

ATTACHMENT 19

Research on Agricultural Buffers

A White Paper

Santa Barbara County Planning & Development Department
Long Range Planning Division
April 2012

Purpose and Intent

The purpose of this document is to provide technical information referenced in the September 9, 2012 Santa Barbara County Montecito Planning Commission Staff Report for Agricultural Buffer Ordinance (Case Nos.: 12ORD-00000-00012 and -00013) and September 13, 2012 Santa Barbara County Planning Commission Staff Report for Agricultural Buffer Ordinance (Case Nos.: 12ORD-00000-00011 and -00013). This document summarizes the literature reviewed as well as the methodology and analysis conducted during the development of the proposed Agricultural Buffer Ordinance.

Executive Summary

In researching agricultural buffers and land use conflicts, staff reviewed publications from the City of Arroyo Grande, the Great Valley Center, the Spray Drift Task Force, the Resource Lands Review Committee of Rogue Valley Oregon, the British Columbia Ministry of Agriculture and Lands, and the Department of Natural Resources of Queensland, Australia. Staff also reviewed pesticide use permit conditions utilized by the Santa Barbara County Agricultural Commissioner's Office, agricultural buffer policies adopted by San Luis Obispo and Ventura counties, and the 2010 Proposed Agricultural Buffer Policy recommended by the Santa Barbara County Ag Futures Alliance. Lastly, staff analyzed the potential effects the Ordinance could have on small, residential lots located along the Urban boundary line.

Literature Review

City of Arroyo Grande - Research Paper on Buffer Criteria

A 2009 research paper for the City of Arroyo Grande¹ reviewed agricultural buffer ordinances and policies in 35 jurisdictions (17 cities and 18 counties) and found very few policies/ordinances were based on science and data showing the efficacy of a buffer to mitigate actual conflict between farming and non-agricultural uses was "minimal". With the exception of Ventura County, none of the policies or ordinances themselves expressly referenced published data. The study found that 23 jurisdictions had a minimum or average buffer width.

The Great Valley Center's Study

The Great Valley Center is a private, non-profit, non-partisan collective, whose goal is to promote the economic, social and environmental well-being of California's Central Valley industries, including agriculture². In 2002, the Great Valley Center and University of California Cooperative Extension authored a study analyzing key ingredients and effective methods for addressing land use conflicts between agriculture and suburban residents. The study stated "a setback distance of 200 feet was frequently cited within the policies reviewed, but there is no hard

¹Pennebaker, Laura; *Agricultural Buffer Criteria for the City of Arroyo Grande*; 2009

² From the Great Valley Center website <http://www.greatvalley.org/>

evidence that 200' is the optimal distance, or that it even works" and recommended that "until more information is available, the setback size discussion would be best served by considering the unique mix of topography, weather, patterns, commodity and uses at the particular site".³

Spray Drift Task Force (SDTF) Studies

The Spray Drift Task Force (SDTF), an industry led group that formed in the early 1990s, developed a risk assessment model for measuring pesticide spray drift⁴ and published a series of studies quantifying drift. The SDTF found that at 300 feet, the amount of spray drift from a ground applied pesticide was already "extremely low"⁵ and for pesticides applied by air, "the amount of material deposited on the ground "approaches zero" at 250 feet downwind of the application site"⁶. The models were based on specific parameters such as application type, nozzle size, boom height, application speeds, etc. A literature review from the SDTF on the effectiveness of vegetation and barriers found a "reduction in drift from natural and artificial barriers depends on the structure and location of the barrier, as well as the wind speed and droplet size spectrum of the spray". There is general agreement in the literature that a drift reduction of 45 to 90% can be achieved through appropriate barriers"⁷ Ventura County developed their Agricultural Buffer Policy in part from the Spray Drift Task Force data. Ventura County requires a 300 foot buffer to new structures and sensitive uses unless a vegetative screen is installed. With a vegetative screen the buffer setback is a minimum of 150 feet. The studies are informative, but they only address one type of nuisance, pesticide drift, and are specific pesticides applied by the air or ground. In Santa Barbara County, agriculturalists utilize other pesticide application techniques in addition to those studied by the SDTF. Staff researched recommended buffer widths for mitigating other agricultural nuisances including noise, odor, dust, trespass/vandalism, etc.

Resource Lands Review Committee of Rogue Valley Oregon (RLRC) Study

The Resource Lands Review Committee (RLRC) studied land use conflicts between rural and urban uses in the Rogue Valley, Oregon and created a set of standards intended to assist local governments and others in finding the best buffering solution based on the type of land use conflict being addressed⁸. The RLRC grouped sources of land use conflicts into six major buffering elements: chemical spray drift, noise, sediment and stormwater run-off, trespass and vandalism, odor, and lastly, dust, smoke, and ash. Recommended strategies include a combination of separation distances, vegetative screening, insulating construction materials, fencing, and restrictive covenants. The RLRC recommended using separation or a combination of separation and vegetation to mitigate chemical spray drift. The recommended minimum separation between the outermost sensitive receptor (all residential uses, hotels, schools, churches, hospitals, etc.) and high

³ Hammond, Sonya; *Can City and Farm Coexist?*; The Great Valley Center; 2002

⁴ The Environmental Protection Agency defines pesticide spray drift as the physical movement of a pesticide through air at the time of application or soon thereafter, to any site other than that intended for application (often referred to as off-target).

⁵ Spray Drift Task Force; *A Summary of Ground Application Studies*.1997

⁶ Spray Drift Task Force; *A Summary of Aerial Application Studies*. 1998

⁷ Hewitt, Andrew J.; *Drift Filtration by Natural and Artificial Collectors: A Literature Review*. 2001

⁸ Resource Lands Review Committee of Rogue Valley, Oregon; *Agricultural Buffering Standards – Establishing Effective Buffers Between Rural Agricultural and Urban Uses*. 2006

potential impact agricultural land (contains Class I-IV soils and supports a wide variety of crops) is 200 feet without vegetative screening and 100 to 75 feet with vegetative screening, depending on the type of vegetation used. The recommended minimum buffer width for high potential impact agricultural land adjacent to non-sensitive receptors (commercial and industrial) is 100 feet without vegetation and 50 feet with vegetation (tree or bamboo based). A minimum buffer width of 50 feet is recommended for all non-agricultural uses (sensitive and non-sensitive) adjacent to “low potential impact” agricultural land (contains less productive soils and is outside an irrigation district) whether or not vegetation is planted.

The RLRC also analyzed noise impacts from agricultural activity. Noise can be intermittent, such as noise from machines, tractors, and wind machines, or constant such as those from pumps, processing plants and refrigeration. Many agricultural activities are conducted at night because of crop or livestock needs and climatic conditions. According to the study, noise is one of the most controversial issues because it affects people in the middle night and strategies that address exterior noise levels such as distance, barriers and reduction of source output (such as insulating a wind machine) are not adequate and are too costly to be feasible mitigation measures. In order to reduce noise to a level typically found in a daytime urban area (approximately 90 dB or less) would require a separation distance of approximately 1,500 feet. It could take another 500 feet or more to reach the level of a quiet urban area at nighttime. Instead, the RLRC recommended reducing interior noise levels (noise inside the home) by using strategies such as structure orientation (such as placing a garage to block sound), using noise mitigating materials during construction (such as double pane windows) and utilizing terrain and other natural features to block sound waves. Interior noise reduction strategies are voluntary and not feasible for inclusion in an ordinance.

The RLRC recommended using separation distances and erosion control measures for mitigating sediment and stormwater runoff. No specific linear amounts were recommended however. Barriers for trespass and vandalism and a restrictive covenant disclosure notice were recommended to address nuisance odors, dust, smoke and ash.

British Columbia Ministry of Agriculture and Lands Guide

The British Columbia Ministry of Agriculture and Lands (BCMAL) of Canada, published a series of guides about “edge planning”. The guides incorporated extensive literature review, research and surveys, and consultation with British Columbia Ministry of Agriculture and Lands commodity and resource specialists. The guides are intended to assist in development of official community plan, zoning bylaws and farm bylaws. The objective of edge planning is to establish a framework of land use policies, regulations and programs that enhances optimum land use and compatibility along both sides of the urban/Agricultural Land Reserve boundary⁹. The Agricultural Land Reserve (ALR) boundary provides a geographic point where local government policy makers can confidently apply land management techniques and guidelines that will ensure greater long term compatibility between urban and agricultural land uses and greater long term security for farming along the urban-

⁹ British Columbia Ministry of Agriculture and Lands, Canada; *Guide to Edge Planning, Promoting Compatibility Along Urban-Agricultural Edges*. 2009

agricultural edge¹⁰. The BCMAL recommended a total separation distance of 30 meters or 98 feet (approximately half which is a vegetative buffer) between a housing unit and Agricultural Land Reserve (ALR) boundary. “A greater separation distance of 50 meters (164 feet) would be optimal based on previous Ministry studies, but land availability and current development patterns have lead to a compromise in the spatial setback”¹¹. “Research undertaken by the BC Ministry of Agriculture and Lands indicates that the most effective buffer combines separation, vegetation and fencing. This combination is the best way to mitigate the impacts from farming activities (noise, dust/spray drift, light) and urban activities (trespass, litter, crop damage, livestock harassment from dogs)”.

Department of Natural Resources (DNR) Study

The guidelines include adopted minimum separation distances between a sensitive receptor¹² and agricultural land based on the type of nuisance¹³ and strategies for developing farm friendly subdivision, road and building design. Sensitive placement of backyards and patios, the installation of double pane windows, clustering of buildings, effective road and public right-of-way layout can be used to maximize buffering between residences and agriculture. According to the DNR, a Federal Government working group conducted a review of agricultural chemical spray drift (CSIRO 1993) and concluded that “there is insufficient knowledge to settle on a single distance for a buffer zone and that evidence indicated that buffer zones need to be chemical/formulation specific, based on supporting data”¹⁴. The DNR adopted a 300 meter (984 feet) minimum buffer width for open fields because “research and subsequent modeling has indicated negligible chemical drift at a range 300 meters downwind from the release point of a chemical spray application (Spillman 1988)”¹⁵. A minimum width of 40 meters (131 feet) was recommended if a vegetated buffer element can be “satisfactorily implemented and maintained”. Buffer widths “may vary according to local topographical or climatic conditions or a further knowledge is obtained”. The adopted separation for odor are 500 meters (1640 feet), 60 - 1000 meters (197 feet – 3,281 feet) for noise, and 150 meters (492 feet) for dust, smoke and ash.

Summary of Santa Barbara County Agricultural Commissioner pesticide use permit conditions

In addition to minimizing conflicts between agricultural and urban uses, an agricultural buffer would help to reduce the effect from other regulatory buffers imposed upon agriculture. The County Agricultural Commissioner’s Office is responsible for enforcing Federal, State and local pesticide laws and regulations. Depending on the pesticide being applied, a pesticide use permit may be required (non-restricted pesticides are regulated differently) and permit conditions may require setbacks from occupied structures, restrictions on start times, or limits on the number of acres that can be treated. Permit conditions are based on Federal label laws, State policies and State

¹⁰ Ibid

¹¹ Ibid

¹² Sensitive receptor is defined in the study as a dwelling, residential place in a residential development, a motel, hotel, or hostel, a childcare center, kindergarten, school, university or other educational institution; or a medical center or hospital.

¹³ Department of Natural Resources of Queensland, Australia. *Planning Guidelines Separating Agriculture and Residential Land Uses*. 1997

¹⁴ Ibid

¹⁵ Ibid. Note: Staff was unable to obtain a copy of the 1988 Spillman study.

regulations that require the Commissioner to consider local conditions before issuing a restricted material permit¹⁶. For example, in Santa Barbara County, buffers from schools range from ½ mile to 200 feet and buffers from occupied structures or bystander areas range from 100 feet to 400 feet. Some pesticide applications cannot begin before 8 a.m. if it is within 500 feet of an urban area or there is a limit on the number of acres that can be treated if the site is within a quarter of a mile of a hard to evacuate site such as a school, hospital, or prison. Below is a summary of Santa Barbara County Agricultural Commissioner's Office pesticide use permit conditions:

Setbacks from schools* and sensitive sites

- ½ mile buffer is required if field is greater than 5 acres and school is in session or scheduled to be in session (Metam Sodium and Metam Potassium by drip).
- ¼ mile buffer is required if field is 5 acres or less and school is in session or scheduled to be in session (for Metam Sodium and Metam Potassium by drip).
- 750 foot buffer for restricted pesticides by air when there are children present at the school.
- 500 foot buffer from a school for some restricted pesticides applied by ground or through an irrigation system (chemigation) or using a fumigant when there are children present.
- 1000 feet minimum buffer from hard to evacuate site such as schools, day care facilities, nursing homes, hospitals, prisons, and playgrounds or other areas or other areas determined by the CAC (Chloropicrin Chemigation).
- 200 foot buffer for restricted pesticides applied by air.

*School buffers are usually measured from the property line

Setbacks from occupied structures or bystander areas

- 300 - 100 foot minimum buffer from to occupied structures, bystander areas or fieldworkers depending on the type of tarp used and proximity of the application site too hard to evacuate sites such as schools, day care facilities, nursing homes, hospitals, prisons, and playgrounds or other areas determined by the County Agricultural Commissioner's Office (Chloropicrin Chemigation).
- 200-400 foot buffers from the property line are typical for Methyl Bromide fumigations in Santa Maria for strawberries. *Note: Buffer zones distances for Methyl Bromide fumigations vary depending on the method of application, application rate, number of acres treated, other fumigations occurring in the area and pounds of active ingredient.*
- 200 foot buffer from occupied structures and persons other than pesticide handlers involved in the application when applying restricted pesticides by air.

¹⁶Food and Agriculture Code §14006.5

- 100 foot buffer to occupied structures (other than schools) or bystander areas (for Metam Sodium and Metam Potassium by drip).
- 100 foot buffer to occupied structures when applying some restricted materials through an irrigation system (chemigation) or applying certain soil fumigants.

Start time restrictions

- Applications within 500 feet of an agricultural urban interface as determined by the County Agricultural Commissioner's Office shall not begin before 8 a.m (Chloropicrin chemigation).

Acreage block restrictions

- 30 acre limit when applying Chloropicrin through the irrigation system when the application site is within ¼ mile of a hard to evacuate site such as schools, day care facilities, nursing homes, hospitals, prisons, and playgrounds or other areas determined by the County Agricultural Commissioner's Office. Special impenetrable tarps must be used.
- 10 acre limit when applying Chloropicrin through the irrigation system when the application site is more than a ¼ mile of a hard to evacuate site such as schools, day care facilities, nursing homes, hospitals, prisons, and playgrounds or other areas determined by the County Agricultural Commissioner's Office. Standard tarps may be used.

Conditions reviewed for this summary

2012 Permit conditions for Chloropicrin Chemigation (revised 1/12)

2012 Permit Conditions for Chemigation (rev. 11/11)

2012 Permit Conditions for Shank Applied Fumigants (rev. 2/12)

2012 Permit Conditions for Shank Applied Metam Sodium/Potassium (rev. 2/11)

2012 Metam Sodium & Potassium Drip Application Permit Conditions (rev. 8/11)

2011 Permit Conditions for Methyl Bromide Soil Fumigation (rev. 8/11)

2012 Outdoor Methyl Bromide Heat Exchanger Soil Fumigation Permit Conditions (rev. 5/10)

Permit Conditions for Greenhouse Applications of Methyl Bromide (rev 1/12)

Agricultural Buffer Policy Review

A review of agricultural buffer policies focused on the San Luis Obispo County Agricultural Buffer Policies and Procedures (adopted in 2005), the County of Ventura Agricultural/Urban Buffer Policy (revised in 2006) and the Santa Barbara County Ag Futures Alliance Proposed Agricultural Buffer Policy for Santa Barbara County (proposed in 2010). In San Luis Obispo County's agricultural buffer policy, agricultural buffers widths range between 50 feet and 600 feet depending of the type of agriculture. Allowed uses within the agricultural buffer are not specified in the policy, although site-specific non-crop factors (such as topography, prevailing wind direction, and elevation differences) and proposal specifications can affect the final buffer distance within the ranges. In Ventura County's agricultural buffer policy, a 300-foot setback to new structures and sensitive uses is required on the non-agricultural property unless a vegetative screen is installed. With a vegetative screen the buffer/setback is a minimum of 150-feet. Roads are considered an acceptable use within 300 feet of agriculture if there is no

vegetative buffer and within 150 feet of agriculture if there is a vegetative screen. The Ag Futures Alliance, an alliance jointly founded in 2007 by the Santa Barbara County Farm Bureau and the Environmental Defense Center, proposed an agricultural buffer policy to support the County's efforts to create an agricultural buffer policy. One of the recommendations is using roadways to fulfill the agricultural buffer requirement.

Methodology for Buffer Width Ranges

On a spectrum of non-agricultural uses compatible with agriculture, residential development is in the middle between the least compatible use, sensitive uses, and the most compatible use, commercial or industrial. Therefore, staff focused on developing buffer widths for residential uses first. Evidence from the Spray Drift Task Force (SDTF) concluded that at 300 feet, the amount of spray drift from a ground applied pesticide was already "extremely low". In addition, the DNR indicated research and subsequent modeling found the distance where chemical drift was negligible was 984 feet (300 meters). Although the studies only address pesticide drift, they establish a reference point. Other research indicates separation distance is not the most feasible approach for mitigating other nuisances such as noise, odor, dust, etc. For example, the RLRC recommended vegetation and noise reduction construction materials to mitigate for noise. In addition to vegetation, unique site specific factors or other circumstances could require a buffer less than 300 feet. Therefore, 300 feet became the maximum buffer width for residential uses adjacent to production agriculture. The RLRC recommended a 200 feet separation between more productive farmland (high potential impact agricultural land) and sensitive uses and the BCMAL concluded 164 feet was the "optimal" separation distance. To address chemical drift, the DNR recommended a minimum buffer width of 984 feet unless a vegetative buffer element is present then the recommended minimum buffer with recommended is 131 feet. Two hundred feet is also the minimum distance required by the Agricultural Commissioner's Office for a restricted pesticide applied near an occupied structure such as a residence. Therefore, based on the technical research, staff proposes 200 feet as the minimum buffer width. The buffer width range for residential development adjacent to production agriculture is 200 feet – 300 feet. Similar methodology was applied to determine appropriate buffer width ranges for the other two types of non-agricultural uses adjacent to production agriculture, sensitive uses and industrial or commercial uses.

To assist with development and review of the draft Ordinance, Planning and Development staff formed the Agricultural Buffer Working Group (ABWG), an ad hoc working group consisting of members from the agricultural industry and development industry. The ABWG recommended reducing the buffer width range to 100 feet- 200 feet for existing small residential lots located on the urban boundary line. A section of this document, Research on small residential parcels located in the Urban Area, provides a more detailed description of the mapping and analysis conducted to determine potential effects of the ordinance on small, residential urban lots.

The AAC, ABWG, RLRC, BCMAL and DNR recommended the buffer width ranges be larger for sensitive uses adjacent to production agriculture. Agricultural Commissioner's Office permit conditions also require larger setbacks for pesticide applications adjacent to schools. Depending on the type of pesticide used and application technique, pesticide use permit conditions near schools require between a half mile and a 200 feet setback from the school property line.

Therefore, the Ordinance proposes a larger buffer width range for sensitive uses, 300 feet to 400 feet, than the buffer width proposed for residential uses.

The AAC, ABWG, RLRC and DNR also recommended smaller buffer width ranges for commercial or industrial uses adjacent to production agriculture. The RLRC recommended a 100 foot buffer for productive farmland adjacent to commercial and industrial uses (no vegetation) and the Agricultural Commissioner's Office permit conditions frequently cite a 300 foot setback from occupied structures. Therefore, the Ordinance proposes a 100 – 300 foot buffer for commercial and industrial uses adjacent to production agriculture.

Once the buffer width ranges for production agriculture were determined, buffer width for rangeland and pastureland were considered. Rangeland and pastureland do not generate the same amounts of odor, dust, noise, etc. because the land is not intensively farmed. Urban threats are predominately from vandalism, thievery and trespassing from persons and domestic animals. Dogs in particular are a threat to cattle. The RLRC recommended 50 feet buffers for all non-agricultural uses adjacent to farmland with less productive potential (such as rangeland or pastureland), in addition to fencing and/or barriers. As such, the Ordinance proposes a buffer width range of 100 – 150 feet for all non-agricultural uses adjacent to rangeland or pastureland.

Lastly, research indicated vegetative buffers and barriers can be highly effective in reducing particulate matter such as dust and pesticide drift. Some studies concluded drift reduction of 45 to 90% can be achieved through barriers, and combining separation and physical barriers such as fencing and vegetation may be more feasible because they are less land intensive. The AAC and ABWG both had concerns with requiring a vegetative screen as part of the buffer scheme for all uses adjacent to production agriculture because of food safety and other concerns. Wholesale buyers of fresh, unprocessed fruit and vegetable crops have strict food safety standards requiring setbacks from natural areas and vegetation. Natural areas and vegetation can attract wildlife which may introduce food borne contaminants. In addition to food safety concerns, the vegetation can shade crops, attract pests, and such buffers are not permanent. Vegetation can die from disease or other natural causes. Therefore, the Ordinance requires fencing in all cases, but vegetative screening is optional and may be used to offset a buffer width increase.

Analysis of the Proposed Ordinance on Small Urban Lots

A mapping analysis of Santa Barbara County revealed the Ordinance, when adopted, will potentially apply to numerous future urban-growth interface areas. The maps indicated the majority of Agriculture/Urban interface areas were located in the Cuyama, Los Alamos, Orcutt, and Santa Ynez areas. In order to determine the effect the proposed Ordinance on small, residential lots, staff further analyzed the development potential of the underlying lots for the Agriculture/Urban interface areas. Lots that met the following criteria were analyzed for development potential: 1.) The lot was located adjacent to the urban boundary line but still within the urban boundary area, 2.) The lot was located adjacent to rural lands zoned as agriculture, 3.) The lot was zoned residential and 4.) The lot size was one acre or less. Lots that met the four criteria were further analyzed for development potential.

Maps with lot lines, Urban/Rural boundary lines, and 300 foot buffer widths were digitally superimposed over aerial photography to determine whether the lot had discretionary development potential. Lots that were owned in common (such as by a homeowner's association or public utility company) or have reached their threshold for minimum lot size were not considered developable. The results of the analysis concluded eight residential urban lots ranging in size from one acre to at least 10,000 sq ft. in size, had discretionary development potential. Three of the eight lots were adjacent to production agriculture and the remaining five lots were adjacent to rangeland or pastureland. Based on the results of the analysis, staff determined the potential effect of the proposed Ordinance on small, residential lots located along the Urban boundary line was negligible.

References

County of San Luis Obispo; *San Luis Obispo County Agricultural Buffer Policies and Procedures* (November 2005); Website: http://www.slocounty.ca.gov/agcomm/Land_Use/Agricultural_Buffers.htm

County of Ventura; *County of Ventura Agricultural/Urban Buffer Policy* (Revised 7/19/06); Website: <http://portal.countyofventura.org/portal/page/portal/AgComm/services/landuse>

Department of Natural Resources, Queensland, Australia; *Planning Guidelines Separating Agriculture and Residential Land Uses*; 1997; Website: <http://www.dsdp.qld.gov.au/resources/policy/plng-guide-sep-ag.pdf>

Hammond, Sonya; Great Valley Center, Modesto, CA; *Can City and Farm Coexist*; 2002; Website: <http://www.greatvalley.org/>

Hewitt, Andrew J.; *Drift Filtration by Natural and Artificial Collectors: A Literature Review*; 2001; Website: <http://www.agdrift.com/>

Ministry of Agriculture Lands, British Columbia, *Guide to Edge Planning, Promoting Compatibility Along Urban-Agricultural Edges*; 2009; Website: <http://www.agf.gov.bc.ca/resmgmt/sf/Publications.htm#edge>

Pennebaker, Laura; *Agricultural Buffer Criteria for the City of Arroyo Grande*; 2009; Website: <http://digitalcommons.calpoly.edu/theses/77/>

Resource Lands Review Committee, Rogue Valley, Oregon; *Agricultural Buffering Standards – Establishing Effective Buffers Between Rural Agricultural and Urban Use*; 2006; Website: http://rvkog.org/MN.asp?pg=rps_reports

Santa Barbara County Ag Futures Alliance; *Proposed Agricultural Buffer Policy for Santa Barbara County*; 2010; Website: http://aginnoventions.org/actions/santa_barbara_action/

Spray Drift Task Force; *A Summary of Aerial Application Studies*; 1998; Website: <http://www.agdrift.com/>

Spray Drift Task Force; *A Summary of Ground Application Studies*; 1997; Website: <http://www.agdrift.com/>