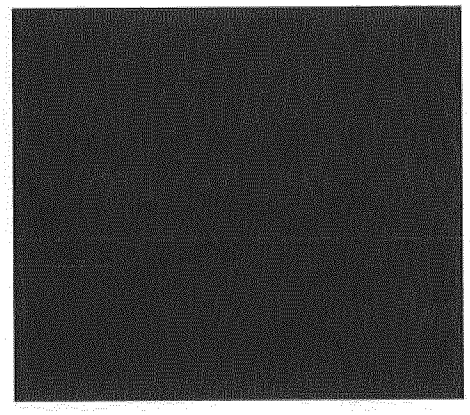
A) In agriculture there is a term called "heat units" and it is a way that a farmer manages plant growth and harvesting. Heat units pertains to soil. The amount of energy the soil can obtain from the environment. High heat units are of great value all throughout the year to prevent root freeze and to stimulate growth. It is for this very reason why having the trans Canada gas line run through your irrigated property is so beneficial because any heat in the soil stimulates and increases root growth and promotes plant health and productivity. This heat also creates fertile soil by decomposition and supporting a longer life cycle of Beneficial's within the soil. (Exhibit U, and Mark Gibbs OVS, McMinnville OR)

Using Heat Units to Schedule Vegetable Plantings, Predict Harvest Dates and Manage Crops | Small Farms Programs

Date 2011	Date 2010	Date 2009	DDs	Event

Using Heat Units to

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.



Schedule Vegetable Plantings, Predict...

Nick Andrews, Small Farms Program, Oregon State University & Len Coop, Integrated Plant Protection Center, Oregon State University

Publish Date: ...

View on webcache.googleuser... Preview by Yahoo

Please see Mr. Steve letter regarding farming add letter here

View on www.deschutes.org Preview by Yahoo

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

13) FAILED TO TEST SE CORNER

The applicants failed to show that the SE portion showed any suitable farming ever, or that it was being farmed this year or previous years. Because of this failure to show any suitable soil analysis according to the governing body soil samples along are not viable to show suitability. **Soil samples alone cannot make the determination of unsuitability or suitability.** With the Cloughs and Mr. Borine alike having both made comments that the entire eastern portion of the property be taken out of farming and haying a hearings officer made the most prudent choice in that the criterion was not met. ALSO, the area in the SE corner is not irrigated. (SEE Irrigation grid EXHIBIT ZZ)

The SE Corner shows no history of farming. Even according the Applicant the only Agriculture raised is hay on the 16 acres is Hay at 6 tons (Exhibit NN). According to Mr. Robinson and Mr. Barbin substantial amounts of hay have been grown on the 16 Acres. The SE corner has always been more suitable for a home.

"Staff finds that the applicant must show that it is the least suitable on the subject property. Pg. 7" of Staff Report.

14) COI/IRRIGATION

A) "PRIME FARM LANDS have an adequate and dependable water supply from precipitation or irrigation. (Exhibit t www.ars.usda)"

In April Cloughs waited one month to turn on the irrigation in 2015. Trying to starve the property of irrigation. This can be proved by them flooding butler market road and a lock was placed on their water flow opening as visibly seen by the opening at the road. The field still grew even though it was starved for water because the new property owner ran the Pivot. Water was turned on End of April.

B) The Cloughs claim that they sold the irrigation to COI...Not the truth. The rights are still allocated to the property and location for the property in question. The landowner watered the NE corner all year long in 2015 up until he shut down the irrigation 2 weeks early in September. Thought there was not more irrigation water rights. (See Photo Exhibit YY)

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

C) According to Mr. Clough a prudent farmer would stop farming the entire eastern location(10 or more acres), (Remember the entire parcel is considered high value farm land according to the staff report findings pg. 5 under 18.16.030) This means more that 11 additional acres would come out of farming but would also come out of irrigation. Sending it back into the canal. If granting a home site encourages 8 acres to come out of irrigation we not only lose the home site, but now more than half of the property is non producing. I pose the question.... where is COI to put all this water and how will COI handle the decrease in water volume which gives pressure to the flow?".

D) With the "what if scenario of a rock cropping doesn't allow for a home site" that the applicants used to gain this appeal is allowed and then the next property pulls off water on irrigated lands and the amount in the canal declines loosing water pressure and the entire irrigation system begins to crumble. The canals would need to be made smaller to increase the pressure that is flowing to meet customer needs down stream. Even though the hearings officer claims that each site has to be independently applied for; each applicant builds on the prior. Just as with this case and the Newell property being quoted in the HO decision several times. It sets a precedence!

E) Senior Planner Paul Blikstad said when he visited the applicants home site "there is an irrigation pivot that runs over this proposed home site, why am I even here?"

F) The pivot supplies daily moisture to the site in question; if the Cloughs would allow it to run. We have witnessed the pivot being turned off and parked down near the wheel lines for several years prior. Please refer to the feedback mechanism offered earlier.

G) Stephanie Hicks notes after the hearing that the Cloughs testified that they only irrigated to keep the dust down, not to grow crops

H) A farmer does not go to the expense of putting in an irrigation pivot over unfarmable lands. This is all in attempt to recoup losses of their personal dream of owning in the applicants words "a big ranch." and way over remodeling the home that was connected to this piece of property. Proof of this was after the purchase of 22105 Erickson Rd in 2012 the applicant would state and I quote as the applicant is sitting on his bike and pointed out that "there is a home site above the pond". How would they know there was a home site? **Roger Borine had visited the property prior in his letter that this was his second visit to the property for site digging specifically turned in with this application. He makes several claims outside his realm of a soil expert. How to farm hay being one of them.** If he previously visited

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

the site and is a soil expert and makes written claims on how to farm all throughout the testimony. It is clear that this soil expert did not give any suggestions on how to improve the soils examined; in fact he could have offered the exact opposite. **These type of discussion are protected between the applicant and soil scientist in his code of ethics. Similar to what a relationship with a lawyer would be.**

15) SE HOMESITE:

A) The grounds that we are even hearing this appeal on from the denied case have nothing to do with the ruling the applicants are now asking for. There is a home site outside of the gas pipeline easement on land that has never been farmed for EFU purposes, that is on the east side. **Mr. Borine the soil expert claims there was "not room" for a home site located in the SE corner of the property. He makes his claim not based on the soil, but rather as a homebuilder.** There is room for a home site and septic, reserve area and non-farm dwelling. The applicants failed to test the area and the hearings officer identified that an entire area that does not produce agriculture was left out of site testing.

In the applicants testimony it states that a 36A soil is rated class 3 soils when irrigated and soil class 6 when not irrigated. Very coincidental that Mr. Borine rating is a 7 for this soil on the home site with intermixed class 3 soils amongst the area and also contradicts the NRCS site that rated the soil class 3.
(Pg. 9/140 Response to staff)

If irrigated class 3 can turn into soil class 6 when not irrigated, does this mean that soil class 4 would turn into soil class 7 when not irrigated? I believe it would. The Question to ponder here is How water plays a huge role in a thriving soil!! Think about the soil class 3 all of the sudden in a drought...what happens in the soil to loose all the beneficials. Why would a non-conditional use permit ever be allowed on irrigated or previously irrigated land?

There are recorded class 3 soils in the proposed home site. Ooops Too much water made it to those locations!

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

16) PIVOT and WHEEL LINE

A) It should be noted that there are THREE separate main watering systems on this property and one wheel gun. TWO Of which overlap the property to the South. The water lines go back and forth.

1) Wheel line that runs from the west property line east to the pond

2) Pivot that runs from the NE overlaps slightly on the western half and ends at the SE portion of Mr. Carroll's property.

3) Wheel gun. Watered the SE land portion but to the west of the portable barn when the pivot was turned off during the growing season and summers. Trying to keep better soils there!

The importance here is that the applicant can decide how to irrigate and which half of his property to create an arid environment. The applicant would ride his mountain bike every day to change the wheel line constantly, rarely engaging pivot. We have witnessed the pivot line staying parked down at the west side of the pond summer after summer. He started it up watered it one time and kept it at the pond multiples summers. I recall thinking years ago "what is he doing." We live and work from home and were able to observe this. By with holding water from the NE corner this deceived Mr. Barbin and his haying efforts and the written opinion he could offer. Water is an abiotic source and is critical to farming and when withheld a farmer is successful manipulating the farming outcome he wants to see. Perhaps the applicant even misled Mr. Borine. Mrs. Clough said daily water changes had to be made. Not the truth. The pivot moves back and forth ever needing to be toughed.

20) Exhibit B. Deschutes County Agriculture Resource Project; pages 1-7. Soil class is referred to for 7 different areas; use and irrigation are also presented on each page.

a. The resource project found Class VII soils to be only found in land that had not been irrigated.

b. In the report irrigated Soil achieved soil classifications 6 and lower in the Deschutes County Resource Project

c. The property appealing the EFU has water rights, functioning pivot that covers the area of land requesting to be removed.

d. **THERE WE NO CLASS 7 SOILS FOUND EVER WHEN IRRIGATED!!**

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

[Typo: ~~it~~]

d. Water has been withheld for several years on the piece of land in query.

Please refer back to Tom Bennett's quote at the Natural Resource management for the potential of each soil. It is what the farmer wants out of the soil.

PIVOT AND WHEEL LINE CONT....

In this study in Exhibit B its very interesting that class 7 soils were never found on irrigated lands. AND YET THIS is the first example of Class 7 soils with irrigation?

Mr. Borine found soils that were deeper than class VII soil depth and yet were labeled as class VII in his report. The accuracy of the soils should come into play when comparing least suitable as it pertains to generally unsuitable. The findings in this case are so conflicting but it should be considered that if truly there are lands that cannot be farmed that the suitability should stand out far and away and that is exactly why it has been pinpointed in attempt to change county code to try to fit in this land. Opponents knew of this SE portion had not been farmed and with Mr. Wymans statement that it was a lesser suitable building site and with that not all evidence was given because of fear of retaliation from the applicant.

THERE WERE NEVER ANY CLASS 7 FOUND WHEN IRRIGATED!
Oregon Department of Land Conservation and Development"

The county may make its own determination as to the accuracy and acceptability of the soils assessment. I note that the web soil survey shows the tested area to be irrigated and cropped, an indication of its suitability for farm use.

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

ALL OF THESE ADDITIONAL FINDINGS ARE TO SUPPORT THAT A LEAST SUITABLE FARM SITE IS A WARRANTED DESIGNATION IN DESCHUTES COUNTY.....

ADDITIONAL FINDINGS

17) Exhibit A3. Letter from the Oregon Department of Land Conservation and Development dated 11/26/14. Katherine Daniels writes,

> **"The county may make its own determination as to the accuracy and acceptability of the soils assessment. I note that the web soil survey shows the tested area to be irrigated and cropped, an indication of its suitability for farm use.**

18) On February 12, 2015 a conversation with Mylen Bohle, Oregon State University Extension office, Associate Professor, Area Extension Agronomist. Quoted facts from Mr. Bohle:

> **"If land can be irrigated land can be farmed."**
> **"Irrigated desert soil can be harvested at a rate of 5 tons grass hay per acre"**
> **"Plantain weed can be controlled with herbicide and good farm use practices would need to be met."**

19) A conversation with Tom Bennett (District Conservationist) at the Natural Resource management quote:

> **"Takes a higher degree of management to work some soil types which then becomes a land owners decision on the potential they (the owner) would want out of the land."**

20) Exhibit C. Interpreting soil change and soil function.

> **"An additional loss of grass and increase in shrubs, which causes the feedback loop to continue"**

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

21) Exhibit D. Work to lower Ash content in forage. Haying fields removes dirt from the acreage and is baled into each flake of hay. Further stripping the soil of essential organic material/dirt. Article also points out that additional dirt is removed when hay is rained on from splatter, which has happened to this field. Thus the need to replenish the soil with water and additional nutrients.

Refer back to Mylen Boyle quote of 10,000 pounds (5tons) of hay per year on irrigated desert soil. University of Wisconsin observed 4% of baled forage samples were dirt. On an annual basis 400 pounds of dirt (organic material) is removed from the top of soil per acre. Over 7 to 10 years that is 2 or more inches of organic material.

22) Page 7 of **Roger Borine included** in the application Analysis points out that on the proposed land for removal there is;
a. **"No organic material; which reduces soil fertility and water capabilities."**

b. Rogers statement further supports the fact that the landowner withheld water, removed any organic material of origin and would not replace organic matter and Beneficial's in this location post harvesting the hay and grazing.

c. Land owner would only water and fertilize with highly visible large trucks from breweries in the other portions of the property currently identified as soil class 3 in the lower section.

d) Applicant claims that "biomass is not indicative that grass is growing over the home site."

Biomass defined as an organic material made from plants and animals.
Soil expert claims there is no organic material. So I ask which is it? Ahh its Grass? Or is it. Did Mr. Borine fail to report the organic material available in the soil to tip the soil to class 7? (Exhibit UU)
www.repreverenewables.com/about-**biomass**.html

Many people know that organic materials--also known as biomass--can be used to produce compost and mulch.
http://webcache.googleusercontent.com/search?q=cache:XXYWzMA4m20J:www.calrecycle.ca.gov/organics/conversion/+&cd=17&hl=en&ct=clnk&gl=us

(Exhibit TT)

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

[Typo: to]

Exhibit E. US Land Use and Soil Classification: THIS IS A LIMITATION CHART...NOT WHATS POSSIBLE.....

a. Only class VIII (8) soils preclude their ability for commercial farming. All other classes of soil have the ability to perform.

b. All 8 Soil class types listed by the NCRS have limitation.

c. Four out of the 7 suitable classes have SEVERE Limitations.

Class 3 "severe limitations"
Class 4 "very severe limitations"
Class 6 "severe limitations"
Class 7 "very severe limitations"

d. Soil Class 3 has severe limitations and yet is farmed and baled every year on this property.

e. **Page 3** "Prime Farmland has an adequate and **dependable water** source from either precipitation or irrigation.

f. Soil class VII is mainly restricted to grazing and the owners of the property were even unsuccessful at grazing according to their testimony.

g. Ironically a class 3 soils adjoins a class 7 soil at the same elevation on this property. Both of these soils have severe limitations. And yet the adjoining soil receives a class 3. Furthermore supporting the lack of water and the stripping of organic material/soil; purposefully not returning organic material.

23) Exhibit F. USDA/NRC: Five Questions non-operator landowners should ask farmers about soil health.

a. Page 1 "**Do you build organic material in the soil? Organic matter may be the most important indicator of farms productivity.** " Current land owners are aware of this practice. Cloughs only apply nutrients and water in all areas of the land except for the area receiving class 3 soils on the East and the area to the NE of the pond.

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

24) Exhibit G. USDA/NRC: Soil health management.

a. **" Soil works for you if you work the soil. Soil will not work for you if you abuse it."**

25) Comparables: Exhibit H, I, J, K, L, M, N; Year after year from Google Earth proving the farmability and revenue generating abilities of the property.

22070 Erickson Rd, Bend OR. 30 yards away to the North of the purposed site lives Joe and Linda Warlein. Since 1999 Warlein has maintain an emerald green pasture and graze 2 heifers with calf on the side in the spring and bring in a seasonal bull. Joe will bale his green field every year along with having cattle graze it. Their property is 10 Acres.

62690 Erickson Rd: This property is south of 22075 and 22079 Erickson. Bauchmans also have trans Canada gas pipe running through their property. They successfully cut and bale and sell their field every year. Make note of the emerald green surface above the trans Canada gas line. **Additionally Refer to Exhibit M for pipeline map.**

62075 Erickson Rd. The neighbor directly across (Lee Davis) has 20 Acres and receives 3 cuttings of hay each year. Make note of the emerald green fields. Even comparing them to the acreage at 22075 may prove a lack of capable farming.

62777 Erickson Rd Receive two cuttings of hay every year on their field

Exhibit N showing Borines map with pipeline.

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

26) APPLICANT TRUTH ABOUT ADJACENT PROPERTY:

Value received off the land Page 13/16 in owners findings:

Two Horses have been boarded and pastured on the land in discussion for several consecutive years into 2014. Land owner makes reference to the use of the land for grazing. Receiving an annual revenue minimum of $7600($300/month per horse). The horses would utilize the pasture as described in the land owners document claiming unsuitable.
The actual seen utilization of the piece of property is at $7600 per year minimum. This does not take into account the additional 15 or more acres used for hay production. The hay income is completely a separate income from the $7600.
They make no mention of livestock in their application.

The argument that a home is needed to care for the horses is not valid by the Cloughs own testiment. They moved out of the neighboring home in 2014 and left their horses for more than 7 months without living there. They continued to have paid horses boarded and trained as well as their own. The new home owner rarely there because traveling on business

27) Don Barbin hayed this upper field in question and received more than 1 ton of hay. Hay was sold to people feeding horses. All the testimony provided by applicants mentions ½ ton of hay creates and environment where is cannot be farmed. Both Clough and Borine noted that because of water this property experienced plant growth. This supports the neighborhood testimony that the Cloughs did not water this upper area. The pivot would stay parked year after year.

28)Clearly once Don hayed this field and had results he realized that Cloughs had been manipulating the field to not produce; such prompting Don to remove his testimony. Don had several conversations with the Cloughs that if they watered and fertilized the field would produce. Cloughs refused to take his advice.

29)Cloughs now claim that they fertilized in the July testimony as the Hearings officer points out that it has been noticed that they had not fertilized. Certainly the fertilizer company would be out of business if they experienced results such as these throughout the class 3 and 7 soils. I'm sure now they would claim that the class 3 soils they didn't fertilize because the soil was good enough. Certainly there

would be an improvement on the class 3 soils. So if they claim they fertilized the class 7 with no results it is amazing how the lawn over the pipeline stays green on sites 4 and 3 of their property as well as neighbors and has to be mowed 1 to 2 times per week.

The property is and has been irrigated by a pivot. A home site cannot be located in the purposed area as the pivot rolls over the land. Certainly this would be very expensive to change the irrigation; something the Cloughs bring up over and over how costly this area is for them to farm. The truth is they spent zero money and time farming this land. Changing the property to keep the current land to the south of the proposed home site would prove to be extremely costly. The pivot is shared by the neighbor and cannot be sold.

30) Clough chose not to utilize their property.

31) Cloughs claim that they would conduct farm activities when the neighbors are not home because they are at work. This is simply not the truth as the neighbors who testified are comprised of retired individuals and folks that work from the home office.

32) The current class 3 soils are also infested with Plantain. This can be managed with an herbicide. The Cloughs choose not to do so on all of their property.

33) Roger Borine has a biased approach as he is looking to load his pipeline for future income. All of Cloughs supportive testimony is from individual who they have paid.

34) The letters that the Clough said Mr. Barbin signed in 2015 were addressed to "whom it may concern." Letters included 3 pages and each page ended way above the margin leaving room for the letters to be altered after signature.

35) Janet Hogan Letter. Janet did not work continuously partime for the Cloughs until after they moved and the growing season was at the tail end. She worked for them for a few days in the Fall one time several years ago. The Cloughs were on vacation so how could she have witnessed any farm work. Janet had never a reason to drive by the Cloughs property to witness any farming practices. And anytime that Janet worked for them was when they were out of town. How could she ever had witnessed them farming? Janet does not mention the site in question at all and the farming practices there.

36) All the amenities for Janet are in the opposite direction. In her letter she does not speak to the areas watered. This is because all that anyone ever saw irrigated was with the wheel line; no where near the home site or area in question; which needs to be noted is irrigated by a continuous pivot.

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

37) Exhibit O The proposed non-productive part can be used by a productive part of the property.

38) Cloughs claim that daily movement of the water is required. Well yes that is true because when they lived on site they only ran the wheel line. This is not the truth. There is an automatic pivot that runs back and forth each day and a farmer does not need to visit the property daily. Does your water system really take Daily movement ? Oh yes it would take daily movement because you only ever used the wheel line to water the west side of the property.

39) Most of America drives to work or to meet customers. Would you ask the county to grant a building site for a home because you wouldn't want to drive to work and it is an inconvenience. This reasoning is so unrealistic and many farmers drive to their "jobsites" to work as they have multiple farming properties around central Oregon. Just as construction workers drive to multiple job sites each day. Again the Cloughs left their horses unattended overnight and day. Their rationale that farming and raising livestock offsite is disproved by their own absence in 2014 and 2015. There is no need for a permanent residence.

40) There are no wild dogs running around off leash on other peoples property. This is not a designated dog park and folks do not have dogs doing this. Two low strands of electric fence keep the dogs out. There is already existing vinyl and electrical fence that can accommodate this. Cloughs purchased the property as a whole 40acres and operated it as such. They knew they were buying EFU only property. The Property could be sold to several of the properties and farmed it with the stated code.

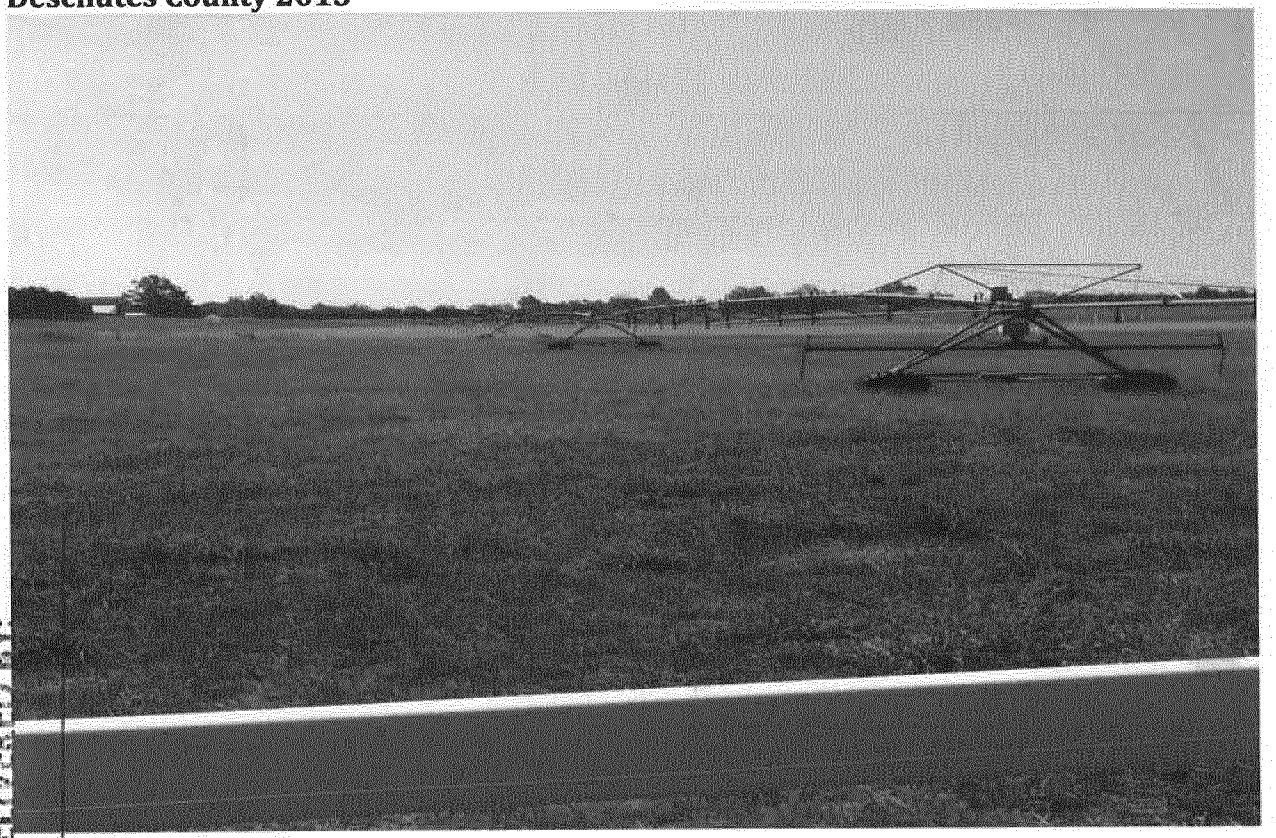
INTERFERENCE WITH OTHER FARM USES NOT ALLOWED UNDER CODE

41) The adjoining property is in farm use. The applicant only makes note of conversations with the property to the south. Cattle and horses are raised on this site. Lessons are given to children and adults. The proposed home site is located in close proximity to a riding arena, used also for cattle training and diet pen. Even with irrigation; the dust and nose and manure would pose a problem for the home. Also the home being in close proximity to the arena noise created from the home, smoke from chimney and daily activities of doors closing and commotion of small children would create a hazard for the exercise and training and diet pen. This would create lots of accidents. The proposed home site would alter the farming done on this property; especially for children learning to work with animals. Would have to discontinue current farm use.

These facts are to encourage the county to give merit and include in the code that the least suitable classification in relation to the generally unsuitable site has merit and a beneficial purpose for EFU land. The SE Corner is the least suitable based on water, crop history and soil.

CLASS VIII SOILS BADLANDS Page 15 Land Capability Classification. CLASS VIII are for recreation, wildlife and watershed.

CLASS VII SOILS According to Mr. Borine. Considered generally unsuitable farm land in Deschutes County 2015



maintain; and [illegible]
difficult.

5. Loss of surface soil by water erosion, soil blowing or land leveling may expose highly calcareous lower strata that are difficult to make into suitable surface soil.
6. Water-control structures are damaged by sediments due to erosion. Maintenance of open drains and ponds becomes a problem and their capacity is reduced as sediment accumulates.
7. Gullies form as a result of soil loss. This kind of soil damage causes reduced yields, increased sediment damage, and physical difficulties in farming between the gullies.

The steepness of slope, length of slope, and shape of slope (convex or concave) all influence directly the soil and water losses from a field. Steepness of slope is recorded on soil maps. Length and shape of slopes are not recorded on soil maps; however, they are often characteristic of certain kinds of soil, and their effects on use and management can be evaluated as a part of the mapping unit.

Where available, research data on tons of soil loss per acre per year under given levels of management are used on sloping soils to differentiate between capability classes.

This is from the

↓

Capability Classification Handbook 210

per Mr. Borine in his sept. 10 letter.

Page 12

Soil Depth

Effective depth includes the total depth of the soil profile favorable for root development. In some soils this includes the G horizon; in a few only the A horizon is included. Where the effect of depth is the limiting factor, the following ranges are commonly used: Class I, 36 inches or more; class II, 20-36 inches; class III, 10-20 inches; and class IV, less than 10 inches. These ranges in soil depth between classes vary from one section of the country to another depending on the climate. In arid and semiarid areas, irrigated soils in class I are 60 or more inches in depth. Where other unfavorable factors occur in combination with depth, the capability decreases.

CLASS . Soil Depth :

Class I 36+ :

II 20-36

→ III 10-20

IV 10 or less

Previous Erosion

On some kinds of soil previous erosion reduces crop yields and the choice of crops materially; on others the effect is not great. The effect of past erosion limits the use of soils (1) where subsoil characteristics are unfavorable, or (2) where soil material favorable for plant growth is shallow to bedrock or material similar to bedrock. In some soils, therefore, the degree of erosion influences the capability grouping.

Available Moisture-Holding Capacity

Water-holding capacity is an important quality of soil. Soils that have limited moisture-holding capacity are likely to be droughty and have limitations in kinds and amounts of crops that can be grown; they also present fertility and other management problems. The ranges in water-holding capacity for the soils in the capability classes vary to a limited degree with the amount and distribution of effective precipitation during the growing season. Within a capability class, the range in available moisture-holding capacity varies from one climatic region to another.

Glossary

This is the only discussion of soil depth in the entire handbook Mr. Borine sites as a resource for findings.

(18)

See next page for siting docs

Exhibit (L)

Sage West, LLC
Soils, Wetlands, Wildlife Habitat

Roger Borine, *CPSS, CPSC, PWS*
(541) 610-2457

May 16, 2015

Stephanie Hicks, Hearings Officer
Deschutes County CDD
Planning Division
117 NW Lafayette Avenue
Bend, OR 97701

Re: Clough Nonfarm Dwelling Application, File 247-15-000035-CU

The purpose for my October 17, 2014 soils investigation for the Clough property was to inventory and locate a site for a nonfarm dwelling that is situated on this parcel that is generally unsuitable for the production of farm crops and livestock or merchantable tree species per ORS 215.284(2)(b) and Deschutes County Code (DCC) 18.16.050(G)-Standards for Dwellings in the EFU Zones-Nonfarm dwelling. The development area and the entire area identified as Class 7 soils are both generally unsuitable for the production of farm crops and livestock or merchantable tree species.

My professional opinion that the site is generally unsuitable for the production of crops and livestock or for growing of merchantable tree species is based on factors addressed in the NRCS Land Capability Classification system (LCC). This information is derived from Agriculture Handbook No. 210, Land-Capability Classification, SCS, 1961. This is the reference document that provides detailed information for the LCC system. LCC is specifically referenced in Goal 3, Agricultural Lands for statewide planning. A "Guide for Placing Soils in Capability Classes in Oregon" dated June 1977 was developed and adopted by USDA-Soil Conservation Service and approved nationally was used for placing soils in a LCC.
The following statements from Ag Handbook 210 explain how the LCC system relates to the suitability of land to produce crops and livestock:

- *"The capability classification is an interpretive classification based on the effects of combinations of climate and permanent soil characteristics on risks of soil damage, limitation in use, productive capacity, and soil management requirements. Slope, soil texture, soil depth, effects of past erosion, permeability, water-holding capacity, type of clay minerals, and many other similar features are considered permanent soil qualities and characteristics."*
- *"Land Limited in Use-Generally Not Suited to Cultivation:*
  Class VI – Soils in class VI have severe limitations that make them generally unsuitable to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.
  Class VII- Soils in class VII have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.
  Class VIII- Soils and landforms in class VIII have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife or water supply or to esthetic purposes."
- *"The range site is a range of soils with a potential for producing the same kinds and amounts of native forage. The range site for rangeland is comparable to the capability unit for cultivated land."*
- *"With a good basic table of yields and practices the soil can be placed in any number of suitability groups. Commonly, five groups – unsuited, fairly suited, moderately suited, well suited and very well suited – are sufficient."*
- *"Criteria for Placing Soils in Capability Classes: Arid and Semiarid, Stony, Wet, Saline-Sodic, and Overflow Soils; Climatic Limitations, Wetness limitations, Toxic Salts, Slope and Hazard of Erosion, Soil Depth, Previous Erosion, Available Moisture Holding Capacity."*

64770 Melinda Court
Bend, OR 97701

rborine@bendbroadband.com

[redacted]

Applicant provided fal data to have a hearing with the com' 'ssioners. This is evidence by her appeal and the evidence brought up at the hearing that there is not another home site in the SE corner. (Appeal Application, statement of Issues, C)

Least Suitable and Generally Unsuitable
All of the evidence is relied upon by the neighbors to bring forward. I ask that we remain to have a rating scale with three classes for farmland. I Believe it has merit.

1) Suitable 2) generally unsuitable 3) least suitable

Generally Unsuitable narrows done the findings to locate the least suitable. Because farming is not an exact science and either is a soil analysis it takes all the current code checkpoints to bring about the truth. Exact science would be:

1) Current, history of Irrigation and irrigable

I've personally spoken with 3 planners. All of who are very informative, kind individuals. The county has limited knowledge on farming and how a farmer can create a low hay yield purposely. This is important as the county relies heavily on neighbors to bring truthful evidence forward and basic knowledge of agriculture. County relies on neighbors to make contact with previous property owners for who they do not know for historical farming statistics. Least suitable assists in bringing about all the facts.

Deschutes county and all of Oregon are very proud of their farmland and the future goal is to preserve as much as possible that are and could contribute to society. EFU land needs to be kept for farmers and ranchers; a farmer would prudently place a home where it would have the least impact on farming for profit and still have a beautiful home. Whether it's a small farm that supports farmers markets, grows 144 tons of alfalfa on 18 acres in a year or a large Driscoll farm that sells to Costco, all sizes matter.

Least Suitable

- Has a history of no irrigation rights
- Is not irrigable
- Has room for a home and drain field (Exhibit A)
- Home site meets state minimum for dwelling.
- Has no history of being cropped
- Could have beautiful rock that the owner would love to build on along the Deschutes River.
- Would allow for maximum farming
- Would not interfere with neighboring pivot system for which a pond and pivot are shared.
- Would not result in substantial additional irrigated acres being removed to satisfy home site.

Currently Generally Unsuitable

- Established and long history of irrigation
- Has history of being farmed successfully
- Has been used for profit by all owners
- Has had horses over graze on it contributing soil loss
- Received baled grass hay and 8ton/acre alfalfa hay crop year after year.
- Has EFU tax document claiming "running livestock" on all 18 acres from 2005 with current owners

Newell Application 2015. The least suitable has been used for years and has worked successfully for Deschutes County. Recent cases such as the Newell property is an example of where the least suitable criteria was satisfied. Mrs. Fancher was the presiding attorney. Mrs. Fancher was already aware of this criteria when she took the clough application.

Airstrip is not on the least suitable so it is denied because of high valued farmland: Least suitable criteria supports farm land.
County Hearings Officer Karen Green denied the application on Sept. 14, 2004. noting that it could not be shown that the airstrip would be located on the portion of the land deemed least suitable for farm crops or livestock use – a requirement under county, not state, land use rules. Dense filed the appeal 10 days later. Still denied.
http://www.bendbulletin.com/news/1502238-151/private-airstrip-application-sparks-debate-on-land-use (Exhibit B)

To compare least suitable we have to discuss generally unsuitable:

Soil Depth can easily be fluffed to greater depths. Just like whipped cream. The NE corner has had equipment and pivot wheels running over it for years. Compaction-Compaction. Soil Depth is Subjective. (Exhibit L & E)

Soil Scientist:

Oregon.gov says
"Soils assessments should not be exclusively relied upon by local governments when making these types of findings." www.oregon.gov (Exhibit C)

Code of Ethics for Mr. Borine code of ethics (included in applicants response) shall protect to the fullest extent possible the interest of his or her employer or client. (Exhibit D)

Mr. Borine falsely reported that there was not a home site in the SE corner of the applicant property. This has proven not to be the truth.

Written in Mr. Borine recent letter dated Sept 10, 2015 he makes reference to using **Capability Classification Handbook 210.** This source is sited below. (Exhibit E)

7/8/15(Exhibit Q) Mr. Borine makes note that ample plant growth occurred in the NE corner because of "spring rains this year" in 2015; and then followed by a drought. And yet he failed to reclassify these soils to a V or VI. According to the Land Capability Classification page 18; "**suitable soils for range but not for common cultivated crops may be placed in**

capability classes V and VI if they are capable of returning inputs from such management practices as seeding, fertilizer, or irrigating and in class VII if they are not. Mr. Borine revisited the site on September 10 to provide additional data and yet with the vegetation on the ground (shown in pictures from August) and the applicant had knowledge that more than one ton of hay was grown in the in the NE corner 2015 and 1/2ton on .58 acre home site in 2014; Mr. Borine did not update his classification. Mr. Borine also had previous knowledge that the applicant grew hay in previous years (included in the applicant testimony); a cultivation practice worthy of a Class V or VI classification. Exhibit Q

Page 17(capability class Exhibit E) – Class VII: satisfactory growth of useful vegetation impossible, except possibly for some of the most salt tolerant forms, such as some Atriplexes that have limited use for grazing.

Mr. Borine testimony at the hearing he states "the evaporation rate occurs at ¼ per day". A pivot replaces moisture every 18-24 hours. Take the 17" soil or 10" soil: at a ¼ evaporation per day; in 4 days the soil looses One inch of moisture. On a soil depth of 10'inches with a holding capacity of the conservative 1 inch (rather than 1.5 or 2 inches) there is adequate water for plants. Pivot cycles within every 18-24 hours. This is why irrigation is a highly regarded abiotic resource. The soil in the NE corner always has water available for plants!

(Page 7 Exhibit E)"Presence of stones; soluble salts or exchangeable sodium, or both or hazard of overflow are not considered permanent limitations"

Class VI soil (page 11): have continuing limitations (plural, multiple) that cannot be corrected such as (1) steep slope (2) severe erosion hazard, (3) effects of past erosion (4) stoniness (5) shallow rooting zone (6) excessive wetness (7) low moisture capability (8) salinity or sodium (9) severe climate. Because of one or more of these limitations these soils are not generally suited to cultivate crops. But they can be used for pasture, range, woodland, or wildlife or a combination of these. Does Class VI resemble the soils Mr. Borine is talking about in the NE corner?

Class VII Not suitable for cultivated crops. Mr. Borine was aware that crops were cultivated. Testimony that the applicant sold hay is evidence by a signed letter from his buyer. The hay quality can be improved with a simple management practice of "**harvest timing**" which reduces lignification when cutting prior to the crop going to seed. Lignification makes the hay less palatable, increases toughness and by passing the optimal harvest date and letting the hay dry in the field (moisture content close to zero) all the tasty nutrients have disappeared. Also by drying the hay (as the applicants did) the weight of the bales decreases. Optimal tonnage and quality has to do with farm management skills.

Most of the emphasis has been placed on the soil in this hearing. And Mrs. Fancher said in the hearing that her own farmers testimony is not credible.

WHAT INFLUENCES SUITABILTY: The Least and Generally Unsuitable.
A Balance between all components is essential.

- Farming for profit history
- Irrigation
- Soil Facts
- Prior Collective farming practices
- EFU tax document allowing farm deferral. Farm deferral program does not require profits year by year to remain in program.
- County Planer collaborating with OSU Agriculture professionals and Irrigation districts to become educated. Planners know how to question soil assessments but have no general knowledge of other factors affecting farming.

FARMING HISTORY: Which has kept the ALL the current land in EFU and farm deferral. Letters from neighbors stating the lands condition. 2005 EFU tax document claims "Raising/Running livestock" SE corner has no farming history, least suitable.

IRRIGATION: I am aware that all irrigation districts have recently urged the county to protect not only irrigated land but the "irrigable" lands as well.

Irrigation is the key limiting factor. Abiotic Source. Your property must be within the service area of irrigation districts. Soils can be amended and have compost delivered for improvements on a half-acre or acre.

"Without Irrigation crops could never be grown:" Irrigable land is highly valued among the farming community.

- Estimates vary, but about 70 percent of all the world's freshwater withdrawals go towards irrigation uses. Large-scale farming could not provide food for the world's large populations without the irrigation of crop fields by water gotten from rivers, lakes, reservoirs, and wells. Without irrigation, crops could never be grown. Reference USGS Water Science School. (Exhibit G)

- By 2050, the global water demand of agriculture is estimated to increase by a further 19% due to irrigational needs. Reference Global Agriculture (Exhibit H)

Deschutes Cour[illegible]y can be apart of the Worl[illegible] farming community with its Irrigated farmland: Preparedness for standard supply; and supportive for when fires and drought reduces the supply.

Article: As wildfires rage in West, ranchers lose cattle, rangeland Sept 14, 2015

2015 Fire with the wildfire in Eastern Oregon... "Soda Fire" burning hay storages with Millions of dollars. Rangelands will be closed for up to two years. 1.6 million acres burned. Large swaths dedicated to cattle grazing.
600 tons of donated hay has been hauled in to replenish losses. (Exhibit I)

Article: Fire destroys large haystacks north of Prineville Oct 12, 2015

Nearly 2,500 tons of hay were destroyed in a costly fire early Monday north of Prineville that likely was sparked by spontaneous combustion, officials said.
At roughly $230 a ton, the losses total nearly $575,000. (Exhibit J)

- Every Irrigated acre counts. Every bale of hay matters. Demand for hay to feed cattle provides essential food for society.
- Mylen Boyle OSU Agronomist recent newsletter "drought may continue into 2016." Encouraging farmers to plant and irrigate accordingly.
- Reduced crops for second and third cuttings 2016
- Irrigated lands are so incredibly valuable.

How can Deschutes County stay involved in producing essential crops....Preserve EFU land & Maximize IRRIGATION-IRRIGATION!!

EVERY Piece of Irrigated farmland matters:
With 21 young adults raising steers in Deschutes County for auction August. These kids median price per cow is $4500. Steer would eat approximately 2.5 tons during the year totaling 50 tons of hay. 50 tons is well within expected yields for 16 irrigated acres. These cows generated $ 114115.22 for the economy. These hay yields would not be possible without irrigation. Would not be possible without irrigated hay fields. Cattle rely on baled hay for growth. Irrigation Matters.

Country Natural Beef Statistic: Country Natural Beef supplies beef to the world. Grass fed, grain finished with zero antibiotics and zero hormones.
33 **Country Natural Beef Cows** feed 220 people per year at a consumption rate of 60 pounds per person. This high end beef is found at Newport Market in Bend Oregon and Whole Food Stores. Every Irrigated Acre matters. Every bale of hay makes a difference. Every cow. Again a small Newport Market and small farms matter. Compared to the Whole Foods giant. Both contributing to diversity in society. A Country Natural New York steak sells for $25.99 per pound and Whole Foods Market.

SOIL FACTS: Please see land capability classification document sited by soil scientist (Exhibit E)

1. SOIL CLASS IS VERY SUBJECTIVE. Because there are many soils, there are many individual interpretations (Page 4)
2. A Ratio of output to input is criteria used to determine class. (Page10)
3. Presence of stones not considered permanent limitations (Page 7)
4. Capability classes are subject to change as new information of soils and behavior become available. (Page 8A)
5. Class IV soils subject to decrease in growth in drought/lack of irrigation (Page 10)
6. Class V is a marsh(Page 11)
7. Class VI is used for common crops with limitations (Page 11)
8. Class VII has irrigation pivot and 5plus tons/ acre crop history, currently considered not farmable in Deschutes County. One or more limitations can not be improved (Page 11)
9. Class VIII beach or rock outcroppings.(Page 12)
10. **Soils suitable for range but are not common cultivated crops may be placed in capability classes V and VI if they are capable of returning inputs from such management practices as seeding fertilizing, or IRRIGATING and in classVII if they are not. (pg14)**
11. Soil depth Page 18.
    Class I; 36 inches or more Class II; 20-36 inches
    Class III; 10-20 inches Class IV; less than 10 inches
12. Deep Soil: Whether its true soil or not is 40 inches or more. (Exhibit E Page 19)

BULLET 10) With the above bullet point 10 from page 14 Why then did the soils produce an above 1 ton hay crop irrigation improvement? Why is there green forage growing as seen in the pictures included in the document? Remember the applicant flooded Butler Market road by not turning on his irrigation to balance out the spring rains. Even Mr. Borine states that the increase in spring rain helped the hay field in 2015(a drought year). True Class VII soils are not to improve with irrigation; the Soils in the NE corner improved!

The Soils in the NE corner are superior to the SE corner because the NE corner saw an improvement with irrigation in 2015. NE corner is irrigated. **This improvement shown in the NE corner transitions the soil class to a 5 or 6.** SE corner could not be farmed currently because of trees and vinyl fence that dissects it in half. (Exhibit E Page 14)

"A nation that destroys its soils destroys itself." – Franklin D. Roosevelt

Soil needs moisture for remodeling and creating organic material with the creates the cation exchange for fertilizer to be successful. In Central Oregon it is incredibly easy to withhold water because mother nature does not deliver sufficient precipitation. Because of this lack of water suitable soil can be turned into an unsuitable soil. Farmers in the

Willamette Valley are nstantly having soil remodeling taki place with all the moisture they receive.

Moisture brings about organic **material which creates an improved cation exchange for fertilizer and organic material increases water-holding capabilities.** Water has been withheld purposefully from the generally unsuitable site until this year when a new owner irrigated. (Exhibit K)

IRRIGATION AND SOIL AND READILY AVAILABLE PLANT NUTRIENTS

- Organic matter is the remains of plants and animals
- Moisture allows the organic material to be turned into hummus which the process allows nutrients to be used by plants
- Organic material increases the water holding capacity of soil
- Organic material has high cation exchange capacity and improves nutrient retention

ORGANIC MATTER AND WATER CAN TREMENDOUSLY IMPROVE THIS SOIL!

SOIL CAN EASILY BE FLUFFED WITH TILLING TO A DEPTH THAT IS GREATER THAN 17 INCHES. THE DEPTH IS VERY SUBJECTIVE IN SOIL CLASS. (Exhibit L)

Soil depth is negatively influenced by:

- overgrazing
- negative bio-feed back system,
- cutting and baling hay short (increase bale weight but also picks up organic material which leaves zero for the soil to create a healthy diverse environment)
- soil samples within the wheel line tracks reduces depth by compaction.
- Haying is extremely tough on the soil. The scrapping of the cutter and the baler along the soil and trucks and trailers driving onto the soil to pick up hay bales compacts the soil.
- The area where the horses grazed is class 7 and on the other side of the fence line is where the class 3 deeper soils begin. All 3 of these items;

  1)overgrazing
  2)cutting and baling hay short/trucks and trailers
  3)removal of water creates a negative biofeedback.

  Organic material can easily be stripped over a decade of improper management. This property has had a combination of all 3. Ever seen what horses can do to pasture land? Their heavy bodies combined with the wheel line track can compact and erode the soil easily.

Exhibit M. Deschute County Agriculture Resource Project pages 1-7. Soil class is referred to for 7 different areas, use and irrigation are also presented on each page.

a. The resource project found Class VII soils to be only found in land that had not been irrigated.

b. In the report irrigated Soil achieved soil classifications 6 and lower in the Deschutes County Resource Project

c. The property appealing the EFU has water rights, functioning pivot that covers the area of land requesting to be removed.

d. **THERE WE NO CLASS 7 SOILS FOUND EVER WHEN IRRIGATED!!**

US Land Use and Soil Classification:

THIS IS A LIMITATION CHART CONFIRMED BY THE NCRS...NOT WHATS POSSIBLE .....Soil analysis plays a portion of the farming success. Additional factors influence productivity

a. Only class VIII (8) soils preclude their ability for commercial farming. All other classes of soil have the ability to perform.

b. All 8 Soil class types listed by the NCRS have limitation.

c. Four out of the 7 suitable classes have SEVERE Limitations.

Class 3 "severe limitations"
Class 4 "very severe limitations"
Class 6 "severe limitations"
Class 7 "very severe limitations"

d. Soil Class 3 has severe limitations and yet is farmed and baled every year on this property.

The SE corner on the Applicants property is the least suitable:

Would not interfere with irrigation systems. Owner has 2 major irrigation systems and by putting the home in the SE Corner the EFU property could continue to be watered by the pivot and farmed. The pond and Pivot on the property are shared with the neighboring farm. The applicant has stated that a prudent farmer would not farm the east side. (The farmer would farm and water it if it kept the land in farm deferral)

The majority of the land would remain in farm use. The soils are superior in the NE corner as they have been irrigated and have shown an improvement in crop output (Exhibit E page 14)

Putting a home on the current generally unsuitable site would remove about 8 acres of irrigation according to the applicant statements that the prudent farmer would stop farming. (Fancher Final Arguments)

Crops could resume being raised for profit on the entire West and East side soils composed predominately of class 3 soils.

No history of crop production in the SE corner

The Soils in the NE corner are superior to the SE corner because the NE corner saw an improvement with irrigation in 2015. NE corner is irrigated. **This improvement shown in the NE corner transitions the soil class to a 5 or 6.** SE corner could not be farmed currently because of trees and vinyl fence that dissects it in half. (Exhibit E Page 14 land Capability Classification)

Least Suitable:
No history of irrigation
No crop history
Class VII soils
Room for a home site
Currently Generally Unsuitable
Improved class VII soils to either a V or VI
Crop History from previous owner
Crop production from recent farmer
Neighborhood letters supporting farm use for profit

MISC.
Expected Alfalfa hay yield is 8tons/Acre under good management practices. See Article Principles of Alfalfa Production in Central Oregon Exhibit N

Class III Soils are Included in the home site Envelope. Exhibit O

Attempted to draw out the irrigation systems. Also LCC is labeled for East side. Exhibit P

At the hearing I used Mr. Borine map to describe a home site. I noticed his scale was off and that soil sites were on the asphalt driveway area. I made a drawing of a home site to scale. Exhibit A

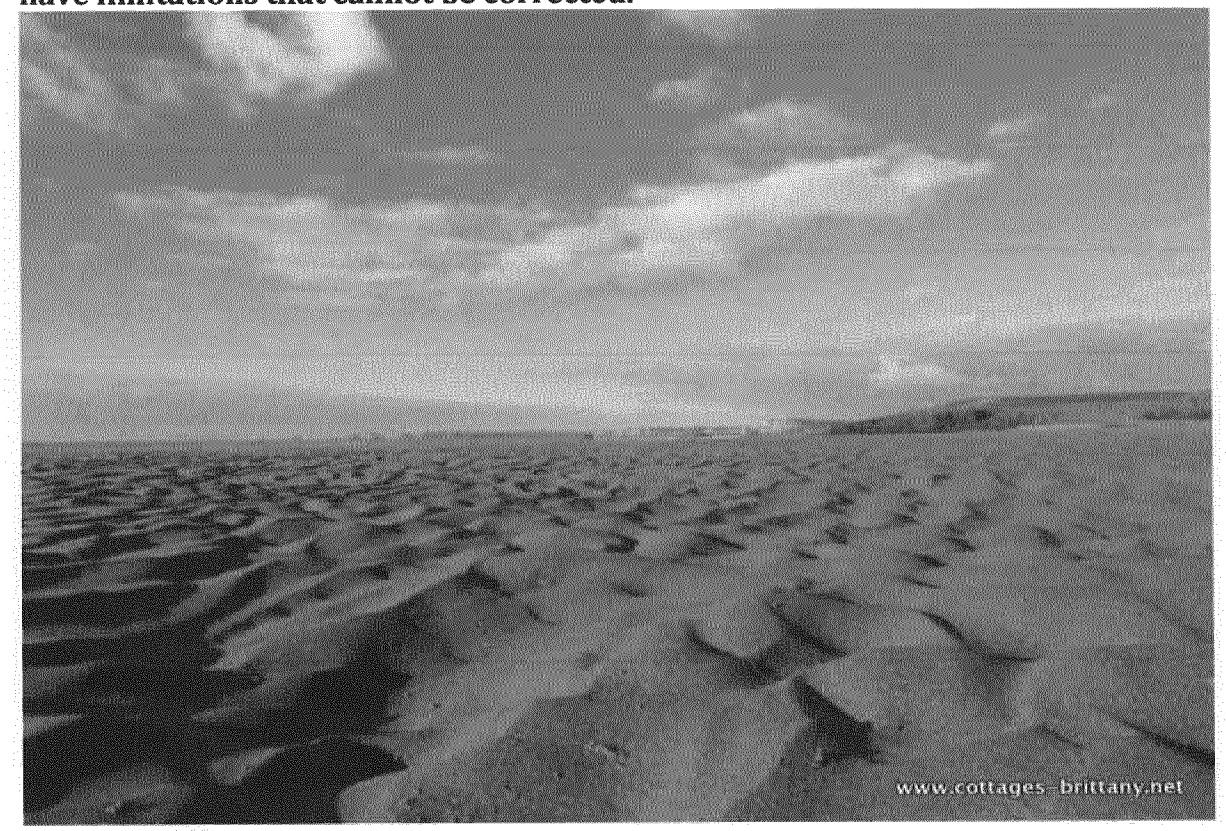
Class VII SOIL. Currently considered generally unsuitable in Deschutes County. Has irrigation and a prior history of farming for profit. Irrigating pivot is over the proposed home site shown here in 2015. Considered class VII. Class VIII are rock out cliffs, sandy beaches, badlands and mine tailings.

Class VII: Irrigating Pivot is over the proposed home site. This is considered generally unsuitable farmland in Deschutes County 2015. Class VII soils.

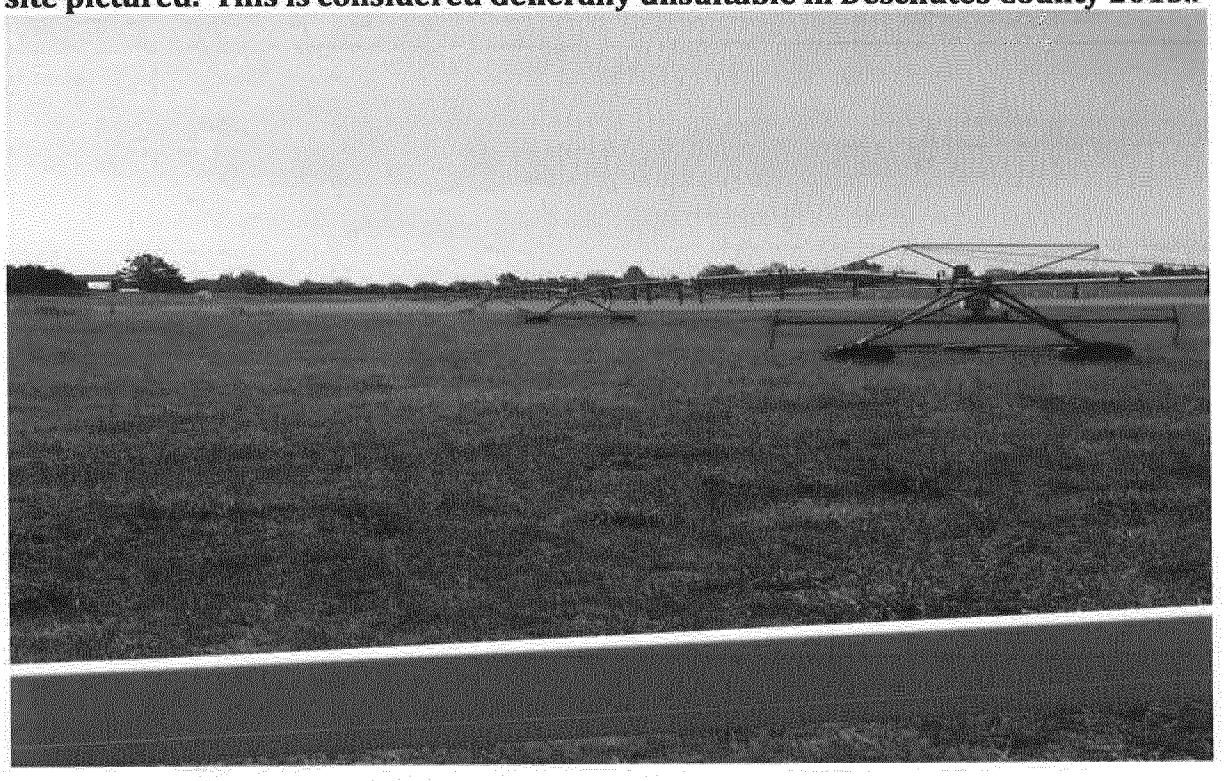
CLASS VIII SOILS BAD LANDS Page 15 Land Capability Classification. CLASS VIII are for recreation, wildlife and watershed.

CLASS VII SOILS In Deschutes County from Mr. Borine. Generally unsuitable Soil.

CLASS VIII SANDY BEACHES Page 15 Land Capability Classification. CLASS VIII soils have limitations that cannot be corrected.



LEAST SUITABLE IS BENEFICIAL CRITERIA IN THE COUNTY RATING SYSTEM. Home site pictured. This is considered Generally unsuitable in Deschutes County 2015..



How is this possible that an irrigated hay field presides just before a Sandy Beach Classification. This entire area is considered LCC VII

Rated Class VII Soils and is considered generally unsuitable

DESCHUTES COUNTY GENERALLY UNSUITABLE DESIGNATION 2015. Have we lost sight of what class VII soils are? See Land Classification Capability Article page 11.

Considered generally unsuitable in Deschutes County 2015. Includes what the applicant and soil scientist claims is "unfarmable" east side soils and Mr. Borine has this area labeled as 7 (Exhibit P). Notice the pivot is stopped mid rotation and the wheel line runs week after week.

East side categorized by Applicant as unfarmable by applicants. Pivot on right. This is their own photo from the RMLS system from 2008 . Current owner claims a prudent farmer would stop farming the entire east side.

SUITABLE FARMING LAND/ Erickson Road

Neighbor directly west across street yields 80 to 90 ton on 16 acres of grass hay for profit. 5 to 5.5 tons/Acre. This is Generally Suitable farmland. (photo date 10/15). According to the application Cloughs claim all they could produce was 6tons on the 8 west side (total irrigated is 16) acres of class III west side soils. Their yield is .75tons/acre.

Final thoughts:

Many letters in the community have attempted to speak on half of this application. With only reaching a 750ft distance this does not include many notices to land owners on acreage. Many of the folks writing did not know the legal wording they needed to say, but all tried to help the county learn about this property. That is has been farmed successfully. There was incredible passion for this piece of property to remain in irrigated farm use from neighbors. They witnessed Ron Robinson hay yields and knew what the land was capable of. Many families have taken time to present information. Many came to the first hearing. I would encourage the county to review the letters and consider the effort of neighbors; some older, some young who have lived here a long time, to bring about the truth.

I believe least suitable has a positive impact on the future of Deschutes County.

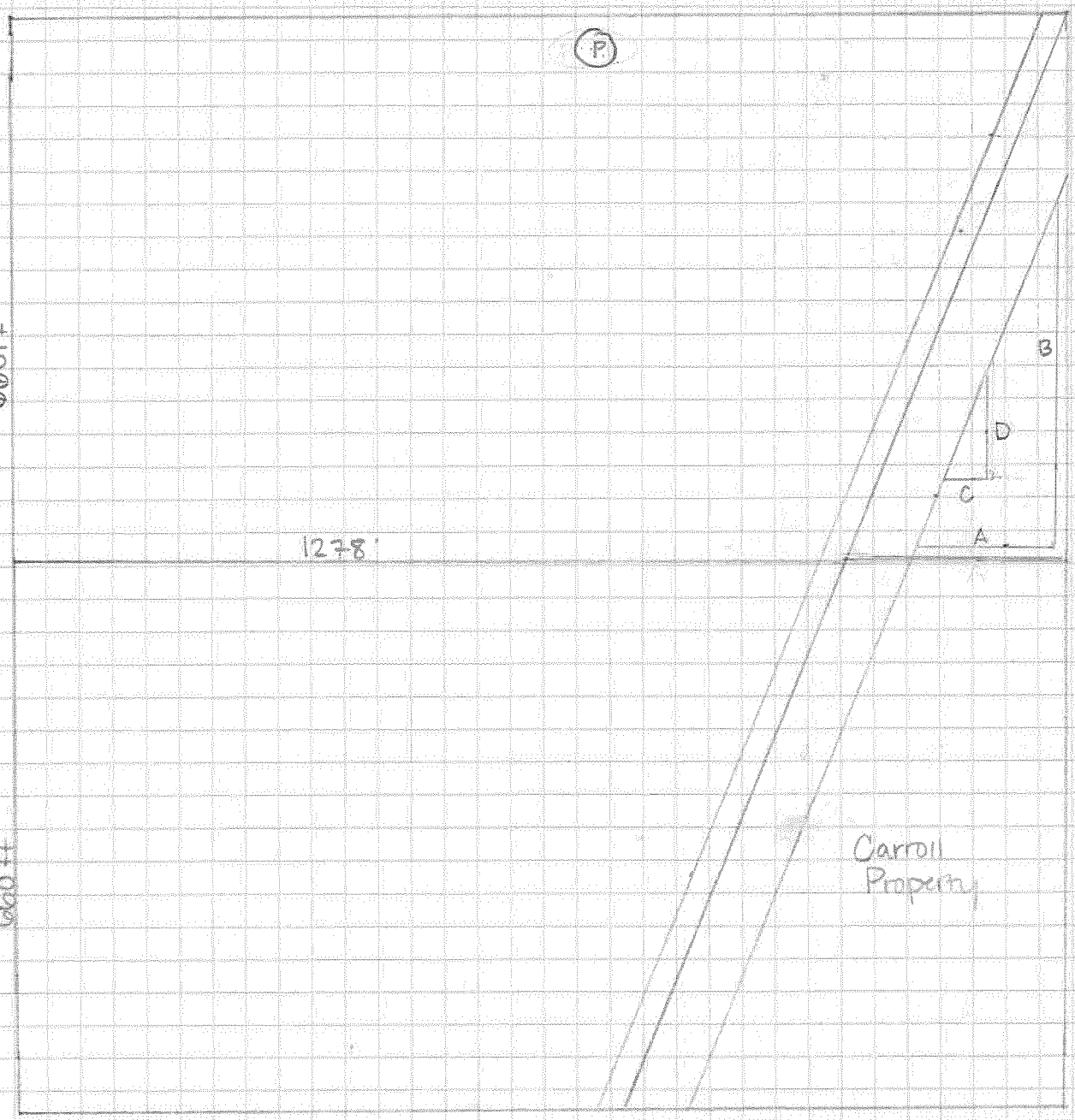
Commissioner Work Session Ideas:

- Connecting the EFU tax assessment with the application. Increase audits on EFU land. Clark County Washington for example has a computerized EFU audit system.
- Property Review by Irrigation District

Commissioner Tony DeBone asked the question: Have you commercially farmed? YES I answered; cattle. I also own 35 year old Vineyard. Refurbished, farmed and sold grapes to Rex Hill and McMennamins for their Pinot Noir and Red Blend Wines. I understand the business planning and prudent decisions needed for successful farming and labor. I have a Bachelor of Science from Colorado State University

Whether large or small scale; every farm contributes to society just as the small boutique-clothing store in downtown bend like Desperado; to the large Nordstrom's stores of the Willamette valley, both businesses play an active positive part in a diverse society

Dimensions from County Minor Land Partition



Building Envelope 34,531

Homesite 3,012

A = 162550
B = 425
C = 50
D = 120.5

A/B w/10 ft easement for ingress/egress

C/D w/100 ft easement for easement property

1" = 200 1/2 = 25
1/2" = 100 1/16 = 12.5
1/4 = 50

Exhibit A

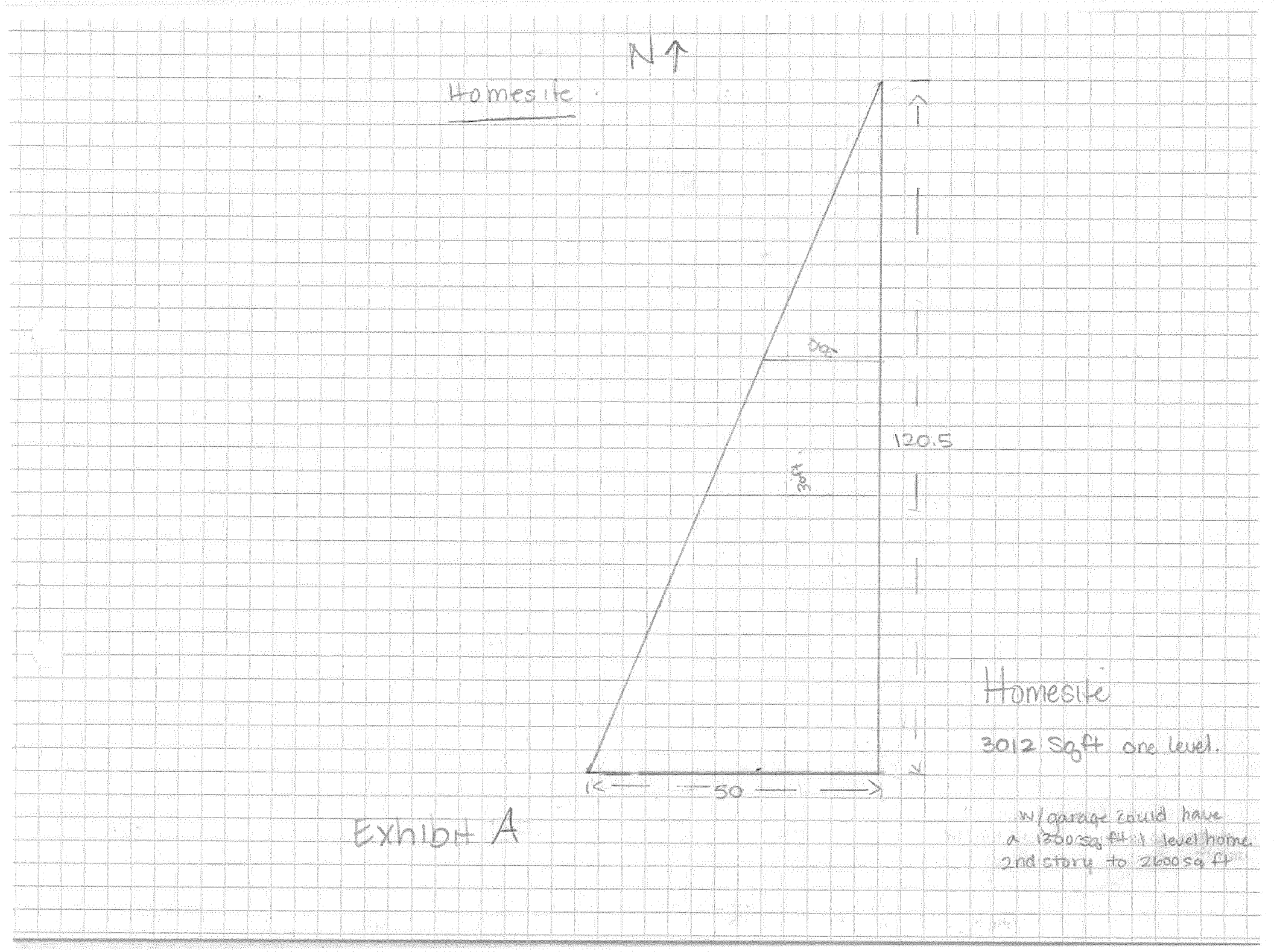

N
Homesite
120.5
50
Homesite
3012 Sqft one level.
w/garage could have
a 1200 sq ft 1 level home
2nd story to 2600 sq ft
Exhibit A

Exhibit B

Private airstrip application sparks debate on land use

Keith Chu Published Oct 7, 2004 at 05:00AM / Updated Nov 19, 2013 at 12:31AM

Doug Dense couldn't believe it when Deschutes County denied his application to build a private airstrip on his ranch northwest of Tumalo.

"It was a real shocker to us. I don't know where they're coming from," said Dense, whose application was approved by the Oregon Department of Aviation and the Federal Aviation Administration (FAA). But as many current and former airstrip owners can attest, the state and federal agencies are mostly concerned with safety, leaving other planning issues to counties.

The developer from Grants Pass had his application denied under a Deschutes County zoning rule that prohibits building airstrips on land suitable for farming or livestock.

The Deschutes County Board of Commissioners plans to decide on Monday whether to let Dense appeal his case and, in the process, relax zoning requirements on all private airstrips.

There are 16 personal-use airports in Deschutes County licensed by the Oregon Department of Aviation and the FAA, according to Gary Viehdorfer, the state aviation department official in charge of small airports. Because most of these airstrips are dirt, gravel or grass paths, between a half-mile and a mile long, they can be hard to spot from anywhere but overhead.

Dense wants to build a half-mile-long, 50-foot-wide airstrip on his ranch at 18485 Snow Creek Lane, off of Highway 20. According to his proposal, he would base a Cessna 206 or Cessna 310 airplane on the 110-acre ranch.

"We've got properties around the state, so we'd be flying around doing that sort of thing," Dense said, adding that his son-in-law would pilot the plane.

Hearing Officer Karen Green denied Dense's application because he plans to

That violates a Deschutes County Code provision that airstrips in exclusive farm zones must be built on the portion of the land that's least-suitable for farming.

It's a provision that draws the ire of some airstrip owners.

"I don't know why cows get priority," said Tim Bryan, a software engineer who owned a private airstrip until 2000, when he sold his strip. Bryan said he now rents hangar space at a public airport.

About three-quarters of Dense's property, and the entire area suitable for a landing strip, is covered in Tumalo Sandy Loam soil, prized for both farming crops and raising livestock.

"By necessity, he's got to put it on the irrigated (high-value) land," said Kevin Harrison, a planner for Deschutes

Exhibit B

County.

That means Dense is out of luck, unless the board of commissioners decides to modify the farm land rule, Harrison said.

At a Deschutes County Commission board meeting on Wednesday, commissioners Mike Daly and Dennis Luke differed on whether to uphold the county's farmland provision and put the matter off until Monday. Tom DeWolf was not present.

"It makes a lot of sense to me," Luke said of the farm land provision. "We don't have a lot of good farm ground in Central Oregon, so it's important to protect it."

Daly disagreed.

"I don't think (farmland value) should be the deciding criteria for an airstrip," he said. "I'm thinking of safety. The airstrip should go in the area where's the longest runway, the greatest visibility and the least amount of obstacles."

The Oregon Department of Aviation charges $75 to $375 to pay for a state official to perform a safety inspection of the proposed airstrip site. If it passes muster, Viehdorfer will approve the site, sending the application to the county and the FAA.

It's not hard to obtain FAA approval for a private airstrip, said Allen Kenitzer, a FAA spokesman. Owners must notify the FAA of their intention to build the airport and provide its exact latitude and longitude, so the agency can decide whether it will interfere with existing airports.

"We really don't have a lot of regulation as far as the airport itself because it's private," Kenitzer said. "What they want to do is their business."

Although Dense's application was denied based a farm land zoning law, complaints about his proposed airstrip were noise-related.

That's what concerns Darrell Pieper, who testified against Dense's application at a public hearing in July.

"The flight path potentially goes right over my ranch," said Pieper, who lives one mile north of the proposed airstrip. "I raise alpacas and there is potential for noise scaring them and potentially losing unborn (alpacas)."

Noise concerns have kept a three-quarter mile airstrip at Sundance Meadows Ranch from being used for the past year, said L.D. Ellison, president of the ranch's board of directors.

"We've had issues with a herd of horses that get spooked, and we're quite concerned with the proximity of that runway to the horse pasture," he said.

But airstrip owners say their planes are an infrequent inconvenience compared to other sources of noise.

"The traffic on the highway is ... a lot more constant and annoying than the airstrip," said David Kelly, who is part of a private co-op that owns an airstrip near Redmond.

Keith Chu can be reached at 541-383-0348 or at kchu@bendbulletin.com (mailto:kchu@bendbulletin.com) .

Exhibit C

Agricultural Soils Capability Assessment

Background

History and Purpose
House Bill 3647 (Bill) (2010) created a process for property owners and others who wish to challenge published soils information on agricultural land when applying for certain land use changes. Such an application must be accompanied by more detailed soils data produced by a professional soil classifier or soil scientist. The bill creates a role for the Oregon Department of Land Conservation and Development (the department) in this process.

Soil capability plays an important determinative role in many land use decisions under Oregon's statewide land use planning program. For this reason, the bill requires that individuals performing soils analyses be fully qualified as a Certified Professional Soil Classifier (CPSC) or have equivalent qualifications. The bill also requires soils professionals to be in good standing with the Soil Science Society of America (SSSA), meaning that the soils professional must sign an ethics statement and complete regular continuing education requirements. These qualifications and the department's role in the process create a high professional standard for complete and accurate soils reports that challenge published agricultural land capability information.

In addition, the bill calls on the department to review the soils reports submitted. This new process will assist local governments by providing greater assurance of consistency and reliability in the soils data that are submitted, when certain land use decisions are being considered.

The bill allows the person who is seeking more detailed soils data to choose a qualifying soils professional from a list maintained by the department to obtain a soils assessment. The resulting soils assessment may not be released by the department prior to its use in a land use proceeding without the written consent of the property owner.

Only those soils assessments submitted under the provisions of the bill may be considered by local governments in local land use proceedings described in the bill.

Rule Requirements
Amendments to OAR 660-033-0030 and -0045 adopted in December 2011 establish a process for assessing agricultural land capability under the bill. These rule amendments:

- Describe the applicability of the rule;
- Define the qualifications of a "professional soil classifier";
- Define an "independent panel of soils professionals" to evaluate certain applicant qualifications to participate;
- Describe a process for the department to list, update and post qualified soils professionals;
- Describe a process for persons to request a soils assessment;
- Describe a process for submitting soils assessments to the department;
- Describe a process for the department review of soils assessments;
- Describe a process for releasing soils assessments to local governments;
- State that after October 1, 2011, only those soils assessments arranged through the department may be considered by local governments; and
- Define a "soils assessment auditing committee" of professional peers to periodically re-evaluate soils professionals.

Applicability
OAR 660-033-0030 and -0045 apply to land zoned for exclusive farm use or mixed farm-forest use. They also apply to rezonings from forest to nonresource use, where the applicant relies on alternative soils information to demonstrate that the land does not qualify as agricultural land. The rules apply to changes in plan designations and zoning, certain nonfarm dwelling and nonfarm land division approvals and potentially other applications. Rule references to a "person" seeking more detailed soils information means any individual, partnership, corporation, association, governmental subdivision or agency or public or private organization of any kind.

Soils Professionals

Application Process
Soils professionals may apply to the department to be placed on the List of Qualified Soils Professionals, below. Applicants who are Certified Professional Soil Classifiers (CPSC) in good standing with the SSSA must complete and return the Soils Professional Application to Perform Soils Assessments. Applicants who are Certified Professional Soil Scientists (CPSS) in good standing with the SSSA, who have equivalent qualifications as a CPSC as determined by an independent panel of soils professionals, may also apply to be placed on the List by completing and returning the application form as well as the Professional Experience Form. Applications will be reviewed and processed on an as-

Exhibit C

needed basis. Soils professionals must re-apply for listing on a biennial basis.

Arranging for a Soils Assessment
A person or property owner requesting a soils assessment must choose from the list of qualified soils professionals and privately contract for a soils assessment to be prepared and submitted to the department together with a Soils Assessment Submittal Form that is signed by the property owner and the soils professional.

Soils Assessment Reporting Requirements
The completed soils assessment must be submitted to the department and not to the local government, and must include the information requested in the Soils Assessment Report Requirements form. This information is nearly identical to the information currently required for soils reports for lots of record under OAR 603-080-0040, performed through the Oregon Department of Agriculture. Please note that the most recent NRCS soils mapping must be provided, available at: Web Soil Survey - Home. This process is the "completeness check." If the department determines that reports are incomplete or unclear, soils professionals will have an opportunity to supply additional information or clarification.

Department Review of Soils Assessments
The department will use the services of a contracted soils professional to review and evaluate approximately 10% of submitted soils assessments, as funding permits, within 30 days of the submittal of a soils assessment that is deemed complete. Evaluations may include field checks, at the discretion of the department. Selected soils assessments will be those that indicate that a predominance of subject parcel soils are less productive than the NRCS Internet Soil Survey indicates, where one or more of the following apply:

1. A prior assessment by the soils professional under OAR 660-033-0030 and 0045 was determined not to be soundly and scientifically based;
2. A county has requested review of the work of a specific soils professional;
3. The soils assessment is for a proposed rezoning of more than 100 acres;
4. Any subject parcel soils are shown to be more than one capability classification lower than that of the NRCS Internet Soil Survey; or
5. Soils assessments submitted by the soils professional under OAR 660-033-0030 and 0045 have not yet been evaluated or have been evaluated relatively fewer times than the work of other participating soils professionals.

Where soils assessments are determined not to be soundly and scientifically based, the soils professional will be provided an opportunity to correct any noted deficiencies. Where such deficiencies are not corrected, written notification of deficiencies will be provided to the soils professional, property owner and person who requested the soils assessment.

Department Audits of Soils Professionals
Soils assessments and department reviews and field checks are subject to periodic audit by an independent soils assessment auditing committee of peers to determine continuing qualifications of participating soils professionals. Soils professionals must also maintain continued good standing with the SSSA.

List of Qualified Soils Professionals
The current list of qualified soils professionals is shown below. Property owners and others who wish to challenge agricultural land capability must select one of these individuals to prepare a soils assessment. These individuals have the necessary education and experience to provide detailed soils data to determine whether soils are agricultural. However, *this listing is not an endorsement* and those requesting soils assessments are encouraged to request references as well as bids from more than one soils professional. It can also be useful to obtain a preliminary field check to determine whether a full soils assessment is warranted. Only soils assessments submitted by the listed individuals to the department may be considered by local governments in local land use proceedings. This list will be updated on an as needed basis.

Name	Address	Phone Number	Email Address	Counties Available to Work in
Roger Borine	64770 Melinda Ct., Bend, OR 97701	541-610-2457	rborine@bendbroadband.com	All
Andy V. Gallagher Red Hill Soil	PO Box 2233 Corvallis, OR 97339	541-740-9508	avg@redhillsoil.com	All
Brian T. Rabe Cascade Earth Sciences	3511 Pacific Blvd. SW Albany, OR 97321	541-812-6639	brian.rabe@cascade-earth.com	All
Dennis Hutchison	1578 Joelson Road Umpqua, OR 97486	541-673-9783	dhutch@douglasfast.net	All

Persons Requesting a Soils Assessment

Arranging for a Soils Assessment
If, as a property owner or representative, you would like to obtain more detailed soils data than is found in the Internet soil survey produced by the Natural Resources Conservation Service of the U.S. Department of Agriculture to determine whether land qualifies as agricultural land prior to a land use application to a local government, you must follow certain steps. First, you must select one of the soils professionals identified on the List of

Exhibit C

Exhibit C

Qualified Soils Professionals above and obtain a soils assessment. Next, you must submit an electronic version of the soils assessment together with a Soils Assessment Submittal Form and a non-refundable review fee of $625 to the department. This form includes a liability waiver and authorization for access to the property to be signed by the property owner or representative, in the event the soils assessment is selected for review and a field check.

Department Release of Soils Assessments

The department will release a soils assessment to a local government only with the written consent of the property owner. If you would like the department to release a soils assessment, please complete and return a Soils Assessment Release Form. On receipt of this form, all soils assessments produced under OAR 660-033-0030 as well as any deficiencies noted in any department review of such soils assessments will also be released to the local government.

Local Governments

Soils assessments provided by soils professionals can provide more detailed and valuable information on agricultural land capability ratings. However, soils ratings are only one part of the definition of agricultural land. Local governments have the responsibility to use soils ratings together with other information, to determine whether land is "suitable" for farm use, "necessary" to permit nearby farming, or intermingled as part of a "farm unit." Similarly, only local governments can ultimately determine whether soils being considered for nonfarm dwellings or nonfarm land divisions are "generally unsuitable" for the production of farm crops, livestock or merchantable tree species. Soils assessments should not be exclusively relied upon by local governments when making these types of findings.

Local governments should let property owners, planning consultants and others know of the requirements for the use of qualified soils professionals as described above. You may wish to post or provide a link to this site and the list of qualified soils professionals.

Only those soils assessments submitted to the department and released to local governments may be used in local land use proceedings requiring compliance with HB 3647 and OAR 660-033-0030. Land use applications that challenge NRCS soils information on agricultural land capability should not be considered complete without such a soils assessment. No testimony at local hearings in support of a land use proposal that introduces any new evidence or makes findings not described in such soils assessments may be relied upon in making local land use decisions. Where soils assessments have been prepared without going through the department, property owners and others may request retroactive review of the soils assessment and qualifications of the soils professional, though this outcome is uncertain and the local land use proceeding must be put on hold.

Additional Information

Contact

Contact Katherine Daniels at (503) 934-0069 or by email at katherine.daniels@state.or.us to submit forms or with questions.

Exhibit C

Exhibit D

SSSA Soils Certifying Board Code of Ethics

Certified Professional Soil Scientist

Article I. Preamble

1. The privilege of professional practice imposes obligations of responsibility as well as professional knowledge. The Soil Science Society of America (SSSA) certifies the credentials of individuals through the Soils Certifying Board, which is the national soil science certification board. Individuals who meet the requirements for soil science certification will receive the designation of Certified Professional Soil Scientist (CPSS) or Certified Professional Soil Classifier (CPSC). The soil science certification program will only award the title of CPSS/CPSC to individuals who have met the examination, education, experience and ethics requirements as set forth by the SSSA Soils Certifying Board.
2. The Soils Certifying Board will award the title of CPSS to individuals who meet the college education, experience, testing requirements, ethics and the continuing education requirements of the Soils Certifying Board. CPSC was no longer issued after 2011. Existing CPSC still apply.
3. A CPSS/CPSC, at the request of a client or employer, must disclose the information used to gain certification. CPSS/CPSC who knowingly misrepresents their credentials will face disciplinary action.

Article II. Relation of Professional to the Public

1 A CPSS/CPSC shall avoid and discourage sensational, exaggerated, and/or unwarranted statements that might induce participation in unsound enterprises.

2 A CPSS/CPSC shall not give professional opinion or make a recommendation without being as thoroughly informed as might reasonably be expected considering the purpose for which the opinion or recommendation is desired, and the degree of completeness of information upon which the opinion is based should be made clear.

3 A CPSS/CPSC shall not issue a false statement or false information even though directed to do so by employer or client.

Article III. Relation of Professional to Employer and Client

1. A CPSS/CPSC shall protect, to the fullest extent possible, the interest of his/her employer or client insofar as such interest is consistent with the law and professional obligations and ethics.
2. A CPSS/CPSC who finds that obligations to their employer or client conflict with their professional obligation or ethics should work to have such objectionable conditions corrected.
3. A CPSS/CPSC shall not use, directly or indirectly, an employer's or client's information in any way that would violate the confidence of the employer or client.
4. CPSS/CPSC retained by one client shall not accept, without the client's written consent, an engagement by another if the interests of the two are in any manner conflicting.
5. A CPSS/CPSC who has made an investigation for any employer or client shall not seek to profit economically from the information gained, unless written permission to do so is granted or until it is clear that there can no longer be a conflict of interest with the original employer or client.
6. A CPSS/CPSC shall not divulge information given in confidence.
7. A CPSS/CPSC shall engage, or advise employer or client to engage, and cooperate with other experts and specialists.
8. A CPSS/CPSC protects the interests of a client by recommending only products and services that are in the best interest of the client and public.
9. A CPSS/CPSC protects his/her credibility by disclosing to clients how he/she will be compensated for providing recommendations to the client.

Article IV. Relation of Professionals to Each Other

1. A CPSS/CPSC shall not falsely or maliciously attempt to injure the reputation of another.
2. A CPSS/CPSC shall freely give credit for work done by others, to whom the credit is due, and shall refrain from plagiarism of oral and written communications and shall not knowingly accept credit rightfully due another person.
3. A CPSS/CPSC shall not use the advantage of public employment (i.e., university, government) to compete unfairly with other certified professions.
4. A CPSS/CPSC shall endeavor to cooperate with others in the profession and encourage the ethical dissemination of technical knowledge.

Article V. Duty to the Profession

1. A CPSS/CPSC shall aid in exclusion from certification those who have not followed this Code of Ethics or who do not have the re¬quired education and experience.
2. A CPSS/CPSC shall uphold this Code of Ethics by precept and example and encourage, by counsel and advice, other Registrants to do the same.
3. A CPSS/CPSC having positive knowledge of deviation from this Code by another Registrant shall bring such deviation to the attention of the Soils Certifying Board.

Soils Certifying Board 8/11

Exhibit D

Exhibit E

LAND-CAPABILITY CLASSIFICATION

Agriculture Handbook No. 210

I numbered the printed pages as the document prints unusual on my printer format.

SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE

Growth Through Agricultural Progress

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Washington 25, D.C. - Price 15 cents

FOREWORD

Since soil siuveys ore based on all of the characteristics of soils that influence their use and management, interpretations are needed for each of the many uses. Among these interpretations the grouping of soils into capability units, subclasses, and classes is one of the most important. This grouping serves as an introduction of the soil mop to farmers and other land users developing conservation plans.

As we have gained experience in this grouping, the definitions of the categories have improved. It is the purpose of this publication to set forth these definitions. In using the capability classification, the reader must continually recall that it is on interpretation. Like other interpretations, it depends on the probable interactions between the kind of soil and the alternative systems of management. Our management systems ore continually changing. Economic conditions change. Our knowledge grows. Land users ore continually being offered new things, such as new machines, chemicals, and plant varieties.

The new technology applies unevenly to the various kinds of soil. Thus the grouping of any one kind of soil does not stay the same with changes in technology. That is, new combinations of practices increase the productivity of some soils more than others, so some are going up in the scale whereas others are going down, relatively. Some of our most productive soils of today were considered poorly suited to crops a few years ago. On the other hand, some other soils that were once regarded as good for cropping ore now being used more productively for growing pulpwood. These facts in no way suggest that we should not make interpretations. In fact, they become increasingly important as technology grows. But these facts do mean that soils need to be reinterpreted and regrouped after significant changes in economic conditions and technology.

Besides the capability classification explained in this publication, other important interpretations ore made of soil surveys. Examples include groupings of sous according to crop-yield predictions, woodland suitability, range potentiaHty, wildlife habitat, suitability for special crops, and engineering behavior. Many other kinds of special groupings are used to help meet local needs.

CHARLES E. KELLOGO
Assistant Administrator for Soil Survey
Soil Conservation Service

Page 4

CONTENTS

3

Issued September 1961

Page 8

LAND-CAPABILITY CLASSIFICATION

By A. A. Klingebiel and P. H. Montgomery, *soil scientists. Soil Conservation Service*

The standard soil-survey map shows the different kinds of soil that are significant and their location in relation to other features of the landscape. These maps are intended to meet the needs of users with widely different problems and, therefore, contain considerable detail to show important basic soil differences.

The information on the soil map must be explained in a way that has meaning to the user. These explanations are called interpretations. Soil maps can be interpreted by (1) the individual kinds of soil on the map, and (2) the grouping of soils that behave similarly in responses to management and treatment. Because there are many kinds of soil, there are many individual soil interpretations. Such interpretations, however, provide the user with all the information that can be obtained from a soil map. Many users of soil maps want more general information than that of the individual

soil-mapping unit. Soils are grouped in different ways according to the specific needs of the map user. The kinds of soil grouped and the variation permitted within each group differ according to the use to be made of the grouping.

The capability classification is one of a number of interpretive groupings made primarily for agricultural purposes. As with all interpretive groupings the capability classification begins with the individual soil-mapping units, which are building stones of the system (table 1). In this classification the arable soils are grouped according to their potentialities and limitations for sustained production of the common cultivated crops that do not require specialized site conditioning or site treatment. Nonarable soils (soils unsuitable for longtime sustained use for cultivated crops) are grouped according to their potentialities and limitations for the production of permanent vegetation and according to their risks of soil damage if mismanaged.

The individual mapping units on soil maps show the location and extent of the different kinds of soil. One can make the greatest number of precise statements and predictions about the use and management of the individual mapping units shown on the soil map. The capability grouping of soils is designed (1) to help landowners and others use and interpret the soil maps, (2) to introduce users to the detail of the soil map itself, and (3) to make possible broad generalizations based on soil potentialities, limitations in use, and management problems.

The capability classification provides three major categories of soil groupings: (1) Capability unit, (2) capability subclass, and (3) capability class.

Page 6

TABLE L—Relaüonship of soil-mapping unit to capability classification

Soil-mapping unit	Capability unit	Capability subclass	Capability class
A soil mapping unit is a portion of the landscape' that has similar characteristics and qualities and whose limits are fixed by precise definitions. Within the cartographic limitations and considering the purpose for which the map is made, the soil mapping unit is the unit about which the greatest number of precise statements and predictions can be made. The soil mapping units provide the most detailed soils information. The basic mapping units are the basis for all interpretive groupings of soils. They furnish the information needed for developing capability units, forest site groupings, crop suitability groupings, range site groupings, engineering groupings, and other interpretive groupings. The most specific management practices and estimated yields are related to the individual mapping unit.	A capabihty unit is a grouping of one or more individual soil mapping units having similar potentials and continuing limitations or hazards. The soils in a capability unit are sufficiently uniform to (a) produce similar kinds of cultivated crops and pasture plants with similar management practices, (b) require similar conservation treatment and management under the same kind and condition of vegetative cover, (c) have comparable potential productivity. The capability unit condenses and simplifies soils information for planning individual tracts of land, field by field. Capability units with the class and subclass furnish information about the degree of limitation, kind of conservation problems and the management practices needed.	Subclasses are groups of capability units which have the same major conservation problem, such as— e—Erosion and runoff. w—Excess water. s—Root-zone limitations. c—Climatic limitations. The capability subclass provides information as to the kind of conservation problem or limitations involved. The class and subclass together provide the map user information about both the degree of limitation and kind of problem involved for broad program planning, conservation need studies, and similar purposes.	Capability classes are groups of capability subclasses or capability units that have the same relative degree of hazard or limitation. The risks of soil damage or limitation in use become progressively greater from class I to class VIII. The capability classes are useful as a means of introducing the map user to tlie more detailed information on the soil map. The classes show the location, amount, and general suitabiUty of the soils for agricultural use. Only information concerning general agricultural limitations in soil use are obtained at the capability class level.

Page 7

The first category, capability unit, is a grouping of soils that have about the

same responses to systems of management of common cultivated crops and pasture plants. Soils in any one capability unit are adapted to the same kinds of common cultivated and pasture plants and require similar alternative systems of management for these crops. Longtime estimated yields of adapted crops for individual soils within the unit under comparable management do not vary more than about 25 percent.^

^ The second category, the subclass, is a grouping of capability units having similar kinds of limitations and hazards. Four general kinds of limitations or hazards are recognized: (1) Erosion hazard, (2) wetness, (3) rooting-zone limitations, and (4) climate.

The third and broadest category in the capability classification places all the soils in eight capability classes. The risks of soil damage or limitations in use become progressively greater from class I to class VIII. Soils in the first four classes under good management are capable of producing adapted plants, such as forest trees or range plants, and the common cultivated field crops ^ and pasture plants. Soils in classes V, VI, and VII are suited to the use of adapted native plants. Some soils in classes V and VI are also capable of producing specialized crops, such as certain fruits and ornamentals, and even field and vegetable crops under highly intensive management involving elaborate practices for soil and water conservation.^ Soils in class VIII do not return on-site benefits for inputs of management for crops, grasses, or trees without major reclamation.

The grouping of soils into capability units, subclasses, and classes is done primarily on the basis of their capability to produce common cultivated crops and pasture plants without deterioration over a long period of time. To express suitability of the soils for range and woodland use, the soil-mapping units are grouped into range sites and woodland-suitability groups.

ASSUMPTIONS

In assigning soils to the various capability groupings a number of assumptions are made. Some understanding of these assumptions is necessary if

* Yields are significant at the capability-unit level and are one of the criteria used in establishing capability units within a capability class. Normally, yields are estimated under the common management that maintains the soil resource. The main periods for such yield estimates are 10 or more years in himiid areas or under irrigation and 20 or more years in subhumid or semiarid areas. The 25 percent allowable range is for economically feasible yields of adapted cultivated and pasture crops.

' As used here the common crops include : Com, cotton, tobacco, wheat, tame hay and pasture, oats, barley, grain sorghimi, sugarcane, sugar beets, peanuts, soybeans, field-grown vegetables, potatoes, sweet potatoes, field peas and beans, flax, and most clean-cultivated fruit, nut, and ornamental plants. They do not include: Rice, cranberries, blueberries, and those fruit, nut, and ornamental plants that require little or no cultivation.

' Soil and water conservation practices is a general expression for all practices including but not limited to those for erosion control.

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the soils are to be grouped consistently in the capability classification and if the groupings are to be used properly. They are:

1. A taxonomic (or natural) soil classification is based directly on soil characteristics. The capability classification (unit, subclass, and class) is an interpretive classification based on the effects of combinations of climate and permanent soil characteristics on risks of soil damage, limitations in use, productive capacity, and soil management requirements. Slope, soil texture, soil depth, effects of past erosion, permeability, water-holding capacity, type of clay minerals, and the many other similar features are considered permanent soil qualities and characteristics. Shrubs, trees, or stumps are not considered permanent characteristics.
2. The soils within a capability class are similar only with respect to degree

of limitations in soil use for agricultural purposes or hazard to the soil when it is so used. Each class includes many different kinds of soil, and many of the soils within any one class require unlike management and treatment. Valid generalizations about suitable kinds of crops or other management needs cannot be made at the class level.

3. A favorable ratio of output to input * is one of several criteria used for placing any soil in a class suitable for cultivated crop, grazing, or woodland use, but no further relation is assumed or implied between classes and output-input ratios. The capability classification is not a productivity rating for specific crops. Yield estimates are developed for specific kinds of soils and are included in sou handbooks and soil-survey reports.
4. A moderately high level of management is assumed—one that is practical and within the ability of a majority of the farmers and ranchers. The level of management is that commonly used by the "reasonable" men of the community. The capability classification is not, how^ever, a grouping of soils according to the most profitable use to be made of the land. For example, many soils in class III or IV, defined as suitable for several uses including cultivation, may be more profitably used for grasses or trees than for cultivated crops.
5. Capability classes I through IV are distinguished from each other by a summation of the degree of limitations or risks of sou damage that affect their management requirements for longtime sustained use for cultivated crops. Nevertheless, differences in kinds of management or yields of perennial vegetation may be greater between some pairs of soils within one class than between some pairs of soils from different classes. The capability class is not determined by the kind of practices recommended. For example, class II, III, or IV may or may not require the same kind of practices when used for cultivated crops, and classes I through VII may or may not require the same kind of pasture, range, or woodland practices.

* Based on longtime economic trends for average **farms and farmers using moderately** high level management. May **not apply to specific farms and farmers but wiU apply to broad areas.**

~~Page 9~~ Presence of water on the surface or excess water in the soil; lack of water for adequate crop production; presence of stones; presence of soluble salts or exchangeable sodium, or both; or hazard of overflow are not considered permanent limitations to use where the removal of these limitations is feasible.^

7. Soils considered feasible for improvement by draining, by irrigating, by removing stones, by removing salts or exchangeable sodium, or by protecting from overflow are classified according to their continuing limitations in use, or the risks of soil damage, or both, after the improvements have been installed. DiiTerences in initial costs of the systems installed on individual tracts of land do not influence the classification. The fact that certain wet soils are in classes II, III, and IV does not imply that they should be drained. But it does indicate the degree of their continuing limitation in use or risk of soil damage, or both, if adequately drained. Where it is considered not feasible to improve soils by drainage, irrigation, stone removal, removal of excess salts or exchangeable sodium, or both, or to protect them from overflow, they are classified according to present limitations in use.
8. Soils already drained or irrigated are grouped according to the continuing soil and climatic limitations and risks that aflfect their use under the present systems or feasible improvements in them.
9. The capability classification of the soils in an area may be changed when major reclamation projects are installed that permanently change the limitations in use or reduce the hazards or risks of soil or crop

damage for long periods of time. Examples include establishing major drainage facilities, building levees or flood-retarding structures, providing water for irrigation, removing stones, or large-scale grading of gullied land. (Minor dams, terraces, or field conservation measures subject to change in their effectiveness in a short time are not included.)

10. Capability groupings are subject to change as new information about the behavior and responses of the soils becomes available.

11. Distance to market, kinds of roads, size and shape of the soil areas, locations within fields, skill or resources of individual operators, and other characteristics of land-ownership patterns are not criteria for capability groupings.

12. Soils with such physical limitations that common field crops can be cultivated and harvested only by hand are not placed in classes I, II, III, and IV. Some of these soils need drainage or stone removal, or both, before some kinds of machinery can be used. This does not imply that mechanical equipment cannot be used on some soils in capability classes V, VI, and VII.

13. Soils suited to cultivation are also suited to other uses such as pasture, range, forest, and wildlife. Some not suited to cultivation are suited to pasture, range, forest, or wildlife; others are suited only to pasture or

* Feasible as used in this context means (1) that the characteristics and qualities of the soil are such that it is possible to remove the limitation, and (2) that over broad areas it is within the realm of present-day economic possibility to remove the limitation.

range and wildlife; others only to forest and wildlife; and a few suited only to wildlife^ recreation, and water-yielding uses. Groupings of soils for pasture, range, wildlife, or woodland may include soils from more than one capability class. Thus, to interpret soils for these uses, a grouping different from the capability classification is often necessary.

14. Research data, recorded observations, and experience are used as the bases for placing soils in capability units, subclasses, and classes. In areas where data on response of soils to management are lacking, soils are placed in capability groups by interpretation of soil characteristics and qualities in accord with the general principles about use and management developed for similar soils elsewhere.

CAPABILITY CLASSES

Land Suited to Cultivation and Other Uses

Class I—**Soils in class I have few limitations that restrict their iise.**

Soils in this class are suited to a wide range of plants and may be used safely for cultivated crops, pasture, range, woodland, and wildlife. The soils are nearly level ^ and erosion hazard (wind or water) is low. They are deep, generally well drained, and easily worked. They hold water well and are either fairly well suppHed with plant nutrients or highly responsive to inputs of fertilizer.

The soils in class I are not subject to damaging overflow. They are productive and suited to intensive cropping. The local climate must be favorable for growing many of the common field crops.

In irrigated areas, soils may be placed in class I if the limitation of the arid climate has been removed by relatively permanent irrigation works. Such irrigated soils (or soils potentially useful under irrigation) are nearly level, have deep rooting zones, have favorable permeabihty and water-holding capacity, and are easily maintained in good tilth. Some of the soils may require initial conditioning including leveUng to the desired grade, leaching of a slight accumulation of soluble salts, or lowering of the seasonal water

table. Where limitations due to salts, water table, overflow, or erosion are likely to recur, the soils are regarded as subject to permanent natural limitations and are not included in class I.

Soils that are wet and have slowly permeable subsoils are not placed in class I. Some kinds of soil in class I may be drained as an improvement measure for increased production and ease of operation.

Soils in class I that are used for crops need ordinary management practices to maintain productivity—^both soil fertihty and soil structure. Such practices may include the use of one or more of the following: Fertilizers and lime, cover and green-manure crops, conservation of crop residues and animal manures, and sequences of adapted crops.

* Some rapidly permeable soils in class I may have gentle slopes.

Class II—SoUs in class II have some limitations that reduce the choice of plants or require moderate conservation practices.

Soils in class II require careful soil management, including conservation practices, to prevent deterioration or to improve air and water relations when the soils are cultivated. The limitations are few and the practices are easy to apply. The soils may be used for cultivated crops, pasture, range, woodland, or wildlife food and cover.

Limitations of soils in class II may include singly or in combination the effects of (1) gentle slopes, (2) moderate susceptibility to wind or water erosion or moderate adverse effects of past erosion, (3) less than ideal soil depth, (4) somewhat unfavorable soil structure and workability, (5) slight to moderate salinity or sodium easily corrected but likely to recur, (6) occasional damaging overflow, (7) wetness correctable by drainage but existing permanently as a moderate limitation, and (8) slight climatic limitations on soil use and management.

The soils in this class provide the farm operator less latitude in the choice of either crops or management practices than soils in class I. They may also require special soil-conserving cropping systems, soil conservation practices, water-control devices, or tillage methods when used for cultivated crops. For example, deep soils of this class with gentle slopes subject to moderate erosion when cultivated may need one of the following practices or some combination of two or more: Terracing, stripcropping, contour tillage, crop rotations that include grasses and legumes, vegetated water-disposal areas, cover or green-manure crops, stubble mulching, fertilizers, manure, and lime. The exact combinations of practices vary from place to place, depending on the characteristics of the soil, the local climate, and the farming system.

Class in—Soils in class III have severe limitations that reduce the choice of plants or require special conservation practices, or both.

Soils in class III have more restrictions than those in class II and when used for cultivated crops the conservation practices are usually more difficult to apply and to maintain. They may be used for cultivated crops, pasture, woodland, range, or wildlife food and cover.

Limitations of soils in class III restrict the amount of clean cultivation; timing of planting, tillage, and harvesting; choice of crops; or some combination of these limitations. The limitations may result from the effects of one or more of the following: (1) Moderately steep slopes; (2) high susceptibility to water or wind erosion or severe adverse effects of past erosion; (3) frequent overflow accompanied by some crop damage; (4) very slow permeability of the subsoil; (5) wetness or some continuing waterlogging after drainage; (6) shallow depths to bedrock, hardpan, fragipan, or claypan that limit the rooting zone and the water storage;

(7) low moisture-holding capacity; (8) low fertility not easily corrected; (9) moderate salinity or sodium; or (10) moderate climatic limitations.

When cultivated, many of the wet, slowly permeable but nearly level

soils in class III require drainage and a cropping system that maintains or improves the structure and tilth of the soil. To prevent puddling and to improve permeability it is commonly necessary to supply organic material to such soils and to avoid working them when they are wet. In some irrigated areas, part of the soils in class III have limited use because of high water table, slow permeability, and the hazard of salt or sodic accumulation. Each distinctive kind of soil in class III has one or more alternative combinations of use and practices required for safe use, but the number of practical alternatives for average farmers is less than that for soils in class II.

Class rV—Soils in class IV have very severe limitations that restrict the choice of plants, require very careful management/ or both.

The restrictions in use for soils in class IV are greater than those in class III and the choice of plants is more limited. When these soils are cultivated, more careful management is required and conservation practices are more difficult to apply and maintain. Soils in class IV may be used for crops, pasture, woodland, range, or wildlife food and cover.

Soils in class IV may be well suited to only two or three of the common crops or the harvest produced may be low in relation to inputs over a long period of time. Use for cultivated crops is limited as a result of the effects of one or more permanent features such as (1) steep slopes, (2) severe susceptibility to water or wind erosion, (3) severe effects of past erosion, (4) shallow soils, (5) low moisture-holding capacity, (6) frequent overflows accompanied by severe crop damage, (7) excessive wetness with continuing hazard of waterlogging after drainage, (8) severe salinity or sodium, or (9) moderately adverse climate.

Many sloping soils in class IV in humid areas are suited to occasional but not regular cultivation. Some of the poorly drained, nearly level soils placed in class IV are not subject to erosion but are poorly suited to intertilled crops because of the time required for the soil to dry out in the spring and because of low productivity for cultivated crops. Some soils in class IV are well suited to one or more of the special crops, such as fruits and ornamental trees and shrubs, but this suitability itself is not sufficient to place a soil in class IV.

In subhumid and semiarid areas, soils in class IV may produce good yields of adapted cultivated crops during years of above average rainfall; low yields during years of average rainfall; and failures during years of below average rainfall. During the low rainfall years the soil must be protected even though there can be little or no expectancy of a marketable crop. Special treatments and practices to prevent soil blowing, conserve moisture, and maintain soil productivity are required. Sometimes crops must be planted or emergency tillage used for the primary purpose of maintaining the soil during years of low rainfall. These treatments must be applied more frequendy or more intensively than on soils in class III.

Land Limited in Use—Climatically Not Suited to

Class V—Soils in class V have little or no erosion hazard but have other limitations impractical to remove that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Soils in class V have limitations that restrict the kind of plants that can be grown and that prevent normal tillage of cultivated crops. They are nearly level but some are wet, are frequently overflowed by streams, are stony, have climatic limitations, or have some combination of these limitations. Examples of class V are (1) soils of the bottom lands subject to frequent overflow that prevents the normal production of cultivated crops, (2) nearly level soils with a growing season that prevents the normal production of cultivated crops, (3) level or nearly level stony or rocky soils, and (4) ponded areas where drainage for cultivated crops is not feasible but where soils are suitable for grasses or trees. Because of these limitations cultivation of the common crops is not feasible but pastures can be improved and benefits from proper management can be expected.

Class VI—Soils in class VI have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Physical conditions of soils placed in class VI are such that it is practical to apply range or pasture improvements, if needed, such as seeding, liming, fertilizing, and water control with contour furrows, drainage ditches, diversions, or water spreaders. Soils in class VI have continuing limiutjons that cannot be corrected, such as (1) steep slope, (2) severe erosion hazard, (3) effects of past erosion, (4) stoniness, (5) shallow rooting zone, (6) excessive wetness or overflow, (7) low-moisture capacity, (8) salinity or sodium, or (9) severe climate. Because of one or more of these limitations these soils are not generally suited to cultivated crops. But they may be used for pasture, range, woodland, or wildlife cover or for some combination of these.

Some soils in class VI can be safely used for *the* common crops provided unusually intensive management is used. Some of the soils in this class are also adapted to special crops such as sodded orchards, blueberries, or the like, requiring soil conditions unlike those demanded by the common crops. Depending upon soil features and local climate the soils may be well or poorly suited to woodlands.

' Certain soils grouped into classes V, VI, VII, and VIII may be made fit for use for crops with major earthmoving or other costly reclamation.

Page 14

Class VU—Soils in class Vu hove very severe limitations that moke them unsuited to cultivation and that restrict their use largely to grazing, woodland/ or wildlife.

Physical conditions of soils in class **VII** are such that it is impractical to apply such pasture or range improvements as seeding, liming, fertilizing, and water control with contour furrows, ditches, diversions, or water spreaders. Soil restrictions are more severe than those in class VI because of one or more continuing limitations that cannot be corrected, such as (1) very steep slopes, (2) erosion, (3) shallow soil, (4) stones, (5) wet soil, (6) salts or sodium, (7) unfavorable climate, or (8) other limitations that make them unsuited to common cultivated crops. They can be used safely for grazing or woodland or wildlife food and cover or for some com-

11

bination of these under proper management.

Depending upon the soil characteristics and local climate, soils in this class may be well or poorly suited to woodland. They are not suited to any of the common cultivated crops; in unusual instances, some soils in this class may be used for special crops under unusual management practices. Some areas of class VII may need seeding or planting to protect the soil and to prevent damage to adjoining areas.

Class Vm—Soils and landiorms in class Vm hove limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply or to esthetic purposes.

Soils and landforms in class VIII cannot be expected to return significant on-site benefits from management for crops, grasses, or trees, although benefits from wildlife use, watershed protection, or recreation may be possible.

Limitations that cannot be corrected may result from the effects of one or more of the following: (1) Erosion or erosion hazard, (2) severe climate, (3) wet soil, (4) stones, (5) low-moisture capacity, and (6) salinity or sodium.

Badlands, rock outcrop, sandy beaches, river wash, mine tailings, and other nearly barren lands are included in class **VIII**. It may be necessary to give protection and management for plant growth to soils and landforms in class VIII in order to protect other more valuable soils, to control water, or for wildlife or esthetic reasons.

CAPABILITY SUBCLASSES

Subclasses are groups of capability units within classes that have the same kinds of dominant limitations for agricultural use as a result of soil and climate. Some soils are subject to erosion if they are not protected, while others are naturally wet and must be drained if crops are to be grown. Some soils are shallow or droughty or have other soil deficiencies. Still

other soils occur in areas where climate limits their use. The four kinds of limitations recognized at the subclass level are: Risks of erosion, designated by the symbol (e) ; wetness, drainage, or overflow (w) ; rooting-zone limitations (s) ; and climatic limitations (c). The subclass provides the map user information about both the degree and kind of limitation. Capability class I has no subclasses.

Subclass **(e) erosion** is made up of soils where the susceptibility to erosion is the dominant problem or hazard in their use. Erosion susceptibility and past erosion damage are the major soil factors for placing soils in this subclass.

Subclass **(w) excess water** is made up of soils where excess water is the dominant hazard or limitation in their use. Poor soil drainage, wetness, high water table, and overflow are the criteria for determining which soils belong in this subclass.

Subclass **(s) soil limitations within the rooting zone** includes, as the name implies, soils that have such limitations as shallowness of rooting zones, stones, low moisture-holding capacity, low fertility difficult to correct, and salinity or sodium.

Subclass **(c) climatic limitation** is made up of soils where the climate (temperature or lack of moisture) is the only major hazard or limitation in their use.^

Limitations imposed by erosion, excess water, shallow soils, stones, low

moisture holding capacity, salinity, or sodium can be modified or partially overcome and take precedence over climate in determining subclasses. The dominant kind of limitation or hazard to the use of the land determines the assignment of capability units to the (e), (w), and (s) subclasses. Capability units that have no limitation other than climate are assigned to the (c) subclass.

Where two kinds of limitations that can be modified or corrected are essentially equal, the subclasses have the following priority: e, w, s. For example, we need to group a few soils of humid areas that have both an erosion hazard and an excess water hazard; with them the e takes precedence over the w. In grouping soils having both an excess water limitation and a rooting-zone limitation the w takes precedence over the s. In grouping soils of subhumid and semiarid areas that have both an erosion hazard and a climatic limitation the e takes precedence over the c, and in grouping soils with both rooting-zone limitations and climatic limitations the s takes precedence over the c.

Where soils have two kinds of limitations, both can be indicated if needed for local use; the dominant one is shown first. Where two kinds of problems are shown for a soil group, the dominant one is used for summarizing data by subclasses.

* Especially among young soils such as alluvial soils, although not limited to them, climatic phases of soil series must be established for proper grouping into capability units and into other interpretive groupings. Since the effects result from interactions between soil and climate, such climatic phases are not defined the same in terms of precipitation, temperature, and so on, for contrasting kinds of soil.

Page 16

CAPABILITY UNITS

The capability units provide more specific and detailed information than the subclass for application to specific fields on a farm or ranch. A capability unit is a grouping of soils that are nearly alike in suitability for plant growth and responses to the same kinds of soil management. That is, a reasonably uniform set of alternatives can be presented for the soil, water, and plant management of the soils in a capability unit, not considering effifects of past management that do not have a more or less permanent effect on the soil. Where sous have been so changed by management that permanent characteristics have been altered, they are placed in different soil series. Soils grouped into capability units respond in a similar way and require similar management although they may have soil characteristics that put them in different soil series.

Soils grouped into a capability unit should be sufficiently uniform in the combinations of soil characteristics that influence their qualities to have similar potentialities and continuing limitations or hazards. Thus the soils in a capability unit should be sufficiently uniform to (a) produce similar kinds of cultivated crops and pasture plants with similar management practices, (b) require similar conservation treatment and management under the same kind and condition of vegetative cover, and (c) have comparable potential productivity. (Estimated average yields under similar management systems should not vary more than about 25 percent among the kinds of soil included within the unit.)

OTHER KINDS OF SOIL GROUPINGS

Other kinds of interpretive soil groupings are necessary to meet specific needs. Among these are groupings for range use, woodland use, special crops, and engineering interpretation.

The range site is a grouping of soils with a potential for producing the same kinds and amounts of native forage. The range site for rangeland is comparable to the capability unit for cultivated land. The purpose of

such a grouping is to show the potential for range use and to provide the basis for which the criteria for determining range condition can be established. The soils grouped into a single range site may be expected to produce similar longtime yields and respond similarly to alternative systems of management and to such practices as seeding, pitting, and water spreading.

Soils suitable for range but not for common cultivated crops may be placed in capability classes V and VI if they are capable of returning inputs from such management practices as seeding, fertilizing, or irrigating and in class VTI if they are not. If these soils do not give economic returns under any kind of management when used for cultivated **crops, pasture,** woodland or range, they fall in class **VIII.**

Soil-woodland site index correlations are essential **for interpreting the potential wood** production **of** the individual **sou units that are mapped.**

Page 17

Woodland-site indices are commonly developed for individual kinds of soils. Soil-mapping units can be placed in woodland groupings according to site indices for adapted species and other responses and limitations significant to woodland conservation. Such groupings do not necessarily parallel those for capability units or range sites; however, in some areas capability units may be grouped into range sites and woodland-suitability groups.

Rice has soil requirements unlike those of the conmion cultivated crops requiring well-aerated soils. Some fruits and ornamentals do not require clean cultivation. Therefore, these crops are not given weight in the capabiHty grouping. Instead, special groupings of the soils for each of these crops are made in the areas where they are significant.

With a good basic table of yields and practices the soils can be placed in any number of suitability groups. Commonly, five groups—unsuited, fairly suited, moderately suited, well suited and very well suited—are sufficient.

Kinds of soil shown on the soil map are also grouped according to need for applying engineering measures including drainage, irrigation, land leveling, land grading; determining suitability as subgrade for roads; and constructing ponds and small dams. Such groupings may be unlike those made for other purposes.

CRITERIA FOR PLACING SOILS IN CAPABILITY CLASSES

Soil and climatic limitations in relation to the use, management, and productivity of soils are the bases for differentiating capability classes. Classes are based on both degree and number of limitations affecting kind of use, risks of soil damage if mismaqaged, needs for soil management, and risks of crop failure. To assist in making capability groupings, specific criteria for placing soils in units, subclasses, and classes are presented here. Because the effects of soil characteristics and qualities vary widely with climate, these criteria must be for broad soil areas that have similar climate.

Capability groupings are based on specific information when available—information about the responses of the individual kinds of soil to management and the combined effect of climate and soil on the crops grown. It comes from research findings, field trials, and experiences of farmers and other agricultural workers. Among the more common kinds of information obtained are soil and water losses, kinds and amounts of plants that can be grown, weather conditions as they affect plants, and the effect of different kinds and levels of management on plant response. This information is studied along with laboratory data on soil profiles. Careful analysis of this information proves useful not only in determining the capability of these

individual kinds of soil but also in making predictions about the use and management of related kinds of soil.

Basic yield estimates of the adapted crops under alternative, defined systems of management are assembled in a table. Where data are few, the

estimates should be reasonable when tested against available fann records and studies of the combinations of soil properties.

Where information on response of soils to management is lacking, the estimates of yields and the grouping of soils into capability units, subclasses, and classes are based on an evaluation of combinations of the following:

1. Ability of the soil to give plant response to use and management as evidenced by organic-matter content, ease of maintaining a supply of plant nutrients, percentage base saturation, cation-exchange capacity, kind of clay mineral, kind of parent material, available water-holding capacity, response to added plant nutrients, or other soil characteristics and qualities.
2. Texture and structure of the soil to the depth that influences the environment of roots and the movement of air and water.
3. Susceptibility to erosion as influenced by kind of soil (and slope) and the effect of erosion on use and management.
4. Continuous or periodic waterlogging in the soil caused by slow permeability of the underlying material, a high water table, or flooding.
5. Depth of soil material to layers inhibiting root penetration.
6. Salts toxic to plant growth.
7. Physical obstacles such as rocks, deep gullies, etc.
8. Climate (temperature and effective moisture).

This list is not intended to be complete. Although the soils of any area may differ from one another in only a few dozen characteristics, none can be taken for granted. Extreme deficiencies or excesses of trace elements, for example, can be vital. Commonly, the underlying geological strata are significant to water infiltration, water yield, and erosion hazard.

Any unfavorable fixed or recurring soil or landscape features may limit the safe and productive use of the soil. One unfavorable feature in the soil may so limit its use that extensive treatment would be required. Several minor unfavorable features collectively may become a major problem and thus limit the use of the soil. The combined effect of these in relation to the use, management, and productivity of soils is the criterion for different capability units.

Some of the criteria used to differentiate between capability classes are discussed on the following pages. The criteria and ranges in characteristics suggested assume that the effects of other soil characteristics and qualities are favorable and are not limiting factors in placing soils in capability classes.

Arid and Semiorid, Stony, Wet, Saline-Sodic, and Overflow Soils

The capability-class designations assigned to soils subject to flooding, poorly or imperfectly drained soils, stony soUs, dry soils needing supplemental water, and sous having excess soluble salts or exchangeable sodium are made on the basis of continuing limitations and hazards after removal of excess water, stones, salts, and exchangeable sodium.

When assessing the capability class of any sou the feasibility of any necessary land improvements must be considered. Feasible as used here means

that the characteristics and qualities of the soil are such that it is possible to remove the limitation, and (2) that over broad areas it is within the realm of economic possibility to remove the limitation. The capability designation of these areas is determined by those practices that are practical now and in the immediate future.

The following kinds of soil are classified on the basis of their present continuing limitations and hazards: (1) Dry soils (arid and semiarid areas) now irrigatedj (2) soils from which stones have been removed, (3) wet soils that have been drained, (4) soils from which excess quantities of soluble salts or exchangeable sodium have been removed, and (5) soils that have been protected from overflow.

The following kinds of soil are classified on the basis of their continuing limitations and hazards as if the correctable limitations had been removed or reduced: (1) Dry soils not now irrigated but for which irrigation is feasible and water is available, (2) stony soils for which stone removal is feasible, (3) wet soils not now drained but for which drainage is feasible, (4) soils that contain excess quantities of soluble salts or exchangeable sodium feasible to remove, and (5) soils subject to overflow but for which protection from overflow is feasible. Where desirable or helpful, the present limitation due to wetness, stoniness, etc., may be indicated.

The following kinds of soil are classified on the basis of their present continuing limitations and hazards if the limitations cannot feasibly be corrected or removed: (1) Dry soils, (2) stony soils, (3) soils with excess quantities of saline and sodic salts, (4) wet soils, or (5) soils subject to overflow.

Climatic Limitations

Climatic limitations (temperature and moisture) affect capability. Extremely low temperatures and short growing seasons are limitations, especially in the very northern part of continental United States and at high altitudes.

Limited natural moisture supply affects capability in subhumid, semiarid, and arid climates. As the classification in any locality is derived in part from observed performance of crop plants, the eñ"ects of the interaction of climate with soil characteristics must be considered. In a subhumid climate, for example, certain sandy soils may be classified as class VI or class VII, whereas soils with similar water-holding capacity in a more humid climate are classified as class III or IV. The moisture factor must be directly considered in the classification in most semiarid and arid climates. The capability of comparable soils decreases as effective rainfall decreases.

In an arid climate the moisture from rain and snow is not enough to support crops. Arid land can be classed as suited to cultivation (class I, II, III, or IV) only if the moisture limitation is removed by irrigation. Wherever the moisture limitation is removed in this way, the soil is classified according to the effects of other permanent features and hazards that limit its use and permanence, without losing sight of the practical requirements of irrigation farming.

Wetness Limitations

Water on the soil or excess water in the soil presents a hazard to or limits its use. Such water may be a result of poor soil drainage, high water table, overflow (includes stream overflow, ponding, and runoff water from higher areas), and seepage. Usually soil needing drainage has some permanent limitation that precludes placing it in class I even after drainage.

Wet soils are classified according to their continuing soil limitations and hazards after drainage. In determining the capability of wet areas emphasis is placed on practices considered practical now or in the foreseeable future. The vast areas of marshland along the seacoast or high-cost reclamation projects not now being planned or constructed are not classified as class I,

II, or III. If reclamation projects are investigated and found to be feasible, the soils of the area are reclassified based on the continuing limitations and hazards after drainage. This places the classification of wet soils on a basis similar to that of the classification of irrigated, stony, saline, or overflow soils. Some large areas of bottom land subject to overflow are reclassified when protected by dikes or other major reclamation work. There are examples of these along streams where levees have been constructed. Land already drained is classified according to the continuing limitations and hazards that affect its use.

Needs for initial conditioning, such as for clearing of trees or swamp vegetation, are not considered in the capability classification. They may be of great importance, however, in making some of the land-management decisions. Costs of drainage, hkewise, are not considered directly in the capability classification, although they are important to the land manager.

Toxic Salts

Presence of soluble salts or exchangeable sodium in amounts toxic to most plants can be a serious limiting factor in land use. Where toxic salts are the limiting factor, the following ranges are general guides until more specific criteria are available :

Class II—Crops slightly affected. In irrigated areas, even after salt removal, slight salinity or small amounts of sodium remains or is likely to recur.

Class III—Crops moderately affected. In irrigated areas, even after salt removal, moderate salinity or moderate amounts of sodium remains or is likely to recur.

Classes IV-VI—Crops seriously affected on cultivated land. Usually only salt-tolerant plants will grow on noncultivated land. In irrigated areas, even after leaching, severe salinity or large amounts of sodium remains or is likely to recur.

Class vii—Satisfactory growth of useful vegetation impossible, except possibly for some of the most salt-tolerant forms, such as some Atriplexes that have limited use for grazing.

Slope and Hazard of Erosion

Soil damage from erosion is significant in the use, management, and response of soil for the following reasons :

1. An adequate soil depth must be maintained for moderate to high crop production. Soil depth is critical on shallow soils over nonrenewable substrata such as hard rock. These soils tolerate less damage from erosion than soils of similar depth wiüi a renewable substrata such as the raw loess or soft shale that can be improved through the use of special tillage, fertilizer, and beneficial cropping practices.
2. Soil loss influences crop yields. The reduction in yield following the loss of each inch of surface soil varies widely for different kinds of soil. The reduction is least on soils having litde difference in texture, consistence, and fertility between the various horizons of the soil. It is greatest where there is a marked difference between surface layers and subsoils, such as among soils with claypans. For example, com yields on soils with dense, very slowly permeable subsoils may be reduced 3 to 4 bushels per acre per year for each inch of surface soil lost. Yield reduction is normally small on deep, moderately permeable soils having similar textured surface and subsurface layers and no great accumulation of organic matter in the surface soil.
3. Nutrient loss through erosion on sloping soils is important not only be-

cause of its influence on crop yield but also because of cost of replacement to maintain crop yields. The loss of plant nutrients can be high, even with slight erosion.

4. Loss of surface soil changes the physical condition of the plow layer in soils having finer textured layers below the surface soil. Infiltration rate is reduced; erosion and runoff rates are increased; tilth is diflBcult to maintain; and tillage operations and seedbed preparation are more diflicult.
5. Loss of surface soil by water erosion, soil blowing, or land leveling may expose highly calcareous lower strata that are difficult to make into suitable surface soil.
6. Water-control structures are damaged by sediments due to erosion. Maintenance of open drains and ponds becomes a problem and their capacity is reduced as sediment accumulates.
7. Gullies form as a result of soil loss. This kind of soil damage causes reduced yields, increased sediment damage, and physical difficulties in farming between the gullies.

The steepness of slope, length of slope, and shape of slope (convex or concave) all influence directly the soil and water losses from a field. Steepness of slope is recorded on soil maps. Length and shape of slopes are not recorded on soil maps; however, they are often characteristic of certain kinds of soil, and their effects on use and management can be evaluated as a part of the mapping unit.

Where available, research data on tons of soil loss per acre per year under given levels of management are used on sloping soils to differentiate between capability classes.

Page 32

Soil Depth

Effective depth includes the total depth of the soil profile favorable for root development. In some soils this includes the G horizon; in a few only the A horizon is included. Where the effect of depth is the limiting factor, the following ranges are commonly used: Class I, 36 inches or more; class II, 20-36 inches; class III, 10-20 inches; and class IV, less than 10 inches. These ranges in soil depth between classes vary from one section of the country to another depending on the climate. In arid and semiarid areas, irrigated soils in class I are 60 or more inches in depth. Where other unfavorable factors occur in combination with depth, the capability decreases.

Previous Erosion

On some kinds of soil previous erosion reduces crop yields and the choice of crops materially; on others the effect is not great. The effect of past erosion limits the use of soils (1) where subsoil characteristics are unfavorable, or (2) where soil material favorable for plant growth is shallow to bedrock or material similar to bedrock. In some soils, therefore, the degree of erosion influences the capability grouping.

Available Moisture-Holding Capacity

Water-holding capacity is an important quaHty of soil. Soils that have limited moisture-holding capacity are likely to be droughty and have limitations in kinds and amounts of crops that can be grown; they also present fertility and other management problems. The ranges in water-holding capacity for the soils in the capability classes vary to a limited degree with the amount and distribution of effective precipitation during the growing season. Within a capability class, the range in available moisture-holding capacity varies from one climatic region to another.

Glossary

Alluvial soils Soils developing from transported and relatively recently deposited material (alluvium) with little or no modification of the original materials by soil-forming processes. (Soils with well-developed profiles that have formed from alluvium are grouped with other soils having the same kind of profiles, not with the allu\aal soils.)

Available nutrient in soils The part of the supply of a plant nutrient in the soil that can be taken up by plants at rates and in amounts significant to plant growth.

Available water in soils The part of the water in the soil that can be taken up by plants at rates significant to their growth; usable; obtainable.

Base saturation The relative degree to which soils have metallic cations absorbed. The proportion of the cation-exchange capacity that is saturated with metallic cations.

Cation-exchange capacity A measure of the total amount of exchangeable cations that can be held by the soil. It is expressed in terms of milli-

equivalents per 100 grams of soil at neutrality (pH 7) or at some other stated pH value. (Formerly called base-exchange capacity.)

Clay mineral Naturally occurring inorganic crystalline material in soils or other earthy deposits of clay size—particles less than 0.002 mm. in diameter.

Deep soil Generally, a soil deeper than 40 inches to rock or other strongly contrasting material. Also, a soil with a deep black surface layer; a soil deeper than about 40 inches to the parent material or to other unconsolidated rock material not modified by sou-forming processes ; or a soil in which the total depth of unconsolidated material, whether true soil or not, is 40 inches or more.

Drainage/ soil (1) The rapidity and extent of the removal of water from the soil by runoff and flow through the soil to underground spaces. (2) As a condition of the soil, soil drainage refers to the frequency and duration of periods when the soil is free of saturation. For example, in well-drained soils, the water is removed readily, but not rapidly; in poorly drained soils, the root zone is waterlogged for long periods and the roots of ordinary crop plants cannot get enough oxygen; and in excessively drained soils, the water is removed so completely that most crop plants suffer from lack of water.

Drought A period of dryness, especially a long one. Usually considered to be any period of soil-moisture deficiency within the plant root zone. A period of dryness of sufficient length to deplete soil moisture to the extent that plant growth is seriously retarded.

Erosion The wearing away of the land surface by detachment and transport of soil and rock materials through the action of moving water, wind, or other geological agents.

Fertility, soil The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Field capacity The amount of moisture remaining in a soil after the free water has been allowed to drain away into drier soil material beneath; usually expressed as a percentage of the ovendry weight of soil or other convenient unit. It is the highest amount of moisture that the soil will hold under conditions of free drainage after excess water has drained away following a rain or irrigation that has wet the whole soil. For permeable soils of medium texture, this is about 2 or 3 days after a rain or thorough irrigation. Although generally similar for one kind of soil, values vary with previous treatments of the soil.

First bottom The normal flood plain of a stream, subject to frequent or occasional flooding.

Parent material The unconsolidated mass of rock material (or peat) from which the soil profile develops.

PermeabiHty/ soil The quality of a soil horizon that enables water or air to move through it. It can be measured quantitatively in terms of rate of flow of water through a unit cross section in unit time under specified temperature and hydraulic conditions. Values for saturated soils usually

are called hydraulic conductivity. The permeability of a soil may be limited by the presence of one nearly impermeable horizon even though the others are permeable.

Phase, soil The subdivision of a soil type or other classificational soil unit having variations in characteristics not significant to the classification of the soil in its natural landscape but significant to the use and management of the soil. Examples of the variations recognized by phases of soU types include differences in slope, stoniness, and thickness because of accelerated erosion.

Profile (soil) A vertical section of the soil through all its horizons and extending into the parent material.

Range (or rangelond) Land that produces primarily native forage plants suitable for grazing by livestock, including land that has some forest trees.

Runoff The surface flow of water from an area; or the total volume of surface flow during a specified time.

Saline soil A soil containing enough soluble salts to impair its productivity for plants but not containing an excess of exchangeable sodium.

Señes, soil A group of soils that have soil horizons similar in their differentiating characteristics and arrangement in the soil profile, except for the texture of the surface soil, and are formed from a particular type of parent material. Soil series is an important category in detailed soil classification. Individual series are given proper names from place names near the first recorded occurrence. Thus names like Houston, Cecil, Barnes, and Miami are names of soil series that appear on soil maps and each connotes a unique combination of many soil characteristics.

Sodic soil (alkali) Soil that contains sufficient sodium to interfere with the growth of most crop plants; soils for which the exchangeable-sodium-percentage is 15 or more.

Soil (1) The natural medium for the growth of land plants. (2) A dynamic natural body on the surface of the earth in which plants grow, composed of mineral and organic materials and living forms. (3) The collection of natural bodies occupying parts of the earth's surface that support plants and that have properties due to the integrated effect of climate and living matter acting upon parent material, as conditioned by relief, over periods of time.

A soil is an individual three-dimensional body on the surface of the earth unlike the adjoining bodies. (The area of individual soils ranges from less than ^ acre to more than 300 acres.)

A kind of soil is the collection of soils that are alike in specified combinations of characteristics. Kinds of soil are given names in the system of soil classification. The terms "the soil" and "soil" are collective terms used for all soils, equivalent to the word "vegetation" for all plants.

Soil Characteristic A feature of a soil that can be seen and/or measured in the field or in the laboratory on soil samples. Examples include soil slope and stoniness as well as the texture, structure, color, and chemical composition of soil horizons.

Soil management The preparation, manipulation, and treatment of soils for the production of plants, including crops, grasses, and trees.

Soil quality An attribute of a soil that cannot be seen or measured directly from the soil alone but which is inferred from soil characteristics and soil behavior under defined conditions. Fertility, productivity, and erodibility are examples of soil qualities (in contrast to soil characteristics).

Soil survey ^ A general term for the systematic examination of soils in the field and in the laboratories, their description and classification, the mapping of kinds of soil, and the interpretation of soils according to their adaptability for various crops, grasses, and trees, their behavior under use or treatment for plant production or for other purposes, and their productivity under different management systems.

Structure, soil The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are platy, prismatic, columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are (1) single grain—each grain by itself, as in dune sand, or (2) massive—the particles adhering together without any regular cleavage as in many claypans and hardpans, ("Good" or "bad" tilth are terms for the general structural condition of cultivated soils according to particular plants or sequences of plants.)

Subsoil The B horizons of soils with distinct profiles. In soils with weak profile development, the subsoil can be defined as the soil below the plowed soil (or its equivalent of surface soil), in which roots normally grow. Although a common term, it cannot be defined accurately. It has been carried over from early days when "soil" was conceived only as the plowed soil and that under it as the "subsoil."

Surface soil The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness.

Texture/ soil The relative proportions of the various size groups of individual soil grains in a mass of soil. Specifically, it refers to the proportions of sand, silt, and clay.

Type, soil A subgroup or category under the soil series based on the texture of the surface soil. A soil type is a group of soils having horizons similar in differentiating characteristics and arrangement in the soil profile and developed from a particular type of parent material. The name of a soil type consists of the name of the soil series plus the textural class name of the upper part of the soil equivalent to the surface soil. Thus Miami silt loam is the name of a soil type within the Miami series.

Water table The upper limit of the part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

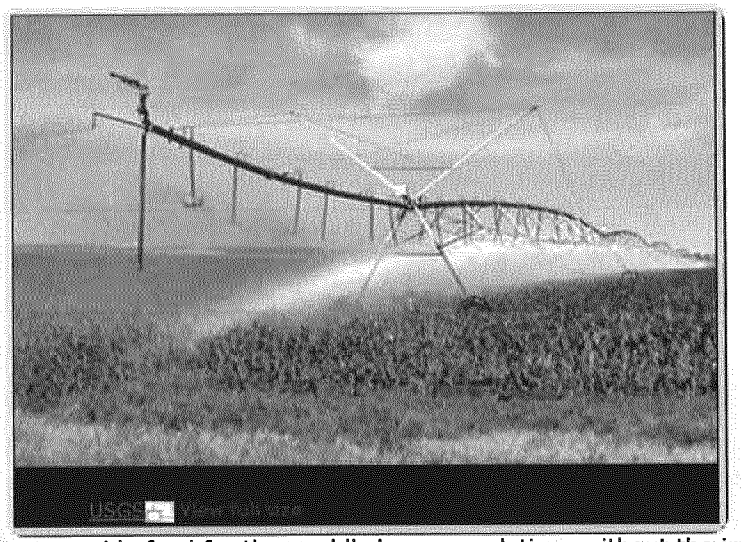
Water-holding capacity The capacity (or ability) of soil to hold water against gravity (see **Field capacity**). The water-holding capacity of sandy soils is usually considered to be low while that of clayey soils is high. It is often expressed in inches of water per foot depth of soil.

Waterlogged A condition of soil in which both large and small pore spaces are filled with water. (The soil may be intermittently waterlogged because of a fluctuating water table or waterlogged for short periods after rain.)

^ U.S. GOVERNMENT PRINTING OFFICE: 1961

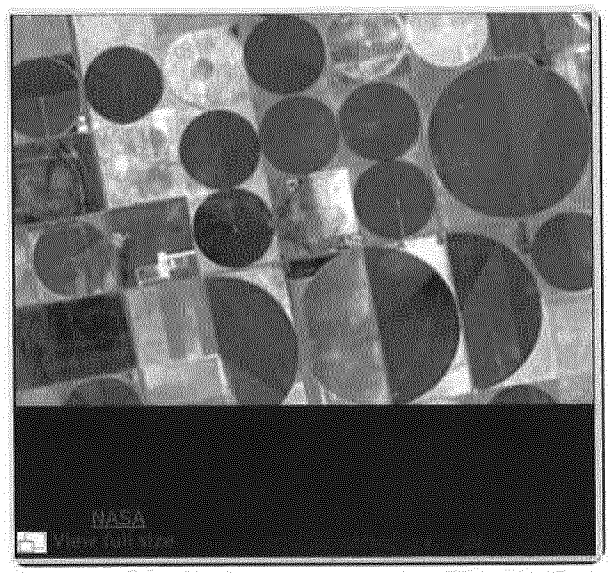
Exhibit G

Irrigation water use



Think of what your supper table might be like if water was not used to irrigate crops. Do you think you could survive very long without heaping servings of eggplant, beets, brussels sprouts, and rutabagas? Irrigation water is essential for keeping fruits, vegetables, and grains growing to feed the world's population, and this has been a constant for thousands of years.

Throughout the world, irrigation (water for agriculture, or growing crops) is probably the most important use of water (except for drinking and washing a smelly dog, perhaps). Estimates vary, but about 70 percent of all the world's freshwater withdrawals go towards irrigation uses (http://www.globalagriculture.org/report-topics/water.html). Large-scale farming could not provide food for the world's large populations without the irrigation of crop fields by water gotten from rivers, lakes, reservoirs, and wells. Without irrigation, crops could never be grown in the deserts of California, Israel, or my tomato patch.



Irrigation has been around for as long as humans have been cultivating plants. Man's first invention after he learned how to grow plants from seeds was probably a bucket. Ancient people must have had strong backs from having to haul buckets full of water to pour on their first plants. Pouring water on fields is still a common irrigation method today—but other, more efficient and mechanized methods are also used. One of the more popular mechanized methods is the center-pivot irrigation system, which uses moving spray guns or dripping faucet heads on wheeled tubes that pivot around a central source of water. The fields irrigated by these systems are easily seen from the air as green circles. There are many more irrigation techniques farmers use today, since there is always a need to find more efficient ways to use water for irrigation

When we use water in our home, or when an industry uses water, about 90 percent of the water used is eventually returned to the environment where it replenishes water sources (water goes back into a stream or down into the ground) and can be used for other purposes. But of the water used for irrigation, only about one-half is reusable. The rest is lost by evaporation into the air, evapotranspiration from plants, or is lost in transit, by a leaking pipe, for example.

Exhibit G

Exhibit H

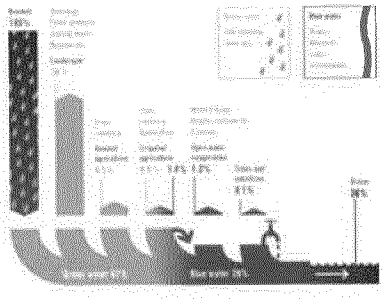
Agriculture at a Crossroads

Findings and recommendations for future farming

Water

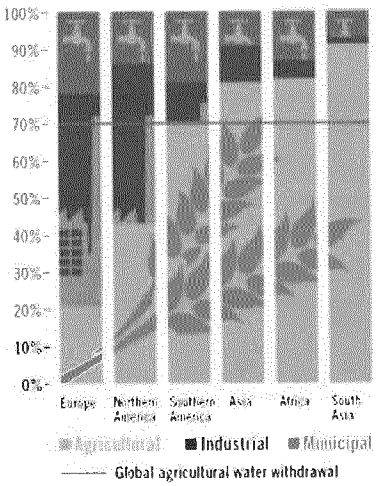
Water is getting scarce – but what does this actually mean? After all, the planet never loses a single drop of H_2O. Although water is a finite resource, it will not be used up as long as we do not render it permanently unusable. However, it is important to integrate human water usage into the natural hydrological cycle and to use the locally available water in an adequate, effective, sustainable and fair way. «» Despite significant progress in this area, there are still millions of people who do not have access to safe drinking water. Everyday, millions of women and children have to walk long, and often dangerous, distances in order to collect water and carry it home. As is the case for food and land, access to clean drinking water and water for agricultural usage is unequally distributed.

Green and blue water



When it comes to freshwater most people think of water in rivers and lakes, groundwater and glaciers, the so-called "blue water". Only part of the rainfall feeds this freshwater supply. The majority of rainfall comes down on the Earth's surface and either evaporates directly as "non-beneficial evaporation" or, after being used by plants, as "productive transpiration". This second type of rainwater is termed "green water". The green water proportion of the total available freshwater supply varies between 55% and 80%, depending on the region of the world, as well as local wood density. The biggest opportunity and challenge for future water management is to store more green water in soil and plants, as well as storing it as blue water. «»

Competition for a scarce resource



Agriculture is by far the largest consumer of the Earth's available freshwater: 70% of "blue water" withdrawals from watercourses and groundwater are for agricultural usage, three times more than 50 years ago. By 2050, the global water demand of agriculture is estimated to increase by a further 19% due to irrigational needs. Approximately 40% of the world's food is currently cultivated in artificially irrigated areas. Especially in the densely populated regions of South East Asia, the main factor for increasing yields were huge investments in additional irrigation systems between the 1960s and 1980s. It is disputed where the further expansion of irrigation, as well as additional water withdrawals from rivers and groundwater, will be possible in the future, how this can take place and whether it makes sense. Agriculture already competes with peoples' everyday use and environmental needs, particularly in the areas where irrigation is essential, thus threatening to literally dry up ecosystems. In addition, in the coming years, climate change will bring about enormous and partly unpredictable changes in the availability of water.

>>more

Facts & Figures

Between 1990 and 2012, over 2.3 billion people gained access to improved water sources and 2 billion to improved sanitation facilities. However, by the end of 2012, over 748 million people - 90% living in sub-Saharan Africa and Asia - were still without access to improved sources of drinking water, 82% of them in rural areas. 2.5 billion people still use unimproved sanitation facilities.

- Progress on Drinking Water and Sanitation: 2014 Update. WHO/UNICEF 2014

Contaminated water can transmit diseases such diarrhoea, cholera, dysentery, typhoid and polio. Contaminated drinking water is estimated to cause more than 502,000 diarrhoeal deaths each year.

Institutions

- FAO - Water website of the Food and Agriculture Organisation on water issues
- Aquastat FAO database on water and agriculture
- OECD - Water on water use in agriculture
- EEA European Environment Agency offers news, articles and publications linked to water
- European Commission on agriculture and water
- World Bank - Water publications, data and information on topics such as agricultural water management and irrigation
- World Health Organisation provides information on water quality, water scarcity and sanitation
- JMP WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation
- IWMI International Water Management Institute the CGIAR research centre wants to improve the management of land and water resources

Exhibit H

- Water: Fact sheet N°391. WHO, June 2015

A combination of rising global population, economic growth and climate change means that by 2050 five billion (52%) of the world's projected 9.7 billion people will live in areas where fresh water supply is under pressure. Researchers expect about 1 billion more people to be living in areas where water demand exceeds surface-water supply.

- The Future of Global Water Stress. Massachusetts Institute of Technology, 2014

69% of the world's freshwater withdrawals are committed to agriculture. The industrial sector accounts for 19% while only 12% of water withdrawals are destined for households and municipal use.

- Water withdrawal by sector. Aquastat, September 2014

Future global agricultural water consumption (including both rainfed and irrigated agriculture) is estimated to increase by about 19% to 8,515 km^3 per year by 2050.

- The United Nations World Water Development Report 4, Volume 1, p. 47. UNESCO, 2012

Every day for more than 20 years, an average of 2,000 hectares of irrigated land in arid and semi-arid areas across 75 countries have been degraded by salt. Today about 62 million hectares are affected - 20% of the world's irrigated lands. This is up from 45 million hectares in the early 1990s.

- World Losing Farm Soil Daily to Salt-Induced Degradation. Institute for Water, Environment and Health, 2014

Anthropogenic inputs of excess nutrients into the coastal environment, from agricultural activities and wastewater, have dramatically increased the occurrence of coastal eutrophication and hypoxia.

Worldwide there are now more than 500 "dead zones" covering 250,000 km^2, with the number doubling every ten years since the 1960s.

- Issue Brief: Ocean Hypoxia - 'Dead Zones'. United Nations Development Programme, 2013

Agriculture is a significant water user in Europe, accounting for around 33% of total water use. This share varies markedly, however, and can reach up to 80% in parts of southern Europe, where irrigation of crops accounts for virtually all agricultural water use.

- Towards efficient use of water resources in Europe. European Environment Agency, 2012

According to the OECD Environmental Outlook to 2050, global water demand will increase by 55% due to growing demand from manufacturing (+400%), thermal power plants (+140%) and domestic use (+130%). These competing demands will put water use by farmers at risk. 2.3 billion more people than today - 40% of the global population - will be living in river basins under severe water stress.

- OECD Environmental Outlook to 2050: The Consequences of Inaction. Highlights. OECD, 2012

Irrigation provides approximately 40% of the world's food, from an estimated 20% of agricultural land, or about 300 million hectares globally. Almost half of the total area being irrigated worldwide is located in Pakistan, China and India, and covers 80%, 35% and 34% of the cultivated area respectively.

- Climate change, water and food security. Water Report 36. FAO, 2011

Exhibit H

SORRY
printer problem

As wildfires rage in West, ranchers lose cattle, rangeland

By **GOSIA WOZNIACKA (/content/gosia-wozniacka)**

Sep. 14, 2015 11:20 AM EDT

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RAGE-WEST-RANCHERS-LOSE-CATTLE-RANGELAND)

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frontman-asks-donald-trump-stopping-using-song)
(http://bigstory.ap.org/article/aeb72360137e4613b503a0d
killer-heads-death-row-1st-texas-2015)
(http://bigstory.ap.org/article/e298bf88b2614c0283c80a8e
source-chase-utley-appeal-hearing-unlikely-monday)
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EXHIBIT I

In this Thursday, Aug. 20, 2015 photo, Gale Sheppard evacuates her horses as a wildfire approaches... **Read more**

PORTLAND, Ore. (AP) — For weeks, rancher Darrel Holliday has rounded up frightened cows and calves off the smoldering hills of the Strawberry Mountain Range, a wilderness area in eastern Oregon of old-growth forest and grass where wildlife and cattle roamed.

Holliday's entire federal forest grazing allotment of about 32,000 acres — 50 square miles — burned last month as a wildfire ravaged the area. The land is now a smoke-filled expanse of blackened tree sticks and ash a foot and half deep.

"We're picking up cows that should have calves with no calves. We assume they might have died out there," said Holliday, who is still missing 22 of his 180 cow-calf pairs. He's among dozens of ranchers similarly wrestling with the loss of animals and grazing land in a region where cattle production is one of the leading agricultural industries.

The vast majority of the 1.6 million acres — nearly 2,600 square miles — that burned in Oregon, Idaho and Washington this year are federally owned, data show, with large swaths of that public land used as rangeland for livestock grazing.

Many of Holliday's recovered animals have burnt hooves or are lame from walking on hot coals, he said. Miles of fences have burned. And the land, for which Holliday pays a fee, will likely be closed to grazing for at least two years while it recovers, he said.

Going to need additional 2 bales hay. Exhibit I

you get sick to your stomach every day you go out there."

In Oregon's Canyon Creek Complex alone, 125 of the 170 square miles burned were grazing allotments, said Malheur National Forest rangeland management specialist Nick Stiner. Some 4,000 cows ranged on those allotments, he said.

And in the Soda Fire in southwest Idaho, that state's biggest fire this year, 280 of the 430 square miles burned were federal grazing allotments and another 75 square miles were private grazing lands, according to the National Interagency Fire Center.

In addition to rangeland lost, ranchers and ranching groups say hundreds of cows have perished and millions of dollars' worth of hay stacks and barns has gone up in flames.

"We're hearing lots of reports of displaced cattle and grazing grounds that are no longer usable," said Kayli Hanley of the Oregon Cattlemen's Association, which says many ranchers are still assessing damage and looking for lost cows.

In northern Washington state, where the Okanogan Complex burned about 475 square miles and is considered the largest wildfire in state history, rancher Doug Grumbach found the burned carcasses of several cows on a hill among smoldering trees.

One of those cows became wedged between two trees trying to flee the flames.

When the fire started last month, the fourth-generation rancher was on his way to move the cows dispersed in the mountainous terrain.

Sorry ↑

But, he said, the winds picked up and the fire exploded, so "we had to get ourselves out of there."

In total, eight of his cows and four calves died and 20 are still unaccounted for — a loss of tens of thousands of dollars. He's also treating calves and cows with burnt feet, severe body burns and respiratory problems.

"They're kind of like family ... you care for them all their life, so you hate for anything to happen to them," he said.

Grumbach said he doesn't have enough unburned private land to feed his cattle; his cows are now eating hay meant for winter feed. And because of the drought, he doesn't have as much hay as usual, he said.

Many ranchers like Grumbach are desperately looking for pastures and hay, said Wyatt Prescott of the Idaho Cattle Association. Those who can't afford feed, he said, are sending their animals to sale yards.

"Producers spend generations developing the genetics of their cows to produce the best beef. Liquidating part of their herd is something they try to avoid at all costs," Prescott said.

His group is facilitating a confidential online pasture exchange where farmers who have land out of production can lease it to those who lost their grazing grounds.

Idaho rancher Brenda Richards, who runs about 500 cow-calf pairs, lost 95 percent of her grazing allotment to the Soda Fire.

"Ranching is the strength of these local communities, that's our tax base," Richards said, adding that the fire has been devastating

Every Irrigated Acre counts!

but it also brought out local ties. "It was amazing to watch people come together."

Cattle associations and private groups are now collecting hay and distributing it to those who lost rangeland.

In eastern Oregon, convoys of trucks have hauled in about 600 tons of hay from donors inside and outside the state to a storage set up by newly-formed group Hay for John Day, a town just northwest of the Strawberry Mountain Range.

The historic fire season has also re-kindled a long-running debate.

Ranchers say the federal government should have allowed more grazing to reduce the severity of the wildfires. Environmental groups say more grazing would have increased soil erosion and riparian damage, removed native grasses and increased fire risk.

Federal officials stand in the middle: grazing, they say, may help slow some fires' spread, but it won't make a difference in extreme weather.

"When you have high winds, grazing won't stop or slow that fire," said Jessica Gardetto with the Bureau of Land Management.

Irrigated Acres helps Deschutes County achieve this kind of support when a need appears.

Exhibit J

Tuesday, October 13, 2015 11:02 am

Fire destroys large haystacks north of Prineville

Nearly 2,500 tons burn; smoke to rise for days

From KTVZ.COM news sources

POSTED: 12:26 PM PDT October 12, 2015
UPDATED: 2:44 PM PDT October 12, 2015

Crook County Fire & Rescue

Haystacks with nearly 2,500 tons of hay burn early Monday near Barnes Butte, north of Prineville

PRINEVILLE, Ore. - Nearly 2,500 tons of hay were destroyed in a costly fire early Monday north of Prineville that likely was sparked by spontaneous combustion, officials said.

"Somebody noticed the glow" in the sky north of Barnes Butte and called authorities around 12:40 a.m., prompting the call-out of Crook County Fire & Rescue, said Fire Cief Matt Smith.

Crews arrived and found three large haystacks fully involved in fire, Smith said.

At roughly $230 a ton, the losses total nearly $575,000.

Crews were on scene for about two or three hours, Smith said, adding that it's likely they will continue to burn and put out a lot of smoke for two or three days.

The cause of the fire is under investigation, but likely spontaneous combustion, the fire chief said. There were no injuries, and no other structures were threatened. Farm equipment was moved from around the haystacks, he added.

Exhibit J

harder to till and have lower productivity than those that have desirable thickness of surface soil. To compensate for surface soil loss, better fertilization, and other management practices should be used. Increasing the organic matter content of an eroded soil often improves its tillage characteristics, as well as its water and nutrient capacity. Erosion can be the result of running water or wind, or can be the result of land leveling during home construction. Whatever the cause, generous use of soil amendments, organic materials and necessary fertilizers can help speed the conversion of poor quality subsoil into high quality top soil.

COMPONENTS OF SOIL

Organic Matter

Organic matter in soil consists of the remains of plants and animals. When temperature and moisture conditions are favorable in the soil, earthworms, insects, bacteria, fungi, and other types of plants and animals use the organic matter as food, breaking it down into humus (the portion of organic matter that remains after most decomposition has taken place) and soluble nutrients. Through this process, materials are made available for use by growing plants. In addition, organic material has a very high cation exchange capacity, so nutrients are retained in plant-available form. The digested and decomposing organic material also helps develop good soil-air-water relationships.

In sandy soil, organic material occupies some of the space between the sand grains, thus binding these together and increasing water-holding capacity. In a finely textured or clay soil, organic material on and around soil particles creates aggregates of the fine soil particles, allowing water to move more rapidly around these larger particles. This grouping of the soil particles into aggregates or peds makes soil mellow and easier to work.

Organic matter content depends primarily on the kinds of plants that have been growing in a soil, the long-term management practices, temperature, and drainage. Soils that have native grass cover for long periods usually have a relatively high organic matter content in the surface area. Those that have desert or native forest cover usually have relatively low organic matter content. In either case, if the plants are grown on a soil that is poorly drained, the organic matter content is usually higher than where the same plants are grown on a well-drained soil. This is due to differences in

available oxygen which is needed by the organisms that attack and decompose the organic material. The activity of soil microorganisms is temperature dependent. Soils in a cooler climate such as in Northern Arizona have more organic matter than those in the southern Arizona deserts where the climate is much hotter.

Water and Air

Water in the soil ultimately comes from precipitation (rain, snow, hail, or sleet), entering the soil through cracks, holes, and openings between the soil particles. As the water enters, it pushes the air out. Oxygen is taken up by roots for respiration. If air is unavailable for too long, the roots will die.

Plants use some water, some is lost by evaporation, and some moves so deep into the soil that plant roots cannot reach it. If it rains very hard or for a long time, some of it is lost through surface run-off.

When organic matter decomposes in the soil, it gives off carbon dioxide. This carbon dioxide replaces some of the oxygen in the soil pores. As a result, soil air contains less oxygen and more carbon dioxide than the air above the soil surface. Carbon dioxide is dissolved by water in the soil to form a weak acid (carbonic acid). This solution reacts with the minerals in the soil to form compounds that can be taken up and used as foods by the plants.

Plant Nutrients

Plants need 18 elements for normal growth. Carbon, hydrogen, and oxygen (come from air and water). Nitrogen is a major plant constituent. Although the atmosphere is 78% nitrogen, it is not directly available for plant use. However, certain bacteria that live in nodules on the roots of legumes are able to fix nitrogen from the air into a form available to plants. Beans, peas, and Mesquite and Acacia trees, and alfalfa, are examples of legume plants.

The other 14 essential elements are iron, calcium, phosphorus, potassium, copper, sulphur, magnesium, manganese, zinc, boron, chlorine, cobalt, nickel and molybdenum. These elements come from the soil.

With the exception of nitrogen, phosphorus, and iron there is usually a large enough quantity of each of these elements in Arizona soils for cultivation of crops. Irrigation and rain water also can contain ample amounts of some essential plant nutrients.

ment to maintain crop yields. [illegible]
even with slight erosion.

4. Loss of surface soil changes the physical condition of the plow layer in soils having finer textured layers below the surface soil. Infiltration rate is reduced; erosion and runoff rates are increased; tilth is difficult to maintain; and tillage operations and seedbed preparation are more diflicult.
5. Loss of surface soil by water erosion, soil blowing, or land leveling may expose highly calcareous lower strata that are difficult to make into suitable surface soil.
6. Water-control structures are damaged by sediments due to erosion. Maintenance of open drains and ponds becomes a problem and their capacity is reduced as sediment accumulates.
7. Gullies form as a result of soil loss. This kind of soil damage causes reduced yields, increased sediment damage, and physical difficulties in farming between the gullies.

The steepness of slope, length of slope, and shape of slope (convex or concave) all influence directly the soil and water losses from a field. Steepness of slope is recorded on soil maps. Length and shape of slopes are not recorded on soil maps; however, they are often characteristic of certain kinds of soil, and their effects on use and management can be evaluated as a part of the mapping unit.

Where available, research data on tons of soil loss per acre per year under given levels of management are used on sloping soils to differentiate between capability classes.

Page 22

Soil Depth

Effective depth includes the total depth of the soil profile favorable for root development. In some soils this includes the G horizon; in a few only the A horizon is included. Where the effect of depth is the limiting factor, the following ranges are commonly used: Class I, 36 inches or more; class II, 20-36 inches; class III, 10-20 inches; and class IV, less than 10 inches. These ranges in soil depth between classes vary from one section of the country to another depending on the climate. In arid and semiarid areas, irrigated soils in class I are 60 or more inches in depth. Where other unfavorable factors occur in combination with depth, the capability decreases.

Previous Erosion

On some kinds of soil previous erosion reduces crop yields and the choice of crops materially; on others the effect is not great. The effect of past erosion limits the use of soils (1) where subsoil characteristics are unfavorable, or (2) where soil material favorable for plant growth is shallow to bedrock or material similar to bedrock. In some soils, therefore, the degree of erosion influences the capability grouping.

Available Moisture-Holding Capacity

Water-holding capacity is an important quaHty of soil. Soils that have limited moisture-holding capacity are likely to be droughty and have limitations in kinds and amounts of crops that can be grown; they also present fertility and other management problems. The ranges in water-holding capacity for the soils in the capability classes vary to a limited degree with the amount and distribution of effective precipitation during the growing season. Within a capability class, the range in available moisture-holding capacity varies from one climatic region to another.

Glossary

Exhibit L

This is from the

Capability Classification Handbook 210

per Mr. Borine in his sept. 10 letter

CLASS
Soil Depth
Class I 36+
II 20-36
III 10-20
IV 10 or less

Soil depth is only one component of classification.

A sandy beach is 10ft deep. Depth has nothing to do with class. other than these general rules.

(18)

Exhibit (L)

CHAPTER 5

Soil Improvement on Pasture Lands

0N grazing properties generally, compaction of the soil has developedfrom the tramping of stock. This tends to limit the pore space and the free movementof oxygen in the soil. These soils change as distinct zones are formed by compactedhorizons below the shallow grass root depth. The natural movements throughout thewhole of the soil becomes more restricted, less deep mineral material finds its wayto the topsoil to replenish it, and the soil gradually becomes impoverished of bothhumus and minerals. An unnatural division of the soil into layers is made. Only theshallow top soil, with its rapidly diminishing minerals, is available.

Good grass species tend to run out, as the whole pasture deteriorates;less rain is absorbed; soil losses may occur; valleys become too moist and sour orthey erode; hills become dryer and less productive.

This pasture now needs two things that it has lost and which can besupplied by proper cultivation, enabling its processes to be stimulated again. Theyare air and water; or simply absorption capacity which will enable the soil to absorband hold the rain that falls on it. Although the soil cannot be put back in perfectcondition in one operation, it can be progressively improved to a condition usuallybetter than it was originally.

Single working Keyline cultivation with a depth of penetration justthrough the top soil into the compacted zone is a logical first means to supply boththe air and moisture required. Excellent results will follow this work completedin the autumn. Another suitable time is probably a few weeks before each locality'sbest rainfall season.

Spike or chisel furrows 12 inches apart and at the depth previouslysuggested, break or crack the continuous horizon of compacted material that now dividesthe full depth of this soil. With aeration and quick moisture penetration the wholenessor completeness of all the soil's depths is brought back progressively. The decayof dead and dying root growth again adds rapidly to soil fertility by the formationof humus below the pasture.

Some pasture grass is destroyed in this process by being uprooted,and further pasture becomes temporarily unavailable to stock by being partly clodand sod covered. Within a very short period a much improved pasture, both in qualityand quantity, is again available. The soil is coming to life again.

Exhibit L

It may be appropriate at this time also to introduce new species ofclover or grasses to assist the development further. The use of lime or fertiliseris often of considerable advantage in commencing a new cycle of fertility in thepoor soils.

It is often highly profitable to conduct a two- or three-year planfor the improvement of a very poor soil paddock.

First Year.--One Keyline cultivation working approximately 4-1/2 inches deep with spike spacing 12 inches apart is given in the autumn.

Second Year.--Another Keyline cultivation working five to seven inches deep with spike spacing 24 inches apart.

Third Year.--A further Keyline cultivation working seven to ten inches deep with spike spacing 36 inches apart.

Stock is moved off the area immediately prior to each Keyline cultivationworking and not returned until some weeks after the first rain has fallen on thearea.

The clods quickly become improved in structure and are partly distributedby the stock over the surface, thus forming a valuable top-dressing to promote furtherabsorption, decay and fertility. Careful stocking of this treated pasture can makeit still more effective. Soils so treated are in a perfect condition, especiallyif frosts have operated on the clods, for rapid response to all other means of increasingsoil fertility and yield.

Rotational grazing, strip grazing and smear harrow treatment, by greatlyincreasing the effectiveness of the use of the fertility potential of the animaldroppings, are outstanding in their fertility effect on this treated soil.

By this means poor shallow soils will not only become more fertile,but will be converted profitably into areas of considerably increased soil depth.

If the depth of fertile soil is doubled, the profit margin is increasedmany times.

The aim of progressive development by progressive increase in penetrationdepths for maximum absorption-fertility is of outstanding importance.

February pasture on Nevallan" (not irrigated). In the picture with meis Ginger, one of our pets. Ginger was badly burned in the bush fire on "Yobarnie"in 1944. Pasture--lucerne, rhodes, clovers, cocksfood-is under two years old.

The drastic deep ripping or subsoiling of pastures on the poorer thinsoils, while probably increasing first year yield, will all too often be disappointingin yield for following years. Deep ripping with rigid implements is very costly andthrows up clods which are too big. Heavy soil will not remain open to this depthbut will reseal with the first good rain. There is no profit in taking depth thatcannot be held. The topsoil fertility will fail to produce a rapid soil change inthe subsoil if it is given too much depth of subsoil to "convert". Againconsider the topsoil as a yeast and do not subject it to too great a dilution--asmay take place in the case of overall deep ripping or subsoiling.

The present methods of subsoiling crop land, where deep sub-soilersrip the soil to 24 inches deep, and surface cultivating implements follow, is wrong.The fine surface cultivation of deep subsoiling largely offsets the benefits of themoisture and air absorption capacity of the subsoiling. All the benefits of subsoiling,without its usual disadvantages and high cost, are obtained in the final deeper runof Keyline cultivation. Extra depth can be obtained by increasing the cultivatingrow spaces.

The object of Keyline cultivating below the soil into the subsoilis always the improvement of soil fertility and the conversion of this subsoil intomore fertile soil. It can be done most profitably and economically only as a progressiveprocess.

Compacted soils of all types have lost the natural fertility potentialthat is available to all soils of good structure. The continuous decay and humusformation from the considerable amount of grass roots material which dies each yearis almost entirely wasted.

Poor compacted pasture land usually has available to it every ingredientfor a rapid fertility increase except oxygen and water, and these two are preventedfrom operating fully.

Minerals of all necessary kinds are usually only inches below thepoor pasture. The urine and dung of the animals are available in sufficient quantity.Materials for aerobic decay and humus formation exist in the grass roots, all ofwhich have not been completely lost.

One low cost fast run with spikes or chisels on the Keyline principlemakes available all the ingredients for a new fertility. Within a few weeks afterrain on this cultivation, the return of life to the soil and pasture can be seenin the rapidly changing structure of the soil.

Whenever pasture land shows sign of surface sealing or compactionit should be treated in this way. If and when the second cultivation is requiredit is made deeper. The same high speed and low cost is obtained by increasing thespike or chisel row spacings. Actual soil depth is increased this way.

On the slopes below "Nevallan" Homestead. "Keyline Cultivation"for soil and pasteure improtement a few days after the first shower of rain. Thearea shown in the lower half of the picture was originally pasture sown on shallowdisking. After this one Keyline cultivation, pasture growth improved fourfold.

As soil becomes more and more fertile, less and less aeration by cultivationis necessary. Reasonably well managed highly fertile soil will look after itself.It will absorb all the available factors of fertility and aerate itself. It willpreserve its own "life", including the beneficial earthworms.

Fertile soil and pasture absorb moisture rapidly, store it deeplyand the soil aerates itself.

Other plant nutrient as well as oxygen and water reach the earth inthe rainfall. These are largely absorbed into the soil and held if the soil is properlytreated.

⊛ ⊛ ⊛

When poor pasture land is to be completely cultivated to kill allgrowth for the replanting of a new pasture, it is treated as described for conversionyear cultivation.

Grass seeds are sown into this cultivation with outstanding resultsby seeding with an ordinary grain

combine with the cultivating tines removed. Foreven sowing and better germination, a flow medium of some kind mixed with the grassseed is a great advantage. Sow into the moisture zone some time after rain has fallen.

If the soil is of poor structure--low in humus--watch it against possiblesurface sealing after heavy rain. If it seals give it one working when it is dryenough. Follow the Keyline cultivation with spike spacings 24 inches apart.

If pasture tends to run out something is definitely wrong. Apart fromoverstocking or indifferent stocking management, the cause will be moisture wastage--shortageof oxygen--or both. If pasture land is assisted by correct cultivation to absorbmoisture and air it will continue to improve in fertility and productiveness andwill not run out.

To-day most pastures tend to deteriorate, and these declining pasturesare ploughed up, a crop or two taken and re-sown again to grass and legumes. Thepoorest pasture paddock is usually selected to be used in this way.

If crops are to be taken on pasture land only good pastures shouldbe used.

Any farmer would be reluctant now to take this course, but if allhis pastures were good, he may select his best pasture paddock for cropping. Anythree-year-old pasture should be good, and improving. The newly sown pasture willprobably be the lowest yielding, but will be improving rapidly with the soil fertility.The farmer will select his best soil and pasture for his crops and so allow timefor his newer and poorer pasture to improve with the soil before they in turn comeup for cropping.

Some pastures may need Keyline cultivation for fertility by absorptioneach year for two years, and need the treatment again in three years, then five ormore years later.

As both the soil and pasture improve, better grasses may be introducedwith any Keyline cultivation.

An improving soil will more truly indicate its requirements in mineralsor trace elements--should these be necessary--than a soil that is being forced toyield by one or more of the popular methods of extractionfertility.

There are numerous methods and techniques for pasture improvement,some good, some very bad.

Pasture improvement can be obtained--temporarily at least--by moreefficient methods of extracting the remaining fertility of the soil. It can be securedproperly and permanently only by methods that primarily improve soil structure, fertilityand depth. It is wrong to use chemical fertilisers only to improve pastures. A fertiliser,if used, should be used in such a way as directly to improve the soil. This improvedsoil will give an improved pasture, thus commencing a cycle of soil fertility, permanentlyimproving pastures.

If fertilisers cannot be used on soil apparently requiring them toassist directly in "triggering-off" this new cycle of soil fertility, thesoil is much better off without the fertiliser.

Soils that do require the use of fertiliser also usually need, andmuch more urgently, the application of the principles of absorption-fertility.

If the soil is very low in humus, the first full green growth on thissoil should be plowed into it. This will

start the cycles of fertility and increasingyields. Fertilise to improve soil and depend on improved soil only for increasedyields.

The recent enthusiasm for pasture improvement in Australia has unfortunatelyemphasised the wrong word. "Soil improvement" is the only real basis forlong-term pasture improvement.

It is more than likely, indeed almost certain, that the introductionof new grasses and fertiliser to increase rapidly the stock-carrying capacity ofpoor soil, is providing the farmer with another method of extracting the fertilityof the soil. The soil must always be considered first. Increase absorption, manufacture--humusunder the pasture, improve the structure of the soil, increase soil "life",then the improved grasses will readily assist in the full development of soil fertilityand produce abundant pastures.

It is fully recognised, however, that some methods and techniqueshave produced outstanding pastures.

Disc implements have on occasions been used exclusively, and haveimproved soil and pasture on soil that had lost its condition and some of its fertility.The shallow disc plowing into the soil of crops of weeds and later sowing pasturegrasses by the methods of broadcasting or "direct-drop" and then harrowing,may give an outstanding pasture for a few years.

By improving top soil fertility, actual improvement of soil depthmay take place very slowly, but the pastures tend to "run-out".

Such pasture treated by the Keyline method for soil and pasture improvementwill produce rapid and permanent soil and pasture improvement.

Very fertile soils on occasions require Keyline cultivation.

After big floods recede from farming and grazing land there is usuallystriking evidence of the damage caused to the soil by waterlogging. The soil hasbeen partly killed by too much water. It is literally "dying-for-air".Pastures which grow out of this soil are not healthy stock food, although the grassmay be growing well. It is the type of food suitable for the hordes of pests thatfeed on the products of infertile or "sour" soils. These pests locate thisfood and devour it as they breed in countless millions. They may "foul"the soil to such an extent that stock will not graze what may remain. With the infestation,weeds often grow in profusion.

This soil needs Keyline aeration cultivation immediately it is dryenough. The "sickness' is then cured and the soil will be almost immune to thesepests. A fast working of the land with tines spaced at 12 or 24 inches apart at adepth of four to five inches is all that may be necessary to bring this soil backto a healthy state. Deeper cultivation depth on the wider spacing could be considered.

Disc implements and mouldboard plows are not recommended because theyare unsuitable for following the lines of Keyline cultivation. They do not promoterapid soil improvement and are incapable of the correct deeper cultivation.

Mixed growths of vine and rough grass may be given one shallow runwith a disc implement and immediately followed with the spiked implements. Keylinecultivation must always be followed.

An outstanding pair of implements for soil improvement particularlywhere the growth is heavy and matted, is the Mulch Mower and the Graham Plow.

The Mulch Mower can be used also to the great benefit of the soilany time pasture growth is high and not required for immediate stocking or fodderconservation.

Exhibit B M

Deschutes County
Agricultural Resource Lands Project

AGRICULTURAL PROFILE

Redmond/Tumalo/Bend Subzone

- Irrigated pasture and some hay
- Small scale, part-time, subsidized non-commercial agriculture
- 81% of tracts gross less than $20,000

  36% of tracts gross less than $10,000
- 59% of acreage on tracts grossing less than $20,000

  18% of acreage on tracts grossing less than $10,000
- 58% of potential gross sales on tracts grossing less than $20,000

  19% of potential gross sales on tracts grossing less than $10,000
- Number of contiguous ownership tracts = 435
- Median irrigated acres = ± 23
- Median potential gross sales = $12,000
- Soils Class 1-2 = 17.4%

  3 = 38.5%

  (irrigated) 4-5-6 = 10.6%

  (dry) 4-5-6-7 = 33.5%

CLASS VII SOILS NOT Shown or found to be irrigated. Irrigated class VII doesn't exist. But it does in this application?

3

Exhibit M

Exhibit N

Principles of Alfalfa Production in Central Oregon

Special Report 483
April 1977

Exhibit N

CONTENTS

Page 3

PRINCIPLES OF ALFALFA PRODUCTION IN CENTRAL OREGON

W. M. Murphy and M. J. Johnson*

INTRODUCTION

Alfalfa hay yields in Central Oregon are only about one-half of their potential level. Annual yields of 4 to 5 tons per acre have been considered to be very good, but if the best known establishment and management practices are conscientiously applied, much higher yields are possible. Studies done at the Central Oregon Experiment Station, Redmond have clearly shown that more than 8 tons of hay per acre can be produced (11). This report discusses aspects of soil conditions, seed inoculation, seeding, weed control, irrigation, cutting time, and spring and fall management that require attention to increase production.

4 to 5 tons is only 50% of potential level
Management Practices play a huge role
page 14 →

ESTABLISHING THE STAND

Optimum alfalfa production begins with a well-established stand. Poor establishment practices result in poor stands, but cost about the same as

Exhibit N. (1)

if the job had been done right. Long-lived, high-yielding stands can be established successfully by considering several aspects of establishment and following proven procedures.

Soil Conditions

Soil Testing

Determine soil fertility levels and fertilizer and lime needs with soil tests. Have soils tested before seeding and at regular intervals during the life of the stand. Follow soil test recommendations to maintain high soil fertility levels for optimum forage production. The cost of a soil test is insignificant in comparison to the loss in yield that occurs when soil nutrient levels are too low.

Fertilizers

Alfalfa varieties with high yielding capacity reach their full potential only when growing on fertile soils. Fertilizer applied to alfalfa can return as much on investment as cultivated crops do. When alfalfa is harvested, nutrients are removed from the soil in the amounts shown in Table 1. Few soils can supply large amounts of required nutrients for very long without fertilizer applications. If maintenance fertilizers are not applied, sooner or later yields decrease, and run-down alfalfa stands full of grass and weeds result.

*Research Agronomist and Superintendent, respectively, Central Oregon Experiment Station, Oregon State University, Redmond, Oregon 97756.

Table 1. Plant nutrients removed from soils in 1 ton of alfalfa hay.

Plant nutrient	N	P	K	Ca	Mg	S
Removal, lb/acre	50	5	50	35	6	

Adapted from Rhykerd, C. L., and C. J. Overdahl (15).

Nitrogen (N) is one of the nutrients used in greatest amounts by alfalfa. It is extremely important for both forage quality and yield. It forms a major part of proteins and chlorophyll, and is essential for photosynthesis, growth, and reproduction. Alfalfa normally obtains most of its nitrogen from air through the symbiotic relationship with rhizobia (nitrogen-fixing bacteria) that live in nodules on the plant roots. One of the main advantages of growing alfalfa is that nitrogen fertilizer should not have to be applied. If establishment and management practices are faulty, plants and rhizobia may be

stressed by adverse soil and moisture conditions, and nitrogen fixation will decrease or stop completely. Under these circumstances, part or all of required nitrogen must be supplied with fertilizer.

Studies at the Central Oregon Experiment Station have shown that the practice of routinely applying nitrogen fertilizer when seeding alfalfa or on established stands interferes with normal nodulation of the plants. Table 2 shows that 50 pounds of nitrogen applied at seeding decreased already low alfalfa nodulation by 50 percent or more. Applied nitrogen replaces rather than supplements, the nitrogen that normally would be fixed from the air free of charge (27).

Table 2. Effect of nitrogen (N) fertilizer on nodulation of alfalfa seedlings grown on Deschutes sandy loam at Redmond, 1976.

Alfalfa variety	Rate of N fertilizer	
	None	50 lb/acre
	---% nodulated plants---	
Vernal	42	14
Anchor	48	24

Seeds were inoculated with Northrup King & Co. Noculator peat inoculant in a 25% sugar slurry immediately before planting. Plants were 5 weeks old when examined for nodules.

Plants require phosphorus (P) in photosynthesis, energy transfer, and in production and breakdown of carbohydrates. It isa key element in growth and cell division, and concentrates in young actively growing tissues. Since these tissues are the most palatable and nutritious, highest quality forage only results when phosphorus supply is adequate. Phosphorus is especially critical for normal root development and seedling establishment (2,23).

Phosphorus is one of the nutrients most generally deficient in soils. A soil test value of 15 ppm phosphorus is considered to be satisfactory for optimum alfalfa growth in Central Oregon. In a 1974 soil-test survey of 42 Central

Oregon alfalfa fields, only 19 had levels of 15 ppm or more. Eight ranged from 11 to 14 ppm, and 15 ranged from 5 to 10 ppm. This indicated that production on 55 percent of the alfalfa fields in the area could be increased with phosphorus fertilization (5,12).

Potassium (K) is essential for many plant processes and promotes development of winter hardiness. If sufficient potassium is not available in the soil, alfalfa stands rapidly thin out and are invaded by grasses and weeds. A soil test value of 150 ppm potassium is considered to be adequate for optimum alfalfa growth in Central Oregon. In a 1974 soil-test survey of 42 Central Oregon alfalfa fields, 12 percent had potassium levels lower than 150 ppm (17).

Almost all soils in the area require annual sulfur applications. Although only 5 pounds of sulfur are needed to produce 1 ton of alfalfa hay, sulfur (S) leaches from Central Oregon soils. Consequently, 50 to 100 pounds of sulfur per acre should be applied each year, depending on soil texture; sandy soils require larger amounts than loam soils. Apply sulfur in fall, spring, or early to midsummer, preferably in two 50-50 split applications to minimize leaching losses. Soils having pH levels of 7.5 or less should receive sulfur as gypsum or as contained in ordinary superphosphate, so that soil pH is not lowered as would happen if elemental sulfur were applied. Apply sulfur in the elemental form on soils with pH levels higher than 7.5.

Lime

Lime corrects soil acidity andsupplies calcium (Ca) and magnesium (Mg). It also affects the availability of almost all essential nutrients, promotes growth of microorganisms, decreases the solubility of toxic elements (aluminum and manganese), and increases the efficiency of applied fertilizers (7,8,9,15).

Alfalfa is one of the most sensitive legumes to acid soil conditions. This is because the kind of rhizobia that nodulates alfalfa is extremely sensitive to soil pH level. Alfalfa plants can grow well under moderately acid conditions if they are supplied with nitrogen fertilizer. Nodulation and nitrogen fixation by rhizobia, however, are greatly reduced at soil pH levels below 6.0. A study done by the Central Oregon Experiment Station showed that alfalfa nodulation and yield increased greatly as a result of liming a moderately acid soil of pH 5.5. Table 3 shows that highest percentages of nodulation were observed at pH levels of 6.4 to 7.3. Highest yields resulted at pH levels of 6.8 to 7.3.

Apply rates of lime recommended by soil tests. Since lime reacts slowly in soils, apply it at least 6 months before seeding. Lime also can be top-dressed on alfalfa at any time, but it is best to mix it thoroughly with soils in the rooting zone. One of the best methods of applying lime is to broadcast one-half of the required amount on the soil surface before plowing. The remaining lime is applied after plowing and is disced into the soil.

Table 3. Effects of liming a Deschutes sandy loam soil on Thor alfalfa nodulation and yield at Cloverdale, 1976.

Soil pH, nodulation, and yield	Lime, ton/acre 0	1	2	4	6	8
Soil ph	5.5	6.0	6.4	6.7	6.8	7.3
% nodulated plants	14	58	86	68	77	80
Dry forage yield, T/acre	0.5	0.8	0.8	0.8	1.2	1.1

Lime was applied in December 1975. Alfalfa was seeded in June 1976. Seeds were inoculated with Nitragin Co. peat inoculant in a 25% sugar slurry immediately before planting. Plants were 5 weeks old when examined for nodules. Yield is from one harvest made in August 1976.

Seedbed Preparation

Seedbeds should be moist and firm, with some looseness at the surface to cover seeds. Compact seedbeds before and after seeding; a firm seedbed maintains soil moisture for seedling roots. Sandy soils especially should be firm because they lose moisture rapidly if they are loose. If a soil crust forms over seeds, seedlings have firm soil to push against, and can break through the crust; seedlings emerging from loose soil under a crust may actually push themselves deeper into the soil. Irrigating before seeding helps to firm seedbeds and makes inoculation more effective (26).

Inoculation

As a legume, alfalfa is able to use or "fix" nitrogen from the air. Enough nitrogen may be fixed for its own growth and for other plants growing with it or following in rotation. This nitrogen would otherwise have to be applied as fertilizer.

Soon after alfalfa begins growing, bacteria called rhizobia enter tiny root hairs of the plants. The rhizobia multiply in large numbers and form growths called nodules on the roots. A partnership or symbiosis is established in which plant and rhizobia live together to their mutual advantage. Plants provide food and protection for the rhizobia, which fix atmospheric nitrogen and make it available to plants. The amount of nitrogen fixed depends on alfalfa variety,effectiveness of the rhizobia, and soil moisture and fertility conditions (10).

Failure to achieve effective nodulation is a major problem in establishing and maintaining productive alfalfa stands in Central Oregon. Without effective nodules, plants suffer from nitrogen deficiency, yields decrease, and the stand rapidly degenerates. Therefore,it is absolutely essential to inoculate seed with a vigorous and effective strain of rhizobia to nodulate the plants so that nitrogen fixation occurs at high rates.

Seed either can be preinoculated before it is sold or can be inoculated on the farm just before planting. Preinoculated seed must be fresh and stored under cool conditions from time of manufacture until planting. Preinoculated seed that is not fresh or that has been exposed to warm temperatures may carry low numbers of live rhizobia and may be worthless as far as nodulation is concerned. If seed will be inoculated on the farm do not buy preinoculated seed, because preinoculation increases the price of the seed.

Follow these steps to successful nodulation:

1. Inoculants are cultures of live rhizobia and must be treated as perishable living things that die rapidly when exposed to warm temperatures. Use only fresh inoculants that have been kept under refrigeration until planting time. If the inoculant has not been stored under refrigeration where it is sold, do not buy it. Insist that managers of businesses selling inoculants refuse delivery of inoculants if they have not been maintained under refrigeration from time of manufacture until delivery for sale.

   Do not use inoculants after the expiration date of the package. Sufficient numbers of live rhizobia are present in packages for about 4 months from time of packaging if kept under refrigeration, and for only 3 to 4 weeks without refrigeration.

2. In spite of directions usually found on inoculant packages, dry application of inoculant does not work. Only about 20 percent of the dry material sticks to seeds, and survival of rhizobia on seeds decreases when applied dry. Apply inoculants either as Pelinoc or in a 25 percent sugar slurry. The Pelinoc system (developed by The Nitragin Company, 3101 W. Custer Ave., Milwaukee, WI 53209) applies large numbers of rhizobia per seed in an adhesive compound that provides nutrients and prevents drying of the rhizobia to insure their maximum survival. Apply it according to instructions furnished with the Pelinoc materials.

   Use of a sugar slurry also increases survival of rhizobia on seeds. Suspend the inoculant in about a quart of 25 percent sugar solution (one cup of sugar per quart of water) for each 100 pounds of seed. Use two or three times the amount of inoculant specified on the package; it is not possible to over-inoculate. Just before planting, mix the slurry and seed together thoroughly, before placing it in the seeder box. Add the slurry to the seed slowly so it does not get too wet. If the seed becomes too moist for planting, add small amounts of finely ground limestone to soak up the excess moisture. With this method of inoculation, it is best to recalibrate the seeder to be certain the desired amount of seed is being sown.

3. Inoculate in the shade--never in direct sunlight--because ultraviolet rays in sunlight kill rhizobia.

4. Plant the seeds as soon as possible after inoculation (3,4,6,16,25).

Seeding Rate

Twelve to 15 pounds of seed per acre are sufficient to obtain a dense stand. Use only good seed, having high percentages of purity and germination (2,19,22,28).

Seeding Depth

Alfalfa is best sown 4 to 1/2 inch deep on heavy soils and 1/2 to 1 inch deep on sandy soils. Sowing deeper than 1 inch is fatal to seed as small as alfalfa unless covered by loose soil. Even when seedlings emerge from deeper planting, they are so weakened that survival decreases. Sometimes certain conditions, such as in sandy soils, require that seed be sown deeper, but the hazard is always greater. Compact the seedbed before and after seeding, expecially on sandy soils (26).

Irrigation

Dry soil conditions kill more alfalfa seedlings than any other cause. Alfalfa seeds are small and must be sown near the soil surface, which may dry out rapidly. Soil moisture may be sufficient to germinate seeds, but seedlings may die if the soil surface dries before they root enough to become established. Irrigate as frequently as necessary to keep the soil moist during establishment (13,21).

Seeding Time

The best times for seeding alfalfa in Central Oregon are in spring and late summer. Spring seedings made during the first week of June usually are not damaged by late spring frosts and become established well enough to survive the high temperatures of July and August. Late summer seedings made before August 15 usually become established well enough to resist heaving by frost in the following fall and winter.

Weed Control

Spring seedings must be made either with a herbicide or a companion crop to control weeds. EPTC (Eptam) herbicide provides good control of annual grass and broadleaf weeds. Apply it according to instructions on the container label at rates of 2 pounds per acre on light sandy soils and 3 pounds per acre on heavier soils (1). Spring seedings made with a herbicide may be harvested in late summer; yields usually range between 1 and 2 tons of hay per acre. If an oat companion crop is used, seed only about 50 pounds of oats per acre and remove the oats as soon as possible as oat hay. If companion crops are seeded too thickly, fertilized heavily with nitrogen, or allowed to remain on the field

too long they may compete so severly with alfalfa seedlings for water, nutrients, light, and space that the stand would be reduced.

Late summer seedings usually are not bothered by annual weeds, because weather and light conditions at this time discourage their growth. Seedings may be made in the stubble of oat-hay crops; the production and income during the alfalfa seeding year resulting from this method may be considerably more

than that obtained by spring seeding. Table 4 presents first-year results of a study on the effects of seeding time and method on forage production during the alfalfa seeding year at the Central Oregon Experiment Station. Although total forage yields were similar from alfalfa sown in spring with a companion crop or with herbicide, a denser stand formed with the herbicide treatment. Alfalfa sown in late summer in the stubble of an oat-hay crop became well established by the end of the season. The amount of forage produced by this method, however, was about twice that produced using a companion crop or herbicide. Consequently, income during the establishment year from the sale of hay produced by this method, would be almost double that from spring seedings.

Table 4. Effects of alfalfa seeding time and method on forage production during the alfalfa seeding year at Redmond, 1976.

	Spring seeding with Oat companion crop			Late summer seeding with Eptam herbicide in oat-hay stubble	
Variety	Alfalfa	Oat hay	Total	Alfalfa	Oat hay
	dry forage yield, tons/acre				
Vernal alfalfa	0.5*	1.8	2.4	1.8	
Anchor alfalfa	0.6	1.7	2.3	2.4	
Park oats					4.3**

*Totals of two harvests made August 10 and September 21; no nitrogen fertilizer applied; alfalfa and Park oats seeded on June 3.

**Harvested July 20; oats seeded at 90 pounds per acre on April 16; 100 pounds of nitrogen applied per acre; treated with 2, 4-D herbicide to control broadleaf weeds; alfalfa seeded in oat-hay stubble on August 4.

MANAGING THE STAND

Managing alfalfa for maximum production and persistence in Central Oregon is more difficult than in other northern areas of the United States. Dry, hot summer conditions require careful and correct irrigation practices. Cold

winters, without continual snow cover and with freezing and thawing conditions, make fall management especially critical. Soils vary widely in depth, drainage, texture, water-holding capacity, and fertility; this makes it very difficult to achieve and maintain correct soil conditions for alfalfa. If the best known management practices are carefully followed, however, environmental effects can be minimized.

Irrigation

A major problem of alfalfa management in Central Oregon is achieving proper irrigation. Much of the alfalfa grown in the area is not irrigated properly. On a given summer day many fields or parts of fields can be found in which alfalfa plants are at or near the wilting points. After each

cutting, bales of hay are left on fields for excessive lengths of time, during which no irrigation can be applied. This practice not only slows plant regrowth, but also kills plants by smothering and lack of sunlight beneath the bales. Plants require adequate moisture for normal growth; water deficiency for any length of time reduces yield and promotes early maturity. Central Oregon soils generally are shallow and have low water-holding capacities; moisture conditions in such soils change rapidly. Consequently, irrigations should be made when available mositure reaches 50 percent of the soil's water-holding capacity (18).

If soil water-storage capacity and effective rooting depth of the plants are known, pan evaporation rates obtained at the Central Oregon Experiment Station (Figure 1) can be used to predict irrigation needs. Available water-storage capacities for major soils in Central Oregon are shown in Table 7. Effective rooting depth of alfalfa varies with soil depth, but alfalfa obtains most of its moisture from the top 2 feet of soil.

Table 7. Available water-storage capacities of major soils in Central Oregon.

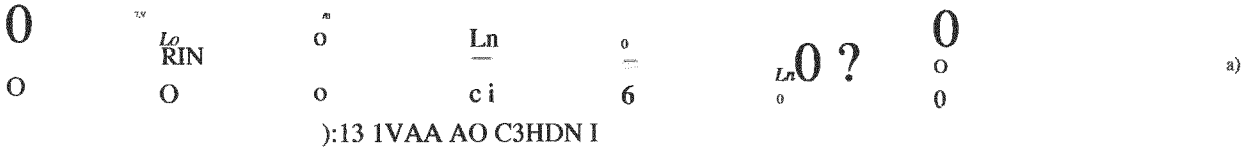
Soil type	Avg. available water-storage capacity in/ft	Location, county
Agency sandy loam	2.2	Crook, Deschutes, Jefferson
Agency loam	2.2	Crook, Deschutes, Jefferson
Deschutes loamy sand	1.5	Crook, Deschutes
Deschutes sandy loam	1.7	Crook, Deschutes
Lamonta loam	1.7	Crook, Deschutes, Jefferson
Madras sandy loam	2.2	Deschutes, Jefferson

Madras loam	2.3	Deschutes, Jefferson
Metolius sandy loam	2.4	Crook, Deschutes, Jefferson
Ochoco sandy loam	2.4	Crook
Prineville sandy loam	1.6	Crook
Willowdale loam	2.9	Jefferson, Wasco

Adapted from Simonson, G. H., and M. N. Shearer (18).

As an example of how to calculate irrigation needs, a Deschutes loamy sand stores 1.5 inches of water in each foot of soil profile. If the soil is 2 feet deep, the most it can hold is 3 inches of water. In a shallow, light-textured soil such as this, it is necessary to irrigate when soil moisture reaches 50 percent of field capacity, or 1.5 inches of available water. The pan evaporation rate between July 22 to 31 is about 0.31 inches of water per day. At this rate, evapotranspiration would remove 50 percent of the water from the profile in 5 days. Therefore, the maximum interval between irrigation sets would be 5 days--as long as the pan evaporation rate remained at 0.31 inches per day. With longer intervals between sets, the plants would be under moisture stress after 5 days, and yields would be reduced. Each irrigation set should apply 1.5 inches of water to fill the soil up to its water-storage capacity.

(10)



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Page 12

From Figure 1 it is clear that intervals between irrigation sets should vary as the pan evaporation rates change during the growing season. It should be noted that pan evaporation rates are closely related to water loss from complete crop cover. Obviously, water loss is less from a developing crop such as in early spring or after alfalfa has been cut. Consequently, the pan evaporation values used to schedule irrigations during such periods of growth should be adjusted downward by using an estimated factor of 0.85. For example, the pan evaporation rate for June 1 to 7 is 0.24 inches per day. Since the alfalfa crop is developing during this period, the actual water loss would be less than that from a complete crop cover. The adjusted pan evaporation rate for this growth period would be 0.85 x 0.24 = 0.20 inches per day. At this rate, the Deschutes loamy sand soil used in the example above, would lose 50 percent of its available water in 7.5 days (1.5/0.20= 7.5). Irrigations during this growth period would be scheduled every 7.5 days and would apply 1.5 inches of water per irrigations set (8).

Be careful to apply only the amount of water that a soil can hold. Not only is it inefficient to over-irrigate, but it harms alfalfa growth (Figure 2) and leaches plant nutrients from the soil. A common practice is to use long

sprinkler irrigation sets of 12 to 24 hours and long intervals of 10 to 12 days between sets; depending on the soil, this can severly damage alfalfa. During and shortly after irrigation, the soil may reach the saturation point. By the time of the next irrigation, available soil moisture may be depleted to the wilting point. Any time wilting or saturation points are reached, hay quality and yield decrease (14).

Irrigate alfalfa fields to their water-holding capacities in the fall, so the plants have enough moisture to live on over winter.

Fertilizing Established Stands

Have soil tested periodically during the life of stands to maintain soil fertility at optimum levels for maximum yields. Topdress annually with sulfur, phosphorus, and potassium as needed. Oregon State University publishes Fertilizer Guides that are revised as research refines information. Guides are available at county Extension offices for use in determining maintenance fertilizer needs.

Cutting Time

An understanding of the trend of available carbohydrate root reserves in alfalfa is essential for its correct cutting management. Plants use reserves to produce new growth and for energy for many life processes. Storage and use of reserves follows a cyclical pattern. When growth begins in spring or after the plant has been cut or grazed, root reserves are used to produce new top growth. Reserves continue to be drawn upon until the plant has produced about 8 inches of top growth. Enough carbohydrates are then formed by photosynthesis so that reserves begin to be replenished. Maximum storage of carbohydrates in the roots is reached at about the full bloom stage.

H_LMO2:19 1 N Yid

When alfalfa is cut at full bloom regrowth is rapid and productivity and persistence of plants are more easily maintained. Cutting at full bloom permits plants to recover from effects of stress due to over-wintering, improper irrigation, or disease.

Although delaying cutting until full bloom is best for plants, the resulting hay has lower quality than that from earlier cutting. If winter hardy, bacterial wilt-resistant varieties are used, it is possible to cut early for better hay quality without reducing productivity and persistence of the stand. The 10 percent bloom or first-flower stage is the optimum time to cut alfalfa for highest yields of nutrients, protein and minerals (Figure 3). Even though root reserves are not at a maximum level, they are high enough so that plants are not damaged.

Cutting according to plant maturity takes into account differences due to varieties, locations, and years. In this sense, it is more satisfactory than cutting according to calendar date or time interval. Growth of new crown shoots also should be considered in deciding when to cut. In Central Oregon, frosts can occur at any time that would stop the flowering process and eliminate it as an indicator of when to cut. If crown shoots begin to elongate to the point where they would be cut off if cutting were to be delayed further, the stand should be harvested. No matter when a cut is made, the hay should be removed from the field as soon as possible and irrigation should begin (Figure 3).

Spring Management

Early spring management is very important in maintaining productivity and persistence, especially if the stand has been damaged during the winter. Stands may be injured during winter when warm periods are followed by below freezing temperatures. If an injured stand is cut too early in spring, yields of subsequent harvests will be reduced and the stand will rapidly degenerate. Disease-resistant varieties usually recover from winter injury if the first cut is delayed until full bloom. Subsequent cuts may be made at 10 percent bloom. If the stand has not been damaged during the winter, all cuts should be made at 10 percent bloom, unless crown shoots elongate excessively before that time. Injured stands that must be cut at first flower every cutting to meet hay quality requirements, probably will need to be reseeded every 5 years.

Fall Management

Four to 6 weeks before the first killing frost of autumn is a critical period in the alfalfa management; alfalfa should not be cut during this time. Eight to 10 inches of top growth are needed during theentire period to produce enough carbohydrates for storage in crowns and roots. Stored reserves are used to develop cold resistance, to live on during the winter dormant period, and to begin regrowth in spring; about 50 percent of the stored reserves are used during the winter. If alfalfa begins the winter with low levels of reserves, winter survival decreases and the number of crown buds and rhizomes that produce spring regrowth declines.

Page 16

The first killing frost usually occurs in Central Oregon about September 15. Cutting after the first killing frost is not as hazardous as cutting before it; reserves are usually at a high level by this time. If a stand is cut in the fall, a tall stubble should be left to catch and hold snow for insulation during the winter. Continual grazing by cattle or sheep during fall and winter is not advisable (19,20).

SUMMARY

Central Oregon alfalfa yields are only about 50 percent of their potential level. This is due mainly to inadequate establishment and management practices. Improving these practices could double hay yields. This report discusses the following production aspects that require attention to increase yields:

Soil Conditions. Have soils tested before seeding alfalfa and throughout the life of the stand. Follow fertilizer and lime recommendations.

Seedbeds should be moist and firm, with some looseness at the surface for seed coverage. Optimum seed coverage ranges from 4 to 1/2 inch on heavy soils and z to 1 inch on sandy soils. Compact soils before and after seeding.

Inoculation. It is absolutely essential to inoculate alfalfa seed with a fresh inoculant that has been refrigerated until planting time. This increases the chances that plants will be nodulated with an effective strain of rhizobia that will fix nitrogen at high rates.

Seeding Rate. Use 12 to 15 pounds per acre of good seed, having high percentages of purity and germination.

Seeding Time and Weed Control. Plant either during the first week of June with an herbicide, or companion crop, or in late summer before August 15 in the stubble of an oat-hay crop.

Irrigation. A major problem in establishing and managing alfalfa in Central Oregon is achieving proper irrigation. If irrigations are applied according to crop needs and soil water-holding capacities, the problem may be minimized. If irrigations are applied according to convenient time schedules, the problem will continue.

Cutting Time. Usually alfalfa should be cut at 10 percent bloom.

Spring Management. Delay first harvest of the season until full bloom if stands have been injured during the preceeding winter.

Fall Management. Do not cut alfalfa during the 4- to 6-week period before the first killing frost of autumn.

LITERATURE CITED

1. Appleby, A., and D. Rydrych. 1975. Selective control of weeds in field crops. o. 48. In H. M. Hepworth (ed.) Oregon Weed Control Handbook. Extension Service, Oregon State University Corvallis.

2. Baylor, J. E. 1974. Satisfying the nutritional requirements of grass-legume mixtures. p. 171-188. In D. A. Mays (ed.) Forage fertilization. Am. Soc. Agron., Madison, Wis.

3. Burton, J. C. 1972. Nodulation and symbiotic nitrogen fixation. In C. H. Hanson (ed.) Alfalfa Science and Technology. Agronomy 15:299-246. Am. Soc. Agron., Madison, Wis.

4. Burton, J. C. 1976. Methods of inoculating seeds and their effect on survival of rhizobia. p. 175-189. In P. S. Nutman (ed.) Symbiotic nitrogen fixation in plants. International Biological Programme 7, Cambridge Univ. Press.

5. Gardner, E. H., N. R. Goetze, G. Gross, E. N. Hoffman, T. L. Jackson, M. J. Johnson, D. P. Moore, W. S. McGuire, and V. Pumphrey. 1969. Fertilizer guide for alfalfa. Extension Service Fertilizer Guide. Sheet 20., Oregon State University, Corvallis, Oregon.

6. Goetze, N. R., and H. Youngberg. 1972. Growing alfalfa in Western Oregon. Extension Circular 806. Oregon State University, Corvallis,Oregon.

7. Griffith, W. K. 1974. Satisfying the nutritional requirements of established legumes. p. 147-167. In D. A. Mays (ed.) Forage fertilization. Am. Soc. Agron., Madison, Wis.

8. Hagan, R. M., and H. R. Haise. 1967. Soil, plant, and evaporative measurements as criteria for scheduling irrigation. In R. M. Hagan, H. R. Haise, and W. W. Edminster (eds.) Irrigation of agricultural lands. Agronomy 11:577-597. Am. Soc. Agron., Madison, Wis.

9. Dresge, B. B. 1974. Effect of fertilization on winterhardiness of forages. p. 437-451. In D. A. Mays (ed.) Forage fertilization. Am.

Soc. Agron., Madison, Wis.

10. Hastings, A. 1965. Legume inoculation: what it is and what it does. Sheepfarming Annual. p. 49-55.

11. Murphy, W. M., and M. J. Johnson. 1976. Alfalfa varieties for Central Oregon. Oregon State Univ., Corvallis, Circular of Information 656.

12. Olsen, S. R. D. V. Cole, F. S. Watanabe, and L. A. Dean. 1954. Estimation of available phosphorus in soils by extraction with sodium bicardonate. USDA Circular No. 939.

Page 18

13. Peters, D. P., and J. R. Runkles. 1967. Shoot and root growth as affectd by water availability. In R. M. Hagan, H. R. Haise, and T. W. Edminster (eds.) Irrigation of agricultural lands. Agronomy 11:373-386. Am. Soc. Agron., Madison, Wis.

14. Peterson, H. B. 1972. Water relationships and irrigation. In C. H. Hanson (ed.) Alfalfa science and technology. Agronomy 15:469-480. Am. Soc. Agron., Madison, Wis.

15. Rhykerd, C. L., and C. J. Overdahl. 1972. Nutrition and fertilizer use. In C. H. Hanson (ed.) Alfalfa science and technology. Agronomy 15:437-465. Am. Soc. Agron., Madison, Wis.

16. Roughley, R. J. 1976. The production of high quality inoculants and their contribution to legume yield. p. 125-136. In P. S. Nutman (ed.) Symbiotic nitrogen fixation in plants. International Biological Programme 7, Cambridge Univ. Press.

17. Schollenberger, C. J., and R. H. Simon. 1945. Determination of exchange capacity and exchangeable bases in soils--ammonium acetate method. Soil Sci. 59:13-24.

18. Simonson, G. H., and M. N. Shearer. 1971. Intake rates and storage capacities of irrigable soils in Central and Northeastern Oregon. Agr. Exp. Sta. Special Report 324., Oregon State University, Corvallis, Oregon.

19.Smith, Dale. 1962. Forage management in the North. Brown Book Co., Dubuque.

20.Smith, Dale. 1972. Cutting schedules and maintaining pure stands. In C. H. Hanson (ed.) Alfalfa science and technology. Agronomy 15:481-493. Am. Soc. Agron., Madison, Wis.

21. Stanberry, C. O. 1955. Irrigation practices for the production of alfalfa. p. 435-443. In USDA yrbk of agriculture: water.

22. Tesar, M. B., and J. A. Jacobs. 1972. Establishing the stand. In C. H. Hnason (ed.) Alfalfa science and technology. Agronomy 15:415-433. Am. Soc. Agron., Madison, Wis.

23.Tisdale, S. L., and W. L. Nelson. 1966. Soil fertility and fertilizers. Macmillan Co., New York. p 128.

24. Van Riper, G. E., and Dale Smith. 1959. Changes in the chemical composition of the herbage of alfalfa, medium red clover, ladino clover, and bromegrass with advance in maturity. Wis. Agr. Exp. Sta. Res. Report 4.

25.Vincent, J. M. 1974. Root nodule symbioses with Rhizobium. p. 265-341. In A. Quispel (ed.) The biology of nitrogen fixation. American Elsevier Pub. Co., New York.

26. Willard C. J. 1967. Establishment of new seedlings. p. 368-374. In H. D. Hughes, M. E. Heath, and D. S. Metcalfe (eds.) Forages. Iowa State Univ. Press, Ames.

27. Woodhouse, Jr., W. W. 1967. Soil fertility and the fertilization of forages. p. 389-400. In H. D. Hughes, M. E. Heath, and D. S. Metcalfe (eds.) Forages. Iowa State Univ. Press, Ames.

28. Youngberg, H. 1972. Inoculating alfalfa and clover seed. Extension Service Fact Sheet 184., Oregon State University, Corvallis, Oregon.

Sage West, LLC
Soils, Wetlands, Wildlife Habitat

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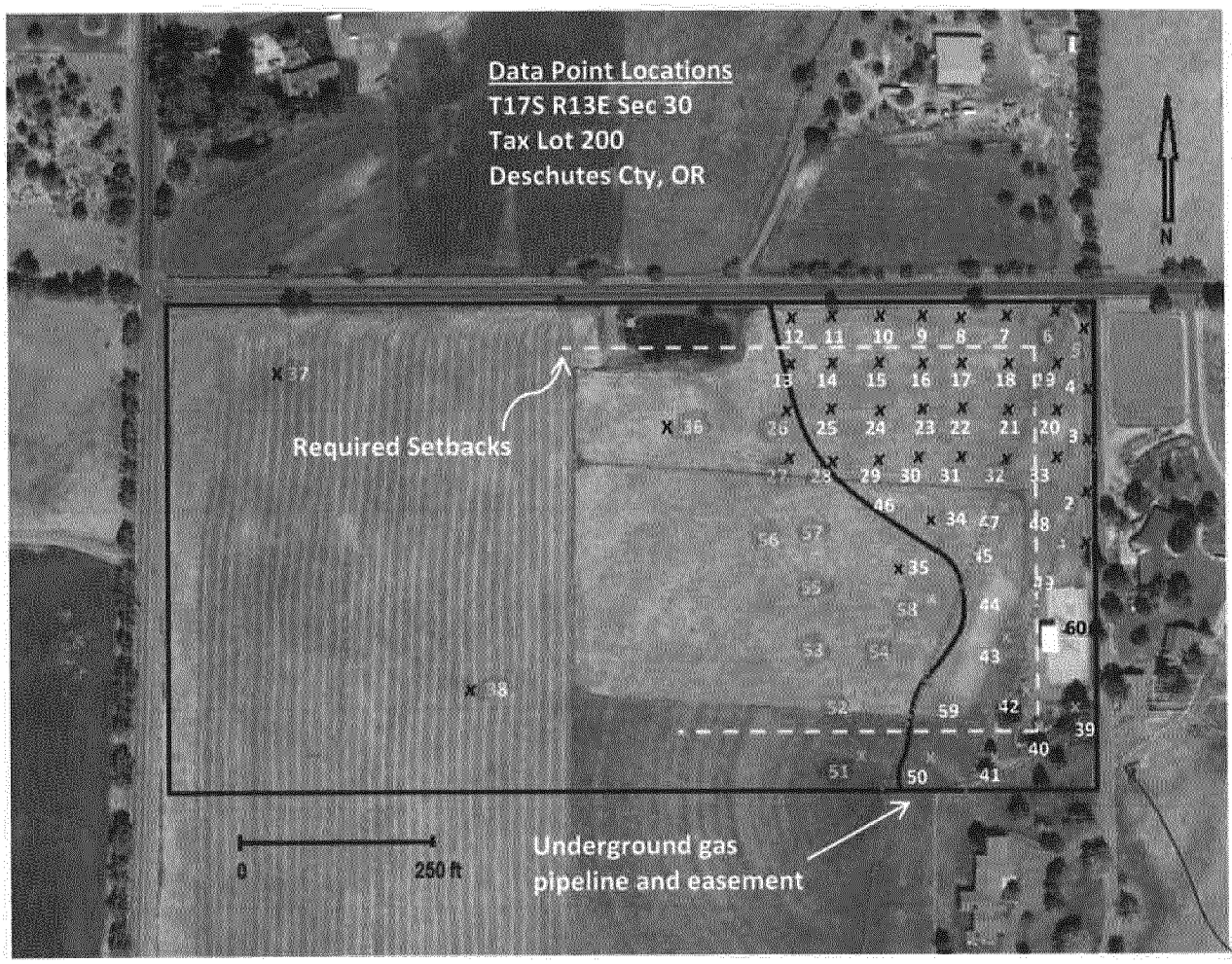
Exhibit O



From the hearing Mrs Pancher states she has reviewed the chart and no class III are in the homesite envelope.

Sites 28 & 32 are class III soils inside the building envelope.

= class 3.

64770 Melinda Court
Bend, OR 97701

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Exhibit O

Exhibit P

Figure 2: Soil map at the Order 1 level of detail. Mapping units separate LCC 7/8 soils from LCC 3-6 soils.

N ↑

N ↑

LCC 7

1) Wheel Lines run West to East in the LCC 3 zone.

Notice tractor lines traveling North to South wheel line stops prior to the west edge of pond

2) Pivot - anchored at that spot. Runs back and forth over 40 Acres without needing assistance.

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Exhibit P

WHEEL LINE . Does not go past pond.
Runs East to west on entire 40 Acres.

WHEEL GUN - MOVEABLE.
WATERED IN MID SECTION
OF FIELD.

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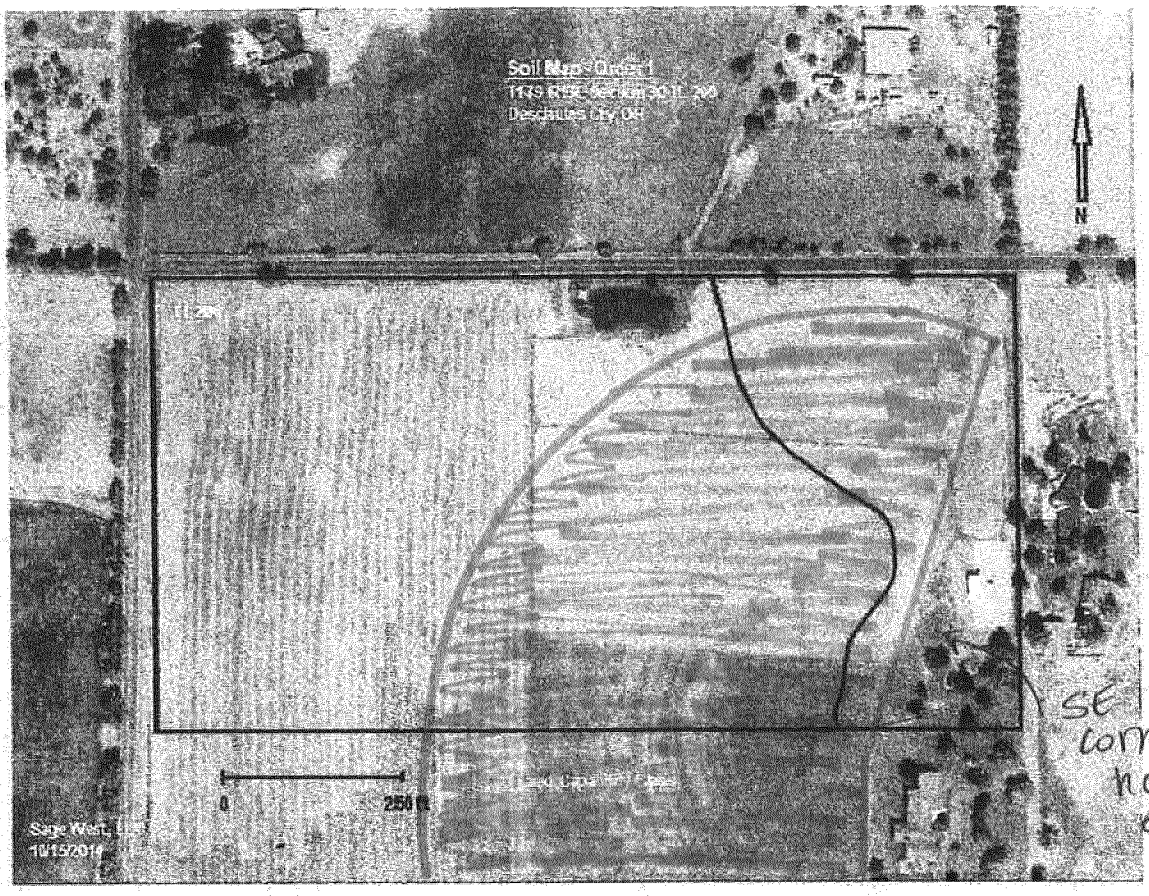
Exhibit P



SE corner home envelope;

PIVOT IRRIGATING CAPACITY. THERE IS A "WATER GUN" AT THE END THAT WATERS BEYOND THE PIVOT STRUCTURE.

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Exhibit P

Figure 3: Building Site for Nonfarm Dwelling:

Considerations for determining suitability of the property for crop, livestock, or merchantable tree production:
NRCS estimates that 36A-*Deskamp loamy sand, 0-3% slopes* will produce 4.0 tons of alfalfa per acre and 1.5 AUMs per acre for pasture, irrigated. The Gosney soil, a contrasting inclusion, will produce 2.0 tons of alfalfa per acre and 0.5 AUMs per acre for pasture, irrigated. Neither soil is rated for non-irrigated farm crops.

NRCS estimates that soils in 58C-*Gosney-Rock outcrop-Deskamp, 0-15% slopes* will produce 150 #/ac forage on the Gosney soil and 250 #/ac on the Deskamp soil for grazing by livestock. Production is very low. Under a high level of management an acre of this soil would support a cow/calf pair for 15 days in late spring, irrigated.

NRCS does not recognize the Gosney or Deskamp soils being capable of producing merchantable trees.

LABELED LCC7. Remember the emerald field pictured.

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Exhibit P

Exhibit Q

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Soils, Wetlands, Wildlife Habitat

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July 8, 2015

Stephanie Hicks
Hearings Officer
117 NW Lafayette Avenue
Bend, OR 97703

Re: File No 247-15-000035-CU, Clough Nonfarm Dwelling Application

I am writing to highlight and elaborate on information contained in my Agricultural Soils Suitability Assessment for the Clough property and to provide information from the point of view of a Central Oregon farmer. I reaffirm my recorded testimony recorded in the public hearing.

It is my professional opinion that the Class 7 Gosney soil I identified as suitable for a nonfarm dwelling in my assessment is generally unsuitable for farm use because the soils are very shallow and shallow, have poor fertility and low available water capacity. The unsuitability of the Gosney soils in the home site area is based primarily on four factors: low organic matter, shallow soil depth, sandy soil and rock fragments.

These soils are very low in organic matter and sandy in texture resulting in a very low Cation Exchange Capacity (CEC). CEC is important because it provides a reservoir of nutrients for plant uptake. This means that the Gosney soil does a poor job of storing the nutrients for plant uptake. The low CEC and the shallow, sandy soil means that only a very small amount of any fertilizer applied to the nonfarm dwelling site will remain in the soil. Without an ability of the soil to attract and absorb nutrients (low CEC) they are readily leached out of the soil by irrigation and precipitation thus becoming unavailable for plant use and lost into surface and ground water. This is why the nonfarm area of the Clough's property produces a low yield of hay. Adding fertilizer to this area will not change this fact and will not make the area generally suitable for farm use.

The pH (acidity/basicity) for most soils in this region is adequate for plant growth. The pH in soils with a low CEC can quickly be reduced by additions of nitrogen and sulfur fertilizers resulting in the reduction of nutrient availability to plants.

I also own a small farm in Central Oregon and use it to raise grass hay. From the point of view of a farmer who hopes to make a profit from farming, fertilizing the Clough's poor soils that are weed infested (as described by opponents and the Cloughs) is putting money "down a rat hole." It does not make sense to fertilize and promote the growth of weeds. Fertilizer is expensive and typically makes up a very high percentage of the cost of raising hay. It is not always a prudent farm practice to fertilize farm land, especially low quality soils like those found on the Clough's property. I do not always fertilize my Central Oregon hay field because the cost of fertilizer is not returned to me in increased production. For instance, on my good farm ground I achieved a yield of almost three tons per acre in two cuttings when I did not fertilize the first cutting and a yield of 3.25 tons per acre when using fertilizer. At this small difference in yield, electing not to fertilize was the prudent and more profitable choice.

Plant growth in Central Oregon was good this spring due to the high amount of spring precipitation. The water holding capacity of the soil had a lesser influence on crop yields because water was being re-supplied on a regular basis by Mother Nature.

Sincerely,

Roger Borine, CPSC, CPSS, PWS

This property has irrigation! PIVOT! Water is supplied on a regular basis. Mr. Borine is aware of plant growth on the homesite.

According to his own Capability Handbook 210 returned inputs on soils to be redisignated to class V or VI

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Exhibit Q

Oct 4, 2015

To Whom it may concern

(½ 22079)

I owned and farmed 22075 Erickson Rd. for profit from 1987 to 2000. I grew alfalfa hay and ran livestock. Annually, I harvested 155 to 200 tons of alfalfa per year. The property had approximately 32.5 irrigated acres. I used wheel lines for irrigating the land and employed sound farming practices in conjunction with consistent irrigation. In addition to irrigating regularly I routinely fertilized and amended the soil to perpetuate the health of the land and to ensure the consistent profit I expected. The other measure I followed meticulously was weed abatement. To achieve this I followed a consistent spray schedule.

My piece of property was a high-value quality piece of agricultural property. I was able to consistently produce yields from my farming that earned profits.

Ron Robinson Jr.

Ron Robinson Jr.

October 2015

To County Commissioners;

I observed more than one ton of hay being baled on the NE corner of the applicant property. This is irrigated farmland and I am in support of its continued use as irrigated EFU. I personally purchase hay from Mr. Davis on Erickson Rd. His management skills are excellent and year after year he grows and sells a reliable crop.

Sarah Daniels