Public Comment Regarding Cannabis Ordinance and Program Update

Received January 2022

From:	Bill Krawetz
To:	Crystal Acker
Cc:	Cannabis; Tennis Wick; Scott Orr
Subject:	RE: Cannabis EIR Draft Ordinance timeline -status
Date:	Wednesday, January 5, 2022 1:41:18 PM
Attachments:	image001.png image002.png image003.png image004.png

Hi Crystal,
Just checking in on the EIR status and timeline. With all the stuff going on, like the tax moratorium, I was wondering if the timeline was affected?

I submitted a couple suggestions of items to be considering in the scoping elements. Hope they helped generate a couple of ideas and didn't confuse the issue.

Thanks Bill

From: Crystal Acker [mailto:Crystal.Acker@sonoma-county.org]
Sent: Wednesday, November 10, 2021 3:46 PM
To: 'Bill Krawetz'
Cc: Cannabis; Tennis Wick; Scott Orr
Subject: RE: Cannabis EIR Draft Ordinance timeline -status

Hi Bill,

The Ordinance update team is working on developing the draft ordinance framework right now (highlighted in yellow below), based on the public outreach already conducted earlier this year and Board direction given on 9/28/2021. Part of the current effort is identifying specific elements of that framework where additional public outreach could help inform development of the actual draft ordinance during the **Development and Refinement of Draft Ordinance** phase, which is targeted to begin early next year. Additional organized public outreach would not occur until 2022. That said, comments can be submitted at any time through the cannabis email.

crystal

Crystal Acker, M.S.
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County of Sonoma
Planning Division | Project Review
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Due to the Public Health Orders, online tools remain the best and fastest way to access Permit Sonoma's services like permitting, records, scheduling inspections, and general questions. You can find out more about our extensive online services at PermitSonoma.org.

The Permit Center has reopened with limited capacity Monday, Tuesday, Thursday, Friday from 9:00 AM – 4:00 PM and Wednesday, 10:30 AM – 4:00 PM.

Thank you for your patience as we work to keep staff and the community safe.

From: Bill Krawetz <billkrawetz@comcast.net>
Sent: Wednesday, November 10, 2021 11:20 AM
To: Cannabis <Cannabis@sonoma-county.org>; Tennis Wick <Tennis.Wick@sonoma-county.org>; Scott Orr <Scott.Orr@sonoma-county.org>
Subject: Cannabis EIR Draft Ordinance timeline -status

EXTERNAL

Hi Crystal Acker, Scott Orr, and Tennis Wick,

Reviewing the below timeline from the County's website, I has a couple questions on the current status:

1. Are we currently in the "Development of Draft Ordinance Framework" phase?
2. If so is the expectation to be completed by year end?
3. If so, this phase mentions identifying elements through public outreach. Do you have such public outreach meetings scheduled or plan to schedule?

I know with the holidays coming, it's a tough time to fit everything in.

Thanks Bill Krawetz

Timeline (subject to change)

- June 8, 2021 Board approval of initial resources request (Link to June 8, 2021 Board Summary Report)
- **Development of Draft Ordinance Framework – October 2021 through December 2021 - WE ARE HERE**
  - Complete a draft ordinance framework including all potential program elements to consider in the Environmental Impact Report (EIR) for the new program
  - Identify potential program elements to develop further through additional public outreach

- **Development and Refinement of Draft Ordinance – January 2022 through May 2022**
  - January 2022 – Draft Ordinance Framework Complete/Initiate Competitive Request for Proposal (RFP) Process for an EIR Consultant
  - Continue public outreach to develop and refine potential program elements, listen to concerns, and develop options to address concerns
  - May, 2022 – Draft Ordinance complete for environmental analysis
- **Environmental Impact Report (EIR) – June 2022 through Fall 2023**
  - June, 2022 – EIR Professional Services Agreement Board Award
  - June, 2022 – Notice of Preparation published for the Draft EIR
  - July, 2022 – Public scoping meeting(s)
  - Seek public input on what Potential Environmental Impacts should be considered in the EIR
  - Conduct environmental analysis of the proposed draft ordinance
  - Provide public access to technical studies used in the environmental analysis, as available
  - Provide regular public status updates throughout the EIR process
  - Fall 2023 – Draft EIR Published for Public Comment
- **Draft Ordinance and EIR Approval – Fall 2023 through Summer 2024**
  - Fall 2023 – Draft EIR to Planning Commission for public comment
  - Revisions to draft ordinance based on public comment and Planning Commission direction
  - Spring 2024 – Planning Commission Hearing on Proposed Ordinance
  - Summer 2024 – Board Hearing on Proposed Ordinance

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From:	Crystal Acker
To:	Cannabis
Subject:	FW: SCOPING – CANNABIS EIR- Traditional Farming Compatibility – PUBLIC COMMENT
Date:	Thursday, January 6, 2022 8:05:19 AM
Attachments:	CLUO-BOS-3-8-2111102021.pdf CLUO-BOS-6-28-21 Letter-6-28-2111102021.pdf

From: Anna Ransome <ransome@sonic.net>
Sent: January 05, 2022 4:26 PM
To: Tennis Wick <Tennis.Wick@sonoma-county.org>; Crystal Acker <Crystal.Acker@sonoma-county.org>; Scott Orr <Scott.Orr@sonoma-county.org>
Subject: SCOPING – CANNABIS EIR- Traditional Farming Compatibility – PUBLIC COMMENT

In support of the County's current work in developing the draft cannabis ordinance framework, we are providing the following recommendations for one item to be included in your scoping study. Specifically, the compatibility of cannabis cultivation with *traditional farming practices* needs to be addressed.

In review of documents submitted in neighboring counties, both during their cannabis ordinance process, as well their real life experiences on the ground, serious concerns have been raised as to the co-existence of a cannabis operation with a nearby traditional farm. In summary, two main concerns were raised:

1. Normal farming practices (chemicals, dust, burning) are problematic for cannabis cultivation because such interferes with the cannabis plants' growth and can contaminate it, making it unsalable

2. Value disparity between traditional crops and cannabis is so large it creates a legal liability that is unsustainable for the traditional farmer.

In the case of Yolo County, the Yolo County Farm Bureau (YCFB) outlined their members' concerns both upfront in the CEQA Ordinance development stage and subsequently in their suit challenging such ordinance.

They feel cannabis is incompatible with traditional family farming: Almonds at $6K an acre verse $1m an acre for cannabis, being such a high difference in value, leads to an economic situation that would likely drive the traditional farmer out of business.

· "The value disparity between traditional crops and cannabis

is so large it creates the reality of serious economic risk to the continuation of traditional ag near cannabis: the traditional farmer or rancher cannot afford to pay for crop damage that may be caused by normal farming practices"

· Traditional farming uses chemicals, creates dust and may require burning, all of which can cause drift onto a neighboring cannabis farm. This can reduce cannabis yield, which cannabis operators have already threatened to bring suit over. An almond farmer making $6K a ton could never compensate a cannabis grower making a $1m an acre. And any insurance would be unaffordable.

· Cannabis is a "no pesticide residue" product, so is incompatible with ordinary farming practices that uses such.

· Williamson act violation - Act requires land devoted to Ag or compatible use. Since cannabis interferes with ordinary farming practices it is incompatible (Govt. code section 51238.1)

Attached are two YCFB letters to the BOS dated March 8, 2021 (see "Point 3") and June 28, 2021 (see paragraphs 3 and 4) that spell out these concerns.

Similarly in Napa County, their report prepared for the Cannabis Regulation Initiative (the Elections Code Section 9111 report, section, VI. Environmental Impacts, subsection C. Introduction of Pests and Diseases) found similar concerns but between cannabis and grapes:

"Pests and diseases are a significant concern for grape growers, as State regulations for cannabis generally disallow application of a broad range of common herbicides and insecticides. This can create the fear that cannabis crops may harbor pests. Conversely, cannabis growers may blame other farmers when their cannabis has illegal pesticides, as their product must meet strict testing requirements before it can be sold. The Initiative does not require any buffers or setbacks between cannabis and other crops, which are necessary to avoid conflicts and potential impacts."

Santa Barbara reports similar problems (reported by NPR on August 14, 2019):

In June, Joseph learned that the fungicide she has been spraying on her grapes for decades could be drifting onto the cannabis.

> Unlike food crops, cannabis can't be sold if there's any trace of fungicide or pesticide in it, according to state law. So while the county investigates, she's using a more expensive and far less effective spray on the grapevines that are nearest to the cannabis farm. "We may lose crop because we can't protect it," Joseph says."

The Sonoma County EIR study must examine these conflicts, find solutions and develop a program that protects our diverse traditional farms.

Thank you for consideration of these comments.

Anna Ransome & Bill Krawetz for Neighbors of West County (NOW)

YOLO COUNTY FARM BUREAU

Yolo County Farm Bureau

P O Box 1556, Woodland CA 95776
530.662.6316 O * 530.662.8611 F
www.yolofarmbureau.org

March 8, 2021

Yolo County Board of Supervisors
ATTN: Jim Provenza, Chair
625 Court Street
Woodland, CA 95695

RE: Draft Cannabis Land Use Ordinance
Review March 9, 2021

Dear Supervisor Provenza;

Yolo County Farm Bureau (YCFB) is here to once again comment that we do not believe that this Cannabis Land Use Ordinance (CLUO) is "ready for prime time".

YCFB has raised many issues since this process started over 4 years ago. I am making only five points today – all of which you have heard before. YCFB requests that the appropriate county legislative bodies, the Board of Supervisors and the Planning Commission rethink the direction in which the County is going.

POINT 1: The EIR should have had a base line of NO CANNABIS (other than the six plant personal use authorized under CA Law). Preparing a comprehensive document by injecting a "given" of dozens of permitted grows distorted the entire process. The perception to the rest of us is that the County's development process for the CLUO was cannabis grower/processor driven.

POINT 2: We – Yolo County Farmers and Ranchers of traditional crops do not consider cannabis agriculture although we recognize it is so described in State law. There are many incompatibilities between cannabis and neighboring or nearby traditional Yolo County crops as I outline.

POINT 3: The disparity in value between cannabis and traditional crops creates seeds of incompatibility that can lead to the inability of the neighboring traditional farmer being able to continue farming. Example: value of an acre of cannabis - $1M. Value of an acre of almonds - $6,000. You need to remember that cannabis is a "No pesticide residue" crop. For instance: pesticides can be put on a neighboring crop according to law – but – testing could show residue on the cannabis grow. And, farmers create dust. However, when dust gets on a neighbor's outdoor cannabis crop the traditional farmer is told the crop has lost value, and he/she is threatened or sued. Insurance is expensive and may not be available at a cost the farmer can afford. In some areas of the State we are seeing cannabis growers use tort law to sue their neighbors. There are instances where pesticide applicators will not apply pesticides for fear a neighboring cannabis grow might be impacted – thus, the traditional farmer may not be able to protect his crop and may lose it. We add that Cannabis can be grown in pots – completely enclosed in space that does not let outside air in or inside air out. The ideal location for all cannabis operations is indoors, in restricted inside air conditions, and in industrial zones located in or near cities. We believe that the DEIR did not cover this value disparity/ incompatibility and inside option adequately.

POINT 4: The FEIR offers a 1,000 foot buffer from a cannabis grow (we note that there are excellent arguments that the buffer should run from any part of the cannabis operation because of the issues they create) to a residence on 20 acres or less, and a 200 foot buffer to a residence located on an ag zoned parcel of over 20 acres. The FEIR justifies this distinction by noting that the house on the "ag zoned" parcel is "incidental" to the ag use and therefore should not expect to be insulated from incidents of "agriculture". Again, in Yolo County cannabis is not a traditional crop. No farmer should have to accept cannabis as a very close neighbor because the State has decided to so categorize it. We also note that the 1,000 feet buffer is a minimum and it must run to the property line --- not include the neighbor's land adjacent to his/her residence. Otherwise, the cannabis grower is "taking" the neighbor's land without paying for it.

POINT 5: we believe that cannabis growers should have the burden of themselves paying for the added risk to neighbors. You all know from the crime statistics that cannabis brings in people with questionable backgrounds. Our members have told us that they have cannabis connected trespass/thievery issues that cause problems. Cannabis growers have security: guard dogs, armed guards, intensive and intrusive lighting to protect their operations. However, the main focus of cannabis security plans should be the neighbors. Thus, cannabis operations should have to provide the county sheriff with a security plan that is focused on protecting those neighbors. They should pay for policies of insurance with reasonable and inflation adjusted limits to protect those neighbors from harm and loss. They should not be able to start any operations until the sheriff has accepted and signed off on an individual plan. The added policing required by these operations should not be the responsibility of the property tax payers of Yolo County.

Sincerely,

Joe Martinez

Joe F. Martinez
President

Cc: County Supervisors
Patrick Blacklock, CEO
Taro Echiburu, Yolo County Community Services
Leslie Lindbo, Yolo County Chief Assistant Department Director
California Farm Bureau Federation

YOLO COUNTY FARM BUREAU

Yolo County Farm Bureau

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June 28, 2021

Yolo County Board of Supervisors
625 Court Street
Woodland, CA 95695

RE: 6/28/2021 Agenda Item #49: Time Set 9:00 am

First – Yolo County Farm Bureau is writing in regard to redirecting your attention to the comments we verbally made at the BOS meeting on June 8. They bear repeating. Outdoor cannabis is incompatible with traditional county agriculture and if you allow it, you will be endangering the ability of those who farm your major Yolo County food crops, who unfortunately find themselves near outdoor cannabis grows, to continue to compete in our world price structure.

YCFB is concerned that some County staff and elected officials seem to believe that outdoor cannabis cultivation is compatible with traditional Yolo County agriculture. Yet, although we have sent written documentation explaining the detrimental impacts of cannabis on food crops since 2017, today's staff report disregards the evidence and documentation explaining how cannabis negatively impacts food crops and therefore is detrimental to Yolo county as a whole.. We note the language in the FEIR at page 3-9: the authors of the FEIR appear to believe that State Pesticide regulations and their enforcement by the County Ag Commissioner, and enforcement of "nuisance dust" by the YSAQD "solve" both issues because "regulations and enforcement" are in place. Thus –ipso facto – no incompatibility.

The existence of and good intentions behind a regulatory scheme do not make it the solution to obvious environmental impacts. The personal experience of one of our board members illustrates this reality: No one doubts the training and the expertise of county employees, or their commitment to do their jobs carefully and well: That is especially true of those who handle herbicides. Some years ago the growers noticed that about 10 walnut trees at the east end of a roadside row had sustained spray drift damage. After looking at the possibilities they realized that the County of Yolo had put on a roadside weed herbicide – and the walnut trees were unintended recipients. The regulations were there --- the good intent was there – but the damage was done. This illustrates that a law on the books is just verbiage: it is not the same as physical barriers and impediments to prevent spray damage. Then, we have the conundrum: The owner of a $1M/acre dollar crop sustaining accidental damage through no intent or bad motive as an adjunct from farming the neighboring $6T/acre almond orchard. This risk- loss of conventional farming - has to be counted in your assessment because it IS an environmental cost of outdoor cannabis cultivation.

Second: Along with more evidence of incompatibility I revisit an issue that I thought would have been handled last meeting: I was assured that the letter filed by Mr. Kyle Lang would be read into the record. However, it was not read. The relevant information that needed to be read was that The Lang family has raised walnuts in Yolo County, both organic and conventional, since 1937. I summarize it now: Kent Lang

lived on their River Ranch in West Sacramento just under a mile from an outdoor cannabis grow. Kyle Lang advises that regular and normal farming practices are absolutely not compatible based on the following examples: "each time we disced our field we immediately got texts demanding and begging us to stop because we were ruining the buds. We piled dead trees to burn and were told not to –we were damaging the cannabis. – And should wait until November. When we sprayed nutrition or for pests, we received the same texts telling us – again -to stop and wait until November. Obviously – waiting until November was not an option if one expects to continue farming. Kyle sums up this part of his narrative by stating "The County really needs to look at the negative impacts to regular agriculture activities because every activity regular farming does will negatively impact the marijuana plant. The marijuana plants need to have a sterile medical filtration system to keep dust, fertilizer sprays and any chemical sprays from devaluing their highly sensitive plants."

Secondly, Kyle gave first hand information about the skunk stench that is part of the cannabis operation for at least 3 months of the year. Kyle outlined that the stench of cannabis would spread for 2-3 miles around and with wind it would become concentrated –and travel farther. He states that there were several tenants living on the River Ranch, and they, along with Kent, experienced the terrible stench of "standing next to a dead rotting skunk" in 109 degrees. It was so strong it would keep him up at night, and caused both him and their tenants to have bad headaches. Kyle also pointed out that crime came with the marijuana: he knows of two times trespassers tried to use their land to access the back of the marijuana grow. He concludes by stating, "If our county cannot see the issues growing pot brings to our agricultural practices and way of life, then our county cannot claim to be 'pro agriculture'".

We note that the Staff Report seems to be discussing outdoor cultivation and – maybe -600 ft buffers. What happened to the 1000 feet? What happened to 10,000 feet? ? Why not consideration of at least the suggested 2,500 foot buffer? We stress that there has been NO discussion of indoor cultivation: it is a ridiculous argument for Staff to use the excuse that a "filtration system might fail". Seriously? Any system "might fail" but it is ridiculous for Staff to try to use this long-shot of a reason to disregard the very valid indoor cultivation alternative.

Staff clearly seems to be fixated on outdoor cultivation coupled with minimal buffers, which remain a major unresolved issue because the proposed 600 foot buffer is seriously inadequate. Cannabis is not only incompatible but has serious negative impacts that must not be imposed on a rural farm constituency and their accompanying farming and ranching. The reality of nearby outside cannabis cultivation incompatibilities include nauseating odors that will destroy their quality of life, damage their health, and bring crime onto their ranches and farms.

Very truly yours,

Joe F. Martinez
President

From: Crystal Acker
To: Cannabis
Subject: FW: Scoping- Inclusion and Exclusion Issues for Cannabis EIR
Date: Thursday, January 6, 2022 2:08:09 PM
Attachments: Scoping Exclusion Zones. final.pdf
Exhibit A Exclusion-Criteria-Recommendation-2018 04-25.pdf
Exhibit B CAG-Inclusion-Exclusion-Recommendations.pdf
Exhibit C Exclusion-combining-zone-notice-public-staff-report-20160524.pdf
Exhibit D Exclusion Zones to be studied.pdf
Exhibit E Exclusion Zone- Bloomfield 12-2021.pdf
Exhibit H Inclusion Zones to be studied.pdf

Another one I want be sure you got

From: craigspencerharrison@gmail.com <craigspencerharrison@gmail.com>
Sent: December 17, 2021 2:30 PM
To: Tennis Wick <Tennis.Wick@sonoma-county.org>; Scott Orr <Scott.Orr@sonoma-county.org>; Crystal Acker <Crystal.Acker@sonoma-county.org>
Subject: Scoping- Inclusion and Exclusion Issues for Cannabis EIR

Dear Tennis, Scott and Crystal:

On behalf of Bennett Valley Residents for Safe Development, attached is our request for scoping entitled "Scoping—Study Designating Exclusion and Inclusion Zones."
Together with exhibits A-H.

Please contact me with any questions.

Craig S. Harrison
4953 Sonoma Mountain Road
Santa Rosa, CA 95404
707-573-9990
https://www.craigsharrison.net/

RAGLE RANCH AREA EXCLUSION ZONE

BLACKBERRY RD

1,000 ft

OCCIDENTAL RD

1,000 ft

HWY 116

GRATON RD

OCCIDENTAL RD

COFFEE LN

BARLOW LN

MILL STATION RD

GREEN HILL RD

CHERRY RIDGE RD

MILL STATION RD

1,000 ft

HWY 116

OCCIDENTAL RD

MONTGOMERY RD

FERGUSON RD

RAGLE RANCH PARK

SEBASTOPOL

FURLONG ROAD

GRANDVIEW RD

FERGUSON RD

BODEGA HWY

SEBASTOPOL

1,000 ft

FURLONG ROAD

1,000 ft

BODEGA HWY

SEBASTOPOL

PARCEL SIZE <10 ACRES

EXCLUSION ZONE

In the "County of Sonoma 2017 Cannabis Ad Hoc Committee Charter/Scope of Work" document the following direction was given:

"Inclusion and Exclusion Zones – In December 2016, the board gave direction to staff to develop inclusion and exclusion combining zones for future consideration. The Ad Hoc will work on the development of combining zones that would allow the Board to carve out specific areas or properties on which to include or exclude certain cannabis land uses separately from what is allowed pursuant to the base zoning district."

Below is a list of possible criteria that could be used in reviewing/assessing applications for creation of exclusion zones that would be received from interested parties. We currently envision that an exclusion zone would exclude all cultivation, but it may be possible to exclude outdoor and mixed light (for example) while continuing to permit indoor cultivation.

Due to strong interest, we suggest the exclusion concept be **fast tracked**. It is a relatively straight forward process to produce; and solves the problem of uncertainty for the cannabis grow applicant who will not be wasting time or money filing an application on a parcel which could end up in an exclusion zone. It is suggested that all ministerial applications be held until this process is finalized.

Allow for a process that lets future exclusion zone applications be submitted prior to a final ordinance adoption. This would allow the county to alert potential cannabis grow applicants that the area they are interested in will be having an exclusion zone application in process as soon as the ordinance is in place.

List of exclusion zone criteria:

1) **Inadequate access**
    a. narrow public road
    b. narrow private road
    c. easement across private property with no owner agreement for commercial use of road
2) **Water resource issues**
    a. inadequate water supply
    b. sensitive watershed
    c. interference with neighborhood wells and septic systems
3) **Residential character is to be preserved**
    a. current land use is residential
    b. neighborhood is clearly defined
    c. currently little or no commercial ag operations
    d. adjacent to residential area
4) **Sensitive flora or fauna habitat**
5) **Scenic corridor**
6) **Existing county study area**
    a. Inconsistent with area specific plan
7) **Area defined to decide by ballot?**

Progress Report for March 2018 CAG Meeting from Inclusion/Exclusion Sub-Group

The Sonoma County Board of Supervisors passed a set of ordinances to regulate the cultivation, manufacturing, sale, and taxation of medical cannabis in December 2016. At that time there was little experience in other counties within the State of California upon which to base the ordinance, and there was a lively public debate over many parts of the regulations. This is especially true regarding the decision over zoning: what cannabis cultivation permits would be available for parcels in what land use zones. Because the Supervisors recognized that their December 2016 decision on cannabis zoning would likely not be optimal in all cases, they adopted a provision that allowed inclusion and exclusion combining overlay zones, which would essentially allow for exceptions to their broad zoning decisions.

In early 2017, a new Supervisor ad hoc committee on cannabis was formed, and this ad hoc decided to convene a citizen's advisory group as a source of ideas and input for issues surrounding the existing medicinal cannabis regulations and upcoming adult use cannabis regulations. This advisory group was selected from volunteers who applied to be in the group…mostly interested parties who were active in the process of creating the regulations in 2015-2016. This group, the Cannabis Advisory Group (CAG), was convened not as a decision-making body, but as a body that could provide input and ideas to the Supervisors (through the county cannabis staff and ad hoc) from a variety of perspectives. It was decided early that this group would not vote on ideas to pass on, because that would limit the breadth of ideas being developed/offered and be subject to the group's specific demographics. Instead the group was encouraged to work on ideas that met the goals of as many of the county's citizens as possible, and where priorities of different group members diverged, offer a variety of ideas and possible solutions that the Supervisors might consider.

In early 2018 a working sub-group of the CAG was formed to evaluate the use of inclusion and exclusion zones to see if they could be used to help the existing cannabis regulations better meet the needs and desires of Sonoma County citizens. This working group consists of seven members which is less than a CAG quorum, enabling the team to have private working meetings to develop its initial ideas. These initial ideas would then be brought back to the entire CAG in a public forum, where additional input could be gathered from both CAG members and from the public. Because of the varied points-of-view and priorities of the CAG and the working sub-group, we expect that a consensus recommendation regarding inclusion and exclusion zones will not be reached, but instead a range of options will be forwarded to county staff for further analysis and possible presentation to the Board of Supervisors. Thus the idea will not be to present a single recommendation, but instead to provide a wide range of possible solutions to zoning-related problems perceived by county residents both within and outside the cannabis industry. The Board of Supervisors will then decide what its own priorities are and what issues it in fact wants to address using inclusion and exclusion zones, and then it will vote to choose one or more solutions to those issues.

The objective of the use of inclusion and exclusion zones is to better meet the needs of Sonoma county residents relative to the existing December 2016 zoning regulations. Thus the first job of the working sub-group was to evaluate what groups are not being well-served under the zoning regulations as they currently exist. Overwhelmingly two issues were identified which are causing significant consternation to different county residents. First, small-scale cannabis growers (that are purported to number in the thousands) who have for the past number of years raised their crops on small residential plots have found that they have very limited options to join the new legal California cannabis market. These growers have little capital, and most of what they do

have is invested in their home and land. When the 2016 regulations did not allow for commercial cannabis cultivation in RR and AR parcels, their path to the legal market became the lease or purchase of a second (likely larger) parcel of land zoned DA, LIA, or LEA. With the rush to the more limited supply of agricultural-zoned properties by these small-scale growers as well as outside businesses looking to join the market in Sonoma County, land prices have escalated and the local growers have felt crowded out of the market. That is, crowded out of both the land market and the legal cannabis market.

The second issue identified is that of the resistance to commercial cannabis cultivation by rural county residents who live in areas that have become primarily residential over the years despite being zoned agricultural. These are mostly owners of DA parcels, and mostly of parcels less than 10 acres in proximity to RR neighborhoods, but also include owners of larger parcels in more spread-out tracts. These residents feel that movement of commercial cannabis grow operations into their areas will impact the quality of life in their neighborhoods through visual impacts, odors, the risk of violent crime, and the general bustle of commercial activities around their homes. They are also wary about the impacts of cannabis on their roads, soil, and water supplies; some of these areas are quite environmentally sensitive. They feel that they live in rural residential neighborhoods despite the inherited agricultural zoning of their land, and as such deserve the same isolation from commercial activity as RR and AR zones.

Having recognized these two issues brought about by current zoning regulations, we have tried to identify possible solutions that may resolve or at least ease them. We recognize that the Board of Supervisors may not feel that one or either of these issues are high on their list of priorities, but these are the issues that up to now this working group has felt justified to provide input on.

In discussing these issues it became clear that the idea of inclusion zones was not going to be as simple to implement as exclusion zones. Exclusion zones are areas where normally by zoning regulation the cultivation of cannabis would be allowed, but where instead it is prohibited (or at least restricted) by virtue of exclusion zone status. In this case the “benefit” of exclusion zone status is shared equally by all landowners who don’t want cannabis cultivation allowed in the area. This evenly shared “benefit” makes for a relatively simple process of agreement and banding together among like-minded landowners to share political and financial costs to request exclusion zone status. The “benefits” of inclusion zone status, in contrast, would generally not be shared evenly by all landowners within the zone, but only by those who are actually cultivating cannabis. This would lead to a group of landowners within the zone that is split between those who benefit and those who are at best indifferent to inclusion zone status. It would be difficult to drum up widespread support for creation of an inclusion zone, and would likely result in few large inclusion zones being created unless there happened to be a very dense concentration of growers. It is more likely that very small inclusion zones (or even individual inclusion parcels) would be applied for and created, where the “benefits” of inclusion zone status would be more universally appreciated by the smaller group of landowners. This processing of tiny inclusion zones or inclusion parcels would result in a logjam within the county zoning process and be an additional financial burden on inclusion zone applicants, in large part defeating the original purpose of the inclusion zones (attempting to make it easier for small-scale growers to enter the regulated market). For this reason the discussion of small-scale growers below strays from a strict discussion of inclusion zones and considers other alternatives as well.

Small-Scale Growers

A range of possible solutions to this problem have been discussed, trying to make more land available to bring small-scale growers into the regulated market. Some of these potential solutions involve inclusion zones and other options do not. These options include: allowing permits to multiple individual growers on large agricultural and/or industrial sites so that many small-scale growers can share the costs and infrastructure of a single large property (this may take the form of either co-operatives or private leasing arrangements); allowing non-flowering cannabis propagation and cultivation (nurseries) in RR/AR; allowing cottage-scale cultivation in larger RR/AR parcels through limited inclusion zones; and allowing countywide cottage-scale cultivation in larger RR/AR parcels by incorporating Staff's suggestions from November 2016.. These various options would not all have an equal impact on improving access of small-scale growers to the regulated market, and they would obviously have varying impacts on rural residents who are not growers.

Multiple Leases on Large Parcels

With small parcels generally unavailable to small-scale growers because of the prohibition of cultivation in RR/AR and the minimum lot sizes for agricultural parcels, we see a possible solution in the use of large agricultural (or industrial, for indoor cultivation) properties by multiple individuals. As examples, a 20-acre agricultural property might be used by 6-8 growers at the cottage or specialty level, or a 100 acre property might be used by a dozen growers at the small or medium level. In these cases, each of the individual growers would have her own permit to cultivate on this shared land. These growers would be able to share the cost of the studies needed in the permit process, to share noise-, odor-, traffic-, and waste disposal plans, to share water and security infrastructure, and still have a relatively low development density on the property. Particularly attractive land for this approach might be the large parcels that are currently used for disposal of treated county wastewater. While this approach wouldn't give the growers the convenience of growing at home, it could be a way to lower the cost of entry into the market for small-scale growers and allow them to continue intensive small-scale farming.

This approach is not possible under current county regulations because the regulations limit permits on a single property to a cumulative one acre. This limit was enacted in 2016 because of an anticipated one acre limit in California law. However, California has lifted that restriction, and the county could do so also if it is interested in this approach to aiding small-scale growers.

Nurseries in RR/AR

Two of the largest impacts of cannabis cultivation on neighbors in rural residential settings are the odor and the security risk around harvest time from having significant quantities of high-value flowering crop on location. In cannabis nurseries only a few plants are allowed to flower, and the vast majority of the material on site is in the propagation and juvenile plant stage. This material does not emit much odor and is not typically the target of thieves. Cannabis nurseries can be the locations where the valuable, creative process of development of new useful medicinal strains occurs, and this has been an important part of the cannabis industry in Sonoma County. Perhaps cannabis nurseries would be acceptable on certain RR/AR properties without the odor and security risks associated with the cultivation of mature plants. This could provide additional opportunities for small-scale growers on RR/AR properties within the county.

Cottage-Scale Cultivation in RR/AR

Another way of making land easier to acquire for small-scale growers in the county is opening up some RR/AR parcels to cottage-scale cannabis cultivation. Of course, the primary land use

in RR/AR is residential, and so this would only apply to growers who live on the land they are cultivating. This could be done in two ways:

1. By creating inclusion zones in certain areas where cannabis is more readily accepted, or where RR/AR land is used more agriculturally than residentially. Within the inclusion zones, the restrictions and minimum lot sizes that are used to govern DA could be adopted, or even more stringent lot size and setback requirements could be used. As discussed earlier, developing support for large inclusion zones may be difficult, as only a minority of landowners are likely to apply for cultivation permits. Also, it may be challenging to get cultivators currently working in the unregulated market to come forth to apply for an inclusion zone they may not, in the end, qualify for.

2. By allowing cultivation on select RR/AR parcels countywide by adopting the November 2016 recommendation of Staff to allow cannabis cultivation on parcels larger than 2 acres. This would open up approximately 9000 parcels in the county to cultivation. If a larger minimum parcel size were chosen, fewer parcels would be available (for example, with a 10-acre minimum, about 1000 parcels would become available). In this scenario, the November 2016 Staff recommendations that RR/AR cultivation must not be detectable by neighbors could be adopted - nothing seen, smelled, or heard. This additional requirement would potentially increase the required setbacks from neighboring residences and would also remove most impact on neighbors. It would also further limit the number of parcels eligible for outdoor and mixed light cultivation in these zones.

In general, the smaller the size of RR/AR parcels that are opened to cultivation and the more that are opened, the easier it would be for small-scale growers to join the regulated market. The trade-off to this would be the additional impact on surrounding residences as cultivation is more widely distributed.

Rural Landowners

Many rural landowners are upset with the influx of cannabis operations and permit applications in their neighborhoods. They are upset for a variety of reasons: environmental concerns, access concerns, concerns about odor, crime, aesthetics, and the onset of commercial activity in a serene rural residential setting. Exclusion zones can be an effective solution to these issues, separating these residential areas from cultivation facilities. They would, however, decrease the number of parcels available in the county to small-scale growers. In order to address these issues, a suggestion for exclusion zone criteria might include the following:

> Allow creation of exclusion zones in areas that are not suitable for commercial cultivation of cannabis because of any the following:
> 1) There is inadequate access, water, or electrical service
> 2) Cannabis cultivation would be incompatible with the biotic character of the area
> 3) There is a significant fire hazard due to topography, vegetation, and/or accessibility
> 4) The residential character of the area would be significantly compromised by the installation of a commercial cannabis cultivation operation.

Proposed exclusion zones should be contiguous with relatively uniform current land usage, but all parcels need not all have the same zoning. Another potential exclusion criterion that was discussed relates to existing study areas: parts of the county with area-specific development plans. These areas could be considered for exclusion zone status if commercial cannabis cultivation is seen as inconsistent with the area-specific plans.

County of Sonoma Agenda Item Summary Report

Clerk of the Board
575 Administration Drive
Santa Rosa, CA 95403

Agenda Item Number:
(This Section for use by Clerk of the Board Only.)

To: Board of Supervisors

Board Agenda Date: May 24, 2016

Vote Requirement: Majority

Department or Agency Name(s): Permit and Resource Management Department

Staff Name and Phone Number:
Jane Riley 565-1833

Supervisorial District(s):
First and Fourth

Title: Zone Change to add the Vacation Rental Exclusion (X) Combining Zone; County of Sonoma. PRMD File No. ZCE16-0003.

Recommended Actions:

Hold a public hearing and adopt an Ordinance rezoning various parcels to add the Vacation Rental Exclusion (X) Combining Zone to certain residential areas within the Sonoma Valley and the north county. APNs: Various; see attached list.

Executive Summary:

On January 26, 2016, the Board of Supervisors considered a package of vacation rental code amendments designed to reduce neighborhood impacts and protect housing stock, including a recommendation from the Planning Commission to prohibit the establishment of new vacation rentals within the Low Density Residential (R1) Zone. Rather than adopt an outright ban on these properties countywide, the Board directed that the Vacation Rental Exclusion (X) Combining Zone be used to specify the areas in which vacation rentals will not be allowed.

On March 15, 2016, the Board of Supervisors adopted Resolution of Intention 16-0085 directing staff to initiate rezoning procedures to consider application of the Vacation Rental Exclusion (X) Combining Zone to certain areas identified by the Board. While the Board chose not to adopt a ban on vacation rentals in all low density single family zones, there are some areas of the County that have been identified as having certain characteristics that necessitate vacation rental exclusions, such as low housing availability and poor neighborhood compatibility. The Resolution of Intention directed staff to consider adding the Vacation Rental Exclusion (X) Combining Zone in the following areas:

a) All R1 Low Density Single Family Residential and RR Rural Residential zoned properties within the communities of Boyes Hot Springs, Fetters Hot Springs, El Verano, Agua Caliente, Glen Ellen and Kenwood;
b) All of the parcels within the private residential communities of Diamond A, Foothill Ranch, Agua Caliente Knolls, Sobre Vista, Palomino Lakes, and the Vineyards subdivision;

c) The residential properties in the Nut Tree/Apple Tree neighborhood and those bordering Winter Creek Road in the Sonoma Valley; and
d) The Fitch Mountain area, bordered by Healdsburg city limits on the west and by the Russian River on the north, east and south.

Following adoption of the Resolution of Intention, PRMD staff identified all affected parcels and provided legal notification of the proposed rezoning to add the Vacation Rental Exclusion (X) Combining Zone Exclusion Combining Zone. Affected property owners and other interested parties were able to comment on the proposal at hearings before the Planning Commission held on April 14, 2016 and April 21, 2016.

Effect of the Vacation Rental Exclusion (X) Combining Zone

In areas where the Vacation Rental Exclusion (X) Combining Zone would be adopted, no new applications would be accepted for vacation rentals. Existing, fully permitted vacation rentals would be able to continue to operate, but their permits would expire upon sale or transfer of the property. All uses permitted in the respective base zone with which the X district would be combined would still be permitted, except for vacation rentals. Existing Combining Zones would not be affected by the Vacation Rental Exclusion (X) Combining Zone. Hosted rentals would continue to be allowed within the Vacation Rental Exclusion (X) Combining Zone.

Criteria for Placement

The Vacation Rental Exclusion (X) Combining Zone would be placed on parcels where one or more of the following criteria are met:

a) There is inadequate road access or off-street parking;
b) The prevalence of vacation rentals is detrimental to the residential character of neighborhoods;
c) The housing stock should be protected from conversion to visitor-serving uses;
d) There is a significant fire hazard due to topography, access or vegetation;
e) The residential character is to be preserved or preferred; and
f) Other areas where the Board of Supervisors determines that it is in the public interest to prohibit the establishment and operation of vacation rentals.

Each of the 7,810 parcels named in the Board's Resolution of Intention 16-0085 for consideration for inclusion within the Vacation Rental Exclusion (X) Combining Zone met one or more of the above criteria. Within each of the named areas, concern had been expressed related to one or more of the above issues, including high fire danger, limited road access, inadequate off-street parking, the loss of housing stock and the prevalence of vacation rentals eroding the residential character of neighborhoods.

Existing Permitted Vacation Rentals in the Vacation Rental Exclusion (X) Combining Zone

On and after the effective date of the rezonings to add the Vacation Rental Exclusion (X) Combining Zone to the parcels designated herein, no application would be accepted for establishment or operation of a vacation rental on any property with the X designation. Existing, fully permitted vacation rentals would be allowed to continue until sale or transfer of the property, at which time the vacation rental permit would expire automatically. A vacation rental permit could also be revoked for repeated

violations of the vacation rental performance standards, as set forth in the Vacation Rental Ordinance (26-88-120), and would not be able to resume as a vacation rental.

Pipeline Provision

The Board of Supervisors may establish a pipeline provision for new applications for vacation rentals that are going through the approval process during these proceedings. Typically, new complete applications submitted prior to the effective date of an ordinance would continue to be processed as usual. Staff has included this provision in the draft ordinance and recommends its adoption.

Future Requests for the Vacation Rental Exclusion (X) Combining Zone

Since the Board's March adoption of the package of zoning code amendments for vacation rentals, including provisions for the Vacation Rental Exclusion (X) Combining Zone, staff have received inquiries from neighborhoods that were not listed within the Resolution of Intention inquiring as to how to initiate the Vacation Rental Exclusion (X) Combining Zone rezone in their areas. Pursuant to 96-010 of Chapter 26 (Zoning) of the Sonoma County Code, requests for changes to zoning may be made by petition (application) of one or more residents of the area affected by the proposed zoning. They may also be initiated by the Board of Supervisors through adoption of a Resolution of Intention. In the future, residents of areas that meet the designation criteria of the Vacation Rental Exclusion (X) Combining Zone and wish to be considered for application of the Vacation Rental Exclusion (X) Combining Zone would need to file an application for a Zone Change with the Permit and Resource Management Department (PRMD). Neighbors in a single geographical area or neighborhood may file together as a single application, thereby reducing their costs, even if not all residents of the area agree about rezoning the neighborhood. All property owners would receive notice by mail of the request unless the number of properties affected exceeds 1000, in which case the law requires placement of a 1/8 page advertisement in a local newspaper. The Planning Commission and the Board of Supervisors would both hold public hearings to consider the rezoning requests. The current cost to apply for a Rezoning is about $8,400.

Planning Commission Actions and Recommendations

After receiving public input at their April 14 and April 21, 2016 public hearings, the Planning Commission reviewed each of the below areas included in Resolution of Intention 16-0085 and made their findings and recommendations on a 3-0-0-2 vote. While 7,810 parcels were originally included in the Resolution of Intention, the Commission recommended 6,204 parcels to move forward for the Board's consideration for the Vacation Rental Exclusion (X) Combining Zone.

Palomino Lakes (4th District)

Palomino Lakes is a private residential community outside of Cloverdale. The Planning Commission recommended this area for the Vacation Rental Exclusion (X) Combining Zone due to its narrow private roads and high fire danger.

The Vineyards (4th District)

The Vineyards is a private residential community outside of Geyserville. This community has recently reached a settlement agreement with some property owners that will allow vacation rental use for up to 14 days per year. This use would not be consistent with the Vacation Rental Exclusion (X) Combining Zone, which prohibits all vacation rental uses. The Planning Commission did not recommend this area for the Combining Zone.

Fitch Mountain (4th District)
Fitch Mountain consists of a mixture of permanent residential uses and vacation rental uses. Access is limited and roads are narrow with inadequate off-street parking. Fire danger is very high. The Planning Commission recommended the residential parcels of Fitch Mountain for the Vacation Rental Exclusion (X) Combining Zone due to extreme fire danger, inadequate access and parking, and the need to preserve residential character.

Kenwood (1st District)
All residentially-zoned parcels in Kenwood were included in the Resolution of Intention. The Commission recommended that only the R1 urban residential parcels be included in the Vacation Rental Exclusion (X) Combining Zone, citing the need to preserve permanent housing stock and the preservation of residential character. The RR parcels in the Kenwood Community were not recommended for the Vacation Rental Exclusion (X) Combining Zone.

Glen Ellen/Hill Road (1st District)
Glen Ellen is a mix of urban residential and rural residential parcels, and includes some rural areas with limited access. All residentially-zone parcels in the Glen Ellen area were also included in the Resolution of Intention, similar to Kenwood, to allow full consideration of these areas. The Commission recommends the inclusion of all of the R1 urban residential parcels within Glen Ellen, and also the inclusion of some of the Rural Residential parcels on the west side of town. The Commission also recommended application of the Vacation Rental Exclusion (X) Combining Zone to the entire Hill Road area, citing poor road access and fire danger.

The Foothills (1st District)
The entire private residential community of the Foothills was recommended for inclusion within the Vacation Rental Exclusion (X) Combining Zone due to limited road access and high fire danger.

Sobre Vista (1st District)
The entire private residential community of Sobre Vista was recommended for inclusion within the Vacation Rental Exclusion (X) Combining Zone due to limited road access and high fire danger.

Diamond A (1st District)
The entire private residential community of Diamond A was recommended for inclusion within the Vacation Rental Exclusion (X) Combining Zone due to limited road access, high fire danger, and the need to preserve the residential character of this community.

Agua Caliente Knolls (1st District)
Ague Caliente Knolls is a residential community composed mostly of smaller urban residential parcels, and there have been a number of neighborhood complaints related to vacation rentals here. This subdivision was recommended for inclusion within the Vacation Rental Exclusion (X) Combining Zone for reasons of neighborhood compatibility and preservation of residential character.

Nut Tree/Apple Tree Area (1st District)
This Rural Residential area has also generated many neighborhood complaints related to vacation rentals, and is recommended for inclusion within the Vacation Rental Exclusion (X) Combining Zone for the reasons of neighborhood compatibility and preservation of residential character.

Winter Creek Lane (1st District)
This subdivision is recommended for inclusion within the Vacation Rental Exclusion (X) Combining Zone for the reasons of poor access and parking, and the need to preserve the residential character of the area.

Boyes Hot Springs (1st District)
The Springs area is also a mixture of rural and urban residential parcels, and the Planning Commission considered this area in two parts. Part one includes all of the urban residential (R1) parcels within the Springs, which are recommended for inclusion within the Vacation Rental Exclusion (X) Combining Zone for reasons of the preservation of permanent housing stock, neighborhood compatibility, and the preservation of neighborhood character. Part two of the Planning Commission's recommendation considered the rural residential areas. The Commission did not feel that the Vacation Rental Exclusion (X) Combining Zone should be applied to all of the rural residential areas shown in the Resolution of Intention, and recommended only that certain areas on the west side of Arnold Drive, generally with smaller parcel sizes, permanent housing stock necessitating preservation, and a history of complaints, should be included within the Vacation Rental Exclusion (X) Combining Zone.

Options for Board Action

The Board of Supervisors may include some, all, or none of the recommended parcels within the Vacation rental Exclusion (X) Combining Zone. The Board may request the removal of parcels or areas from the recommended Combining Zone. The Board may also request the addition of parcels or areas into the Combining Zone, but may only do so as a part of today's action if those areas were included in the public notice. Mapping services will be available at the Board hearing if needed.

Prior Board Actions:

03/15/2016: The Board adopted Ordinance No. 6145 making changes to the Vacation Rental Code, and adopted Resolution of Intention 16-0085 directing staff to consider application of the Vacation Rental Exclusion (X) Combining Zone to a variety of parcels in the 1st and 4th Districts. Ordinance No. 6145 became effective on April 14, 2016.

01/26/2016: The Board straw-voted changes to the Zoning Code for vacation rentals and identified areas for future application of the Vacation Rental Exclusion (X) Combining Zone Exclusion Combining Zone

11/04/2014: The Board adopted a Resolution of Intention directing staff to conduct a robust public outreach program and undertake amendments to the Vacation Rental Ordinance.

10/07/2014: The Board considered the Auditor's Report on Vacation Rentals and provided direction to PRMD staff on the Resolution of Intention to amend the Vacation Rental ordinance.

11/09/2010: The Board adopted the Vacation Rental Ordinance, effective January 1, 2011.

11/03/2009: The Board adopted a Resolution of Intention directing staff to amend the Zoning Code to include provisions for vacation rentals, as recommended by the Ad Hoc Committee.

04/21/2009: The Board considered the compatibility issues with the use of single family homes as transient rentals and considered a range of possible policy options. The Chair appointed two supervisors

to an Ad Hoc Committee to return with a recommendation.

Strategic Plan Alignment Goal 1: Safe, Healthy, and Caring Community

Application of the Vacation Rental Exclusion (X) Combining Zone to selected parcels will preserve existing housing stock, reduce fire danger, and improve neighborhood compatibility.

Fiscal Summary - FY 15-16

Expenditures		**Funding Source(s)**	
Budgeted Amount	$		$
Add Appropriations Reqd.	$	State/Federal	$
	$	Fees/Other	$
	$	Use of Fund Balance	$
	$	Contingencies	$
	$		$
Total Expenditure	**$**	**Total Sources**	**$**

Narrative Explanation of Fiscal Impacts (If Required):

Vacation Rentals countywide generate an estimated $2000 in TOT per property, per year. There are currently 268 permitted vacation rentals located within areas recommended for the Vacation Rental Exclusion (X) Combining Zone. As properties with the X Zone designation begin to be sold and their permits expire, the County could see a decrease in TOT revenue over time. If residential turnover is 5% per year, the expected decrease in TOT revenues would be approximately $6000 per year, compounded annually.

Staffing Impacts

Position Title (Payroll Classification)	**Monthly Salary Range** (A – I Step)	**Additions** (Number)	**Deletions** (Number)

Narrative Explanation of Staffing Impacts (If Required):

None.

Attachments:

Exhibit A: Draft Ordinance with Attachment A (APN List) and Attachment B (Maps)
Exhibit B: Planning Commission Resolution No. 16-002, dated April 21, 2016
Exhibit C: Planning Commission Draft Minutes dated April 21, 2016
Exhibit D: Planning Commission Draft Minutes dated April 14, 2016
Exhibit E: Planning Commission Staff Report dated April 14, 2016
Exhibit F: Public Correspondence

Related Items “On File” with the Clerk of the Board:
None.

Exhibit D—Exclusion Zones to Be Studied

1. Bennett Valley (all parcels included in Bennett Valley Area Plan)
2. Bloomfield (parcels identified in Exhibit E)
3. Franz Valley. Parcels bordered by:
   West/NW: include all of Pepperwood Preserve
   East/NE: include the Joe Montana property (10500 Franz Valley Road), top of Oat Hill (ridge between Franz Valley and south edge of Knights Valley) to the Napa County line
   East/SE: Napa County line
   South/SW: Napa County line to Mountain Home Ranch Road to Porter Creek Road to Franz Valley Road (at Porter Creek Road/Mark West Springs Road.
4. Liberty Valley (to be defined later)
5. Coffee Lane, Sebastopol (all parcels; this may be subsumed in the Ragle Ranch Area)
6. Los Alamos Road and side roads accessed by Los Alamos Road (all parcels)
7. Palmer Creek Road (all parcels)
8. Mark West Springs Watershed (to be defined later)
9. Penngrove (to be defined later)
10. Ragle Ranch Area (parcels identified in Exhibit F)
11. Firestone/Gold Ridge Area (parcels identified in Exhibit G)
12. Voter-protected community separators (all parcels)

Scoping- Cannabis EIR- Exclusion Zone- Bloomfield-12/17/21

The subjects that can be covered under an EIR are as follow:

Aesthetics, Agricultural and Forest Resources, Air Quality, Biological Resources, Cultural Resources, Energy, Geology/Soils, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land use and Planning, Mineral Resources, Noise, Population and Housing, Public Services, Recreation, Transportation / Traffic, Tribal Resources, Utilities and Service Systems & Wildfire.

1. We advocate for only Conditional Use Permits – discretionary permits that require public hearing and environmental review, No more ministerial permits that can be approved without notice and environmental review in AG or RRD zones, especially those near residential enclaves.

2. Issues of concern:

a. Setbacks of sufficient size and able to be implemented to buffer residential enclaves from Odor, **noise, night lighting, safety of potential criminal incursion onto private property and inadequate Sheriff response time to our rural area, waste stream impacts from excess wastewater & environmental impacts of plastic hoop houses, endangered species or sensitive species-we have substantial wildlife activity including badger, wildlife corridors, wetlands, historic and cultural resources such as our cemetery, impairment of scenic vistas, water availability, including groundwater overdraft and reduced recharge impacting our wells-we have over 400 people in town and ranch families on the outskirts, County lack of enforcement on illegal grows without constant effort of neighbors and implementing conditions of approval on applications.**

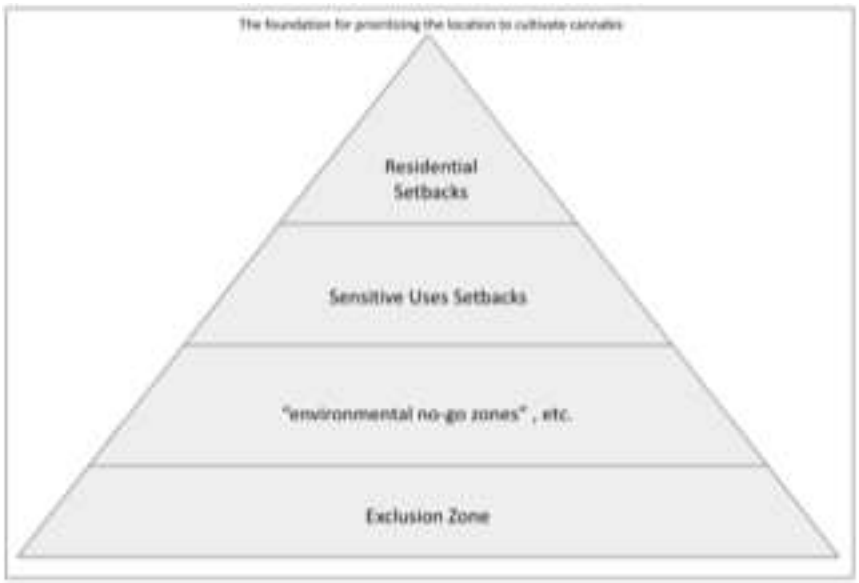
b. Study the impacts on processing plants located in close proximity to residences. We believe processing plants should be located in Commercial/Industrial zone districts due to their substantial negative impacts of: operating 24 hours, 7 days a week, deliveries on site from 8-5, commercial traffic on community substandard non-fire safe streets where two vehicles cannot pass concurrently, security fencing, and/or motion sensor night lights, audible alarms, security guards, significantly increased waste use endangering adjoining residential water source, chemical drift to residential uses, including agricultural chemicals and Fog odor neutralizing aerosols that contain oxidizing agents that have not been subject to long-term studies, increased noise at night when residents are home and sleeping at night, impacting residents enjoyment of night skies and significantly impacting wildlife, the 300 foot setback from residents homes using private property to buffer an industrial use and impact a homeowners use of private property without homeowner consent. Do not want to see cannabis tasting on site in a neighborhood setting and impaired drivers after evens on neighborhood street from events and parties

3. Studies we want to see to address environmental impacts

a. Air quality – technical studies, Comprehensive Water Availability Analysis, Adequate Analysis of environmental setting-by watershed, any environmental issues through which the **EIR technical analyses will develop siting criteria, setbacks and performance standards.**

4. Designate Exclusion and Inclusion zones as a means to achieve mitigation of Issues of concern above.

We are proposing a minimum 1000’ buffer from the RR zoning around the town of Bloomfield (as shown in the maps below). From its inception in the 1850’s Bloomfield had a core of smaller lots created in a typical grid pattern.The lots varied form .5 acres to 1.5 to 10 acres as a buffer to the adjacent larger agricultural site. The initial plan included a school site, community park and cemetery, which all exist today. When Sonoma County created zoning it respected this development pattern with RR zoning.
All lots were assumed to be large enough for residences and some smaller agricultural activity.
We are requesting a minimum1000’ buffer to limit the impact of commercial cannabis on the adjoining residential community. Given the potential for larger scale grows in the future with hoop houses, 24hour security, commercial operations and the state requirements of closed fencing, the buffer would limit these impacts on our residents. The current dairy activities area have located their “intensive” operations in the center of their larger sites, naturally creating a buffer to the smaller residential uses. We would like this development pattern to continue.



FREESTONE/GOLD RIDGE AREA EXCLUSION ZONE

BODEGA HWY

GRAVENSTEIN HWY

SEXTON RD

WATERTROUGH RD

BODEGA HWY

ELPHICK RD

1,000 ft

FREESTONE

BODEGA HWY

BARNETT VALLEY RD

1,000 ft

KENNEDY RD

PLEASANT HILL RD

GRAVENSTEIN HWY

1,000 ft

FREESTONE RANCH RD

1,000 ft

BURNSIDE RD

<< 5,600 ft >>

1,000 ft

MOONSHINE RD

BURNSIDE RD

BLOOMFIELD RD

PARCEL SIZE <10 ACRES

EXCLUSION ZONE

Exhibit H—Inclusion Zones to be Studied

1. All industrial-zoned parcels in Sonoma County, including those on Todd Road near U.S. 101 where many cannabis operations are already located (PRMD should consider beginning the rezoning process to increase the number of industrial-zoned parcels)

2. Parcels near Charles M. Schutz Airport (many of these are zoned industrial)

3. Parcels near wastewater treatment plants, including the following (finding a master list of such plants has been challenging, and there may be additional locations):

   a. Sonoma Valley Wastewater Treatment Plant, 22675 8th Street East Sonoma

   b. City of Santa Rosa Laguna Wastewater Treatment Plant, 4300 Llano Rd. Santa Rosa

   c. Russian River County Sanitation District Treatment Plant, 18400 Neeley Road, Guerneville

   d. Charles M. Schulz Airport Wastewater Treatment Plant (near Sanders Road)

Scoping—Study Designating Exclusion and Inclusion Zones

December 17, 2021

An overall goal of the revised cannabis program should be to reduce the angst and simmering hostility between growers and rural neighborhood residents. After five years, it is evident that the needs and desires of these groups are incompatible. Identifying exclusion zones where cannabis cannot be commercially grown, processed, or sold is a first priority. There are many easily-identifiable areas where there is strong resistance to cultivation, and eliminating them from the permitting system would result in fewer complaints and fewer permit appeals. County staff could redirect its time and resources to processing applications outside of exclusion zones and to enforcement issues. Inclusion zones where permitting is expedited should also be identified. This will also save staff time.

Albert Einstein observed that "insanity is doing the same thing over and over again and expecting different results." Continuing to allow cannabis cultivation scattered all over the county in areas where there is strong local resistance is the worst possible policy, and would prolong the current program's manifest failures. Once exclusion zones are designated, many controversies will disappear.

Exclusion Zones Have Long Been an Option in the Cannabis Ordinance.

Exclusion zones were included in the drafts of the original ordinance, and the Planning Commission approved creating them in 2016. Bennett Valley and perhaps other communities requested to be declared exclusion zones in 2016. Ultimately the supervisors declined to establish exclusion zones in the December 2016 ordinance and elected to give the issue more thought. The Charter/Scope of Work for the 2017 Cannabis Ad Hoc Committee included the following direction: "develop inclusion and exclusion combining zones for future consideration. The Ad Hoc will work on the development of combining zones that would allow the Board to carve out specific areas or properties on which to include or exclude certain cannabis land uses separately from what is allowed pursuant to the base zoning district." See Exhibit A.

In March 2018, the Cannabis Advisory Group's Inclusion/Exclusion Sub-Group's report (Exhibit B, p. 4) suggested that exclusion zones be created in areas where any the following conditions exist:

- There is inadequate access, water, or electrical service.
- Cannabis cultivation would be incompatible with the biotic character of the area.
- There is a significant fire hazard due to topography, vegetation, and/or accessibility.
- The residential character of the area would be significantly compromised by the installation of a commercial cannabis cultivation operation.

The Inclusion/Exclusion Sub-Group also suggested that area-specific plans "could be considered for exclusion zone status if commercial cannabis cultivation is seen as inconsistent with the area-specific plans." Exhibit B, p. 4.

In 2018, the Cannabis Ad Hoc Committee (supervisors Gorin and Hopkins) recommended that exclusion zones would be appropriate for areas where:

- Commercial cannabis is detrimental to residential character.
- Residential character is to be preserved.
- Water supply is inadequate.

Exclusion zones have wide popular support. In 2018, Save Our Sonoma Neighborhoods' polling company found that 70% of county voters approve of exclusion zones. PRMD's August 2021 survey found that 74% approve of exclusion zones. Providing communities with the right to chart their own destinies with respect to commercial cannabis is especially compelling given that cultivation of cannabis was legalized by the initiative process. Many who voted for Proposition 64 do not want commercial cannabis activities in their neighborhoods. Why not let them decide this issue for their own communities? The Planning Commission again approved the creation of exclusion zones in 2018, but the supervisors declined to establish them in October 2018.

Mechanism to Create Exclusion Zones.

An ordinance provision to create exclusion zones (technically, "combining district overlay zones") that forbids the commercial cultivation, processing, or sale of cannabis could readily be crafted using elements from the X Vacation Rental Exclusion Combining District, § SCC 26, article 79. On May 24, 2016 the Board designated about 7,800 parcels in 15 neighborhoods or communities in the first and fourth supervisorial districts to be exclusion zones for vacation rentals. PRMD's Summary Report is attached (Exhibit C).

The environmental impact report (EIR) for the revised cannabis ordinance should study providing for the exclusion of commercial cultivation, processing, or sale of cannabis in neighborhoods where one or more of the following criteria are met:

(a) Areas where the roads are inadequate, including shared access private roads and roads so narrow that vehicles cannot safely pass each other at the same time.
(b) Areas where water supply is inadequate, including water zones 3 and 4.

(c) Areas that are located in a high fire severity zone designated by the Board of Forestry or an Extreme Fire Hazard designated by the Public Utilities Commission.
(d) Areas where commercial cannabis activity is detrimental to the residential character of neighborhoods.
(e) Areas where the primary residential nature is to be preserved, especially where many contiguous parcels under 10 acres in size are grouped together.
(f) Areas where the scenic character is to be preserved.
(g) Areas where law enforcement is inadequate because average response times are more than 15 minutes.
(h) Areas where there is strong resistance to commercial cannabis activity.
(i) Areas where the Board determines that it is in the public interest to prohibit commercial cannabis activity.

Exhibit D is a working list of such neighborhoods that are requesting to be an exclusion zone and that should be explicitly studied. Additional neighborhoods may be added to this list, and the boundaries that are proposed here might be revised. The EIR should study having a buffer zone (e.g., minimum 1,000 feet) around the parcels to be excluded.

Mechanism to Create Inclusion Zones.

The EIR should also study including in the revised cannabis ordinance designating as inclusion zones (technically "combining district overlay zones") areas where commercial cultivation, processing, or sale of cannabis have limited negative impacts on communities or the environment. In such areas, cultivation could be permitted on an expedited basis with a less stringent environmental review process. This would hopefully provide an incentive for potential growers to locate their projects in such areas and avoid unnecessary controversy. PRMD's August 2021 survey found that 51% approve of inclusion zones. Exhibit H is a working list of such areas that should be explicitly studied. Additional areas may be added to this list, and the boundaries that are proposed here might be revised.

Issues to be studied in the EIR.

It is important that the EIR study not only the concept of exclusion and inclusion zones, but also the specific areas identified in Exhibits D and H relative to the criteria listed above under Mechanism to Create Exclusion Zones and Mechanism to Create Inclusion Zones. Following the example of the vacation rental ordinance, this would provide the necessary environmental review to allow designation of specific parcels in the revised ordinance without additional Board of Zoning Adjustment or board of supervisor hearings. The ordinance should also study allowing areas to become exclusion or inclusion zones as a zoning change processed in accordance with the provisions of Chapter 26, Article 96 of the County Code. Designating a large number of parcels as exclusion and inclusion zones in the ordinance would avoid lengthy petitioning processes, save PRMD staff time, avoid BZA hearings, and avoid appeals to the Board. The petitioning process should be a backstop for areas that were not considered or identified during the ordinance process.

From:	Crystal Acker
To:	Cannabis
Subject:	FW: Map showing Bloomfield Boundary and 1000 ft Setback/ Buffer for study under EIR- Exclusion Zones
Date:	Thursday, January 6, 2022 1:33:33 PM
Attachments:	1000 ft buffer.pdf

Did you get this one? I'm doing audit of Dec emails to be sure I responded to all (and def finding some I haven't).

Just want to be sure.

From: concerned citizens <ccobloomfield@gmail.com>
Sent: December 06, 2021 10:49 AM
To: Scott Orr <Scott.Orr@sonoma-county.org>; Crystal Acker <Crystal.Acker@sonoma-county.org>
Cc: David Rabbitt <David.Rabbitt@sonoma-county.org>; Andrea Krout <Andrea.Krout@sonoma-county.org>
Subject: Map showing Bloomfield Boundary and 1000 ft Setback/ Buffer for study under EIR- Exclusion Zones

Dear Scott and Crystal,

We have done as you have asked during our small group session and prepared a map showing the buffer/setback that we think protects the residential character of our community.

Please let us know if you have any thoughts to share or questions. We hope that you will study this setback under the EIR and find that it is as appropriate for the character and wellbeing of our community as we do.

We would also very much appreciate it if a moratorium on all ministerial cannabis permitting were to be adopted within this 1000 ft setback until the EIR is complete.

Thank you.

Best,

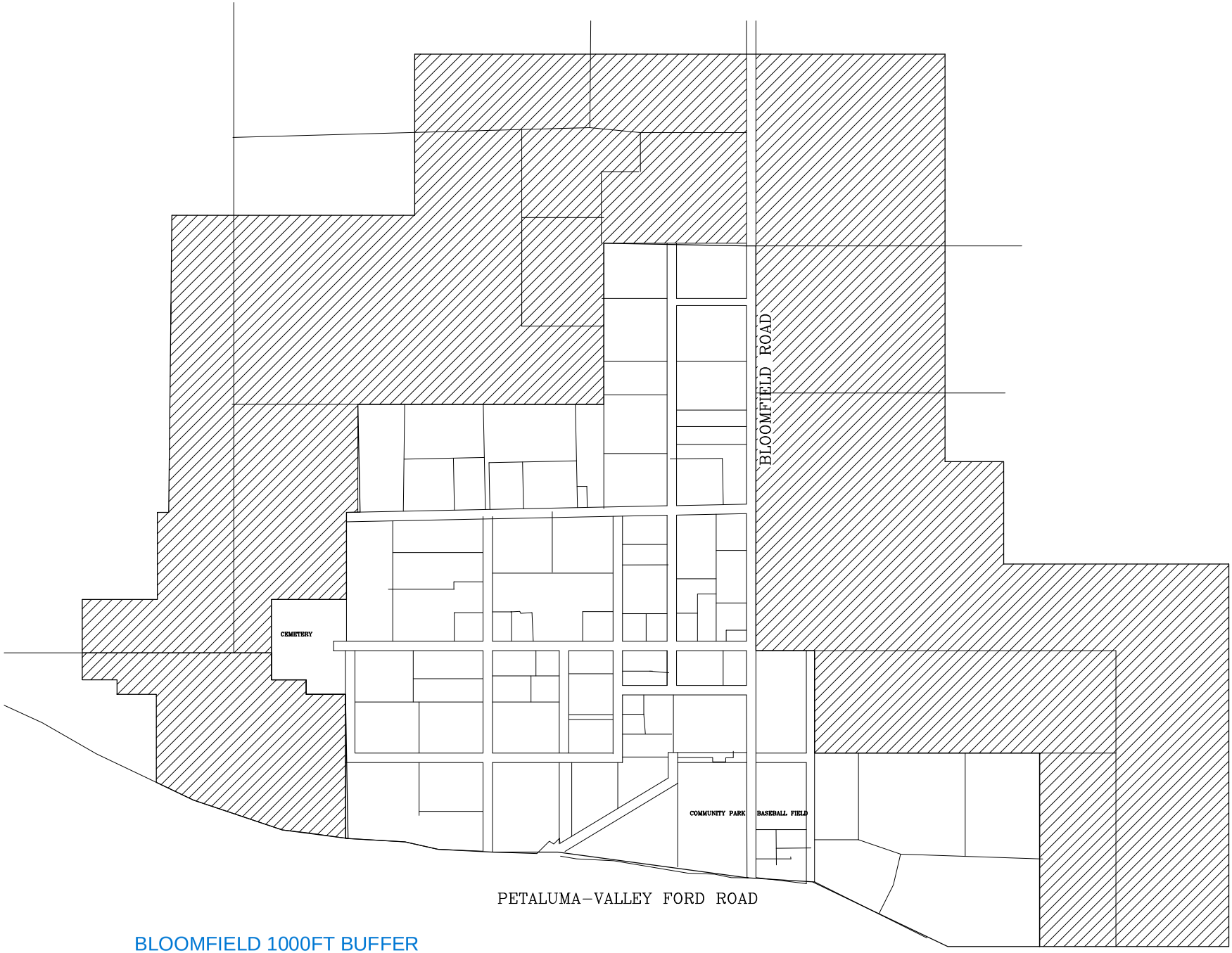
Veva Edelson, Vi Strain, Toby Levy and the rest of CCOBloomfield

Explanation and Map:

We are proposing a 1000' buffer from the RR zoning around the town of Bloomfield.
From its inception in the 1850's Bloomfield had a core of smaller lots created in a typical grid

pattern.
The lots varied form .5 acres to 1.5 to 10 acres as a buffer to the adjacent larger agricultural site.
The initial plan included a school site, community park and cemetery, which all exist today.
When Sonoma County created zoning it respected this development pattern with RR zoning.
All lots were assumed to be large enough for residences and some smaller agricultural activity.

We are requesting the 1000' buffer to limit the impact of commercial cannabis on the adjoining residential community. Given the potential for large scale hoop houses, 24hour security, commercial operations and the state requirements of closed fencing, the buffer would limit these impacts on our residents. The current diary activities area have located their "intensive" operations in the center of their larger sites, naturally creating a buffer to the smaller residential uses. We would like this development pattern to continue.



BLOOMFIELD 1000FT BUFFER

From: Scott Orr
To: Cannabis
Subject: FW: Water resource
Date: Friday, January 7, 2022 9:43:04 AM
Attachments: WATER RESOURCES (003).pdf

From: Dodesr <dodesr@aol.com>
Sent: Friday, January 7, 2022 9:30 AM
To: Tennis Wick <Tennis.Wick@sonoma-county.org>; Cyrstal.Acker@sonoma-county.org; Scott Orr <Scott.Orr@sonoma-county.org>
Subject: Water resource

Please see the attached letter from the League of Women Voters

Donna Roper
President
707-869-9273

LEAGUE OF WOMEN VOTERS®
OF SONOMA COUNTY

WATER RESOURCES - _WHAT DOES A SUCCESSFUL CANNABIS ORDINANCE LOOK LIKE?

The League of Women Voters of Sonoma County (LWVSC) is most concerned about water resources and the critical need to complete a thorough Environmental Impact Report (EIR) as part of its compliance with the CEQA process. The goal is to seek accurate information that identifies the least impactful locations where cannabis can be grown. Specifically, the EIR should include the following:

1. Areas where public water and sewer, storm water drainage etc. are located.
2. If not on public water, areas located in a groundwater basin where water use will not adversely impact environmental needs.

Particular analysis should be given to two major issues:

1. the half dozen impaired watersheds and
2. the construction of catchment ponds.

Questions to be addressed are: 1. If the watersheds are already impaired or critical should any cultivation be allowed? Should an acreage cap be set? 2. How many catchment ponds could be allowed in an area without affecting replenishment and future health of the underlying aquifer and downstream flows?

Existing baseline conditions should be examined to include all cannabis permits already issued, all people growing without a permit in the Penalty Relief Program, and all pending and reasonably foreseeable future permits. Other residential, police protection, fire protection and agricultural users in the unincorporated areas would be identified and their present and future needs assessed. It must also include evaluation of all constraints on our water supply by all users in the County, including everyone the Sonoma County Water Agency (SCWA) sells water to. It should be noted here that the SCWA also sells water to Marin.

In addition, all users with any water rights should be listed so they can be evaluated as a draw on our overall water "system". In this process the EIR can more accurately reach a conclusion about how much total water is available and how much can be used for new users in the unincorporated areas. New permits must rely on the best accounting of assumed water supply. Climate change and drought may have altered these assumptions and an analysis of the existing usages and cumulative impacts needs to be a part of the EIR.

Analyses of drought year water availability should be conducted and areas to be considered for cultivation should be based on dry years, not average year conditions. In the past, the county and the

consultants always used an historical average, but, due to climate change even historical average is now likely inappropriate. This drought year benchmark analysis is an important factor combined with projections of current and future water needs for all users county-wide.

The ultimate goal for the EIR and a successful ordinance should be future sustainability in compliance with the Sustainable Groundwater Management Act.

Once these areas meeting the criteria listed above are identified and mapped, an assessment of how much suitable land can be projected as reasonably necessary to meet current and future demand (20 years for a General Plan) can more accurately be determined. The areas deemed to be suitable should then be presented to the public in hearings and after considering all public comment, the description of the project may be revised before a consultant is hired to evaluate the environmental impacts.

Finally, the CEQA process is complicated, and the County needs to be proactive and transparent so that the public knows and understands the process and timeline and will be able to provide meaningful input.

Donna Roper-President
Leona Judson- Chair of Advocacy
League of Women Voters of Sonoma County

From:	Crystal Acker
To:	Cannabis
Subject:	FW: Neighborhood Coalition Input to Cannabis Ordinance Framework
Date:	Saturday, January 8, 2022 4:36:54 PM
Attachments:	Final_NC Framework Ord and EIR.pdf

Just in case you didn't get

From: Tennis Wick
Sent: December 27, 2021 1:53 PM
To: Judith Olney <milestonesmet@gmail.com>
Cc: Susan Gorin <Susan.Gorin@sonoma-county.org>; David Rabbitt <David.Rabbitt@sonoma-county.org>; Chris Coursey <Chris.Coursey@sonoma-county.org>; district4 <district4@sonoma-county.org>; Lynda Hopkins <Lynda.Hopkins@sonoma-county.org>; Scott Orr <Scott.Orr@sonoma-county.org>; Crystal Acker <Crystal.Acker@sonoma-county.org>
Subject: Re: Neighborhood Coalition Input to Cannabis Ordinance Framework

Thank you and Happy New Year!

Tennis Wick, AICP
Director
www.PermitSonoma.org
County of Sonoma
2550 Ventura Avenue, Santa Rosa, CA 95403
Direct: 707-565-1925 |
Office: 707-565-1900 | Fax: 707-565-1103

Permit Sonoma logo

Sent from my iPhone

> On Dec 27, 2021, at 12:03, Judith Olney <milestonesmet@gmail.com> wrote:
>
> EXTERNAL
>
> December 27, 2021
>
> To Sonoma County Supervisors and Permit Sonoma Staff
> From The Neighborhood Coaltion of Sonoma County

RE: Input to Cannabis Ordinance Framework - scheduled to be released 1st Q 2022

The Neighborhood Coaltion's letter is attached, and copied into email below:

Date: December 27, 2021

To: Sonoma County Board of Supervisors, Tennis Wick, Scott Orr, Crystal Acker

From: Neighborhood Coalition

Subject: **Neighborhood Coalition Input to Cannabis Ordinance Framework**

It is the Neighborhood Coalition of Sonoma County's (NC) understanding that the Ordinance Framework, to be released for public review in early 2022, will form the basis for required analyses in the Program Environmental Impact Report (PEIR). The NC's input for the Ordinance Framework is detailed below. Referenced documents have been previously entered into the Cannabis Program Administrative Record.

Members of the NC coalition have been constructively participating in the formation of regulations for over five years. At the County's behest, we have volunteered for community planning groups, provided analyses to staff, participated in all public meetings, written letters and made endless suggestions as to how to account for neighborhood compatibility, assure cumulative impacts are measured and protect our watersheds – only to see most of our recommendations ignored.

We trust the County will address the issues raised in the 2021 administrative record. To this end, this letter incorporates by reference much of the legal and technical studies and input provided by community groups and their legal representatives addressing the requirements of and technical studies to be included in a Program EIR. These documents were provided in the spring to the Planning Commission and Board of Supervisors, as part of the summer Visioning Sessions, and for the October hearing on legal violations associated with multi-tenant ministerial permits and related moratorium.

Bring Current Violations into Compliance with State Law

Currently, many of Sonoma County permits are in violation of State law. Thus, in the interim, when approving cannabis Conditional Use Permits, the NC trusts County officials will follow the State Department of Cannabis Control (DCC) and other State agency regulations that require site-specific CEQA evaluation for each project as well as cumulative impact analyses prior to issuing permits that are adequate for State licensing.

The County must change the initial term and renewal of permits to match the

State License term of one year. Extending non-compliant permits for five years again opens the County to legal challenge. Compliance with State law will allow the County to monitor performance and adjust standards on compliance with water, odor control, plastic handling and disposal. Adjacent neighbors are frustrated at having to turn in violations and not having evidenced claims of potential violations investigated immediately.

Neighborhood Compatibility

For the past five years, the community has submitted substantive evidence into the record as to the need for an Ordinance that addresses “neighborhood compatibility.” To this end, the NC expects the County will make project determinations based on the Mandatory Findings of Significance, which protects nearby property owners’ rights to health, safety and the peaceful enjoyment of their properties.

Overview: Ordinance Framework and PEIR Processes

Public involvement to date has called for an **Environmental Review that is protective of residences, sensitive receptors and our watersheds**: The NC supports the development of a full Programmatic Environmental Impact Report, as well as project-specific environmental review per State CEQA and DCC requirements.

The Neighborhood Coalition understands that the **County’s framework document will be an accurate, stable and a finite Project Description** with all activities and uses within the scope of the comprehensive cannabis program defined. However, we oppose including illegal cannabis grows in the baseline as it may be used as a way to inflate the acreage of cannabis cultivation in the Ordinance. NC prefers a criterion–based methodology that examines the characteristics of a parcel, and/or the will of the landowners, to define exclusion zones. Analyses for inclusion zones must account for overconcentration/cumulative impacts, preferable setting acreage caps.

In addition to a stable Project Description, the County must prepare a baseline document of existing conditions and, an environmental or regional setting document. In other words, as a foundation for the EIR technical studies, the County must identify all known cannabis cultivation and processing operations: PRP operations, existing cannabis permits and applications in process by square footage of cultivation type, location, intensity, zoning code, and Groundwater Zone 1, 2, 3 or 4. Again, if the analyses also identify illegal grows, said illegal acreage **should not be used to justify the total appropriate future acreage of cannabis** in Sonoma County. Future maximum acreage should be based on identifying the most appropriate locations, with attendant mitigations and acreage caps.

These foundation studies must fully address existing conditions, especially as related to public utilities, groundwater, surface water, adequate road access, fire risk and public safety services. Fully analyze and proactively identify locations for cannabis cultivation that are least impactful on residences and agricultural, resource, commercial and industrial zoned parcels, plus set an

acreage cap for each groundwater basin.

The PEIR should be Fact Based, using technical analyses, siting criteria, performance standards, setbacks and an aggregate acreage cap by operator for outdoor, indoor and mixed light cultivation. Per CEQA, ensure that all findings, siting criteria, setbacks and mitigation measures are based on facts, reasonable assumptions predicated upon facts and expert opinion supported by facts. Mitigation measures must be adequate, measurable, and enforceable – noting that future mitigations are not allowed.

The NC, and its member organizations, request the County proactively identify the most suitable locations for cannabis cultivation and fully analyze the exclusion zones recommended by the Bennett Valley Residents for Safe Development (submitted 12/17/21) and requests from other communities received during the Ordinance Framework public review period.

And, it is well past time for the County to complete cumulative impact assessments to avoid creating areas of over concentration, as well as based on definition and analyses of the full development potential of all uses and activities within the cannabis cultivation, and processing program.

Input to the Scope of the Ordinance Framework

The input from community groups and individuals includes, yet is not limited to, the items below. Please consider this part of the public process required to build the Administrative Record, and note that the public will submit additional input during the Ordinance Framework public review process:

1. **Water**: The County's water planning documents are woefully out of date; thus, it would be wise for the County to limit new cannabis cultivation permits until an EIR that analyzes the impacts of the proposed full Cannabis Program is completed.

   This industry is projected to grow tons of a new water-guzzling product, yet current analyses rely on water survey data from 1980. We face a historic drought emergency that will likely become the new normal, extend for multiple years, caused by climate change, that was never considered in that 1980 data, or the 20-year-old General Plan Environmental Impact Report (EIR).

   The PEIR should not move forward without evaluating our current water resources, determining if we have enough supply to meet current and projected demand in normal and drought years. Recently released reports on climate indicate a long-term drought is increasingly likely; issuing new permits prior to completing water availability scenarios is irresponsible – not to mention the GSAs 50-year precipitation model does not pass the red face test given it predicts only two years that will be dryer compared to last season.

   Maintain the Planning Commission's inserted prohibition on all cannabis cultivation in Sonoma County's Class 3 and 4 groundwater areas for all ministerial permits, and the County should assess water availability in all

water zones as recommended by CDFW, before issuing new conditional use permits. And, prohibit trucking of water or recycled wastewater under all circumstances.

Oregon recently allocated $1.5 million to address cannabis operations violations of people's water rights – this is a significant issue that must be addressed by Sonoma County as well. Require all wells to be independently monitored using a micro grid network system. Take precautionary steps to ensure that residential and agricultural wells do not run dry due to cannabis groundwater extraction or catchment systems.

Water analyses should include, yet not be limited to the items addressed in the 12/14/ 2021 Neighbors of West County NOW submittal titled "Scoping – Cannabis EIR – Water Resources – Public Comment.

Address water availability, water demand, wastewater disposal and water quality protections as regulated by the State Water Resources Control Board and the Department of Water Resources. Address setbacks, groundwater pumping limits and other protections for biotic resources, riparian habitats and special status species as regulated by the CA Department of Fish and Wildlife and State Water Resources Control Board. Also address issues raised in the 10/16/2021 Neighborhood Coalition letter to California Water Board and North Coast Water Quality Control Board, titled "Sonoma County Cannabis Permitting Non-Compliance – Water Issues."

In addition, the County must address municipal and water theft issues both in the interim period and through regulations and penalties in the Ordinance Framework. In September 2021 multiple eye witnesses and subsequent emails with photographs documented municipal water theft for use on cannabis cultivations in the Dairy Belt, Sonoma Valley and elsewhere, **in violation of CUP Ordinance (26-88-254(g)(10) requirements that each permit holder, *"…must have on site water supply source adequate to meet all onsite uses on a sustainable basis."***

2. **Exclusion Zones:** Letters entered into the Ordinance Framework Scoping process describe available land use processes to define Exclusion Zone areas within the Ordinance itself. As part of the analyses to determine appropriate Inclusion zones, the County should consider centralizing industrial processing facilities: These businesses do not belong in or near residential or agricultural zoned lands, nor in our fire prone watershed areas. Focus permits for processing in our commercial and industrial zoned lands only.

   The Neighborhood Coalition supports analyses based on observable, measurable criteria, and land use processes to identify Cannabis Inclusion and Exclusion Zones. And, note that other neighborhoods may submit similar requests including two emails on 12/17/2021 with multiple attachments/maps: Bennett Valley Residents for Safe Development titled, "Scoping – Study Designating Exclusion and Inclusion Zones" and

Concerned Citizens of Bloomfield titled, “Scoping – Cannabis EIR - Bloomfield Exclusion Zone- Public Comment.”

3. **Wildfire Safety Issues:** The Neighborhood Coalition supports the northern and southern California Fire Safe Roads coalition’s input to the Board of Forestry’s 2021 State Minimum Fire Safe Regulations, including their request for an Environmental Impact Report. 12/16/2021 Deborah Eppstein summarized key points concerning wildfire and public safety risks in an email titled, “Scoping Wildfire Issues – Cannabis EIR”.

   Instead of following the protective policies in its General Plan, especially as they relate to intensive commercial development in high fire risk zones, Sonoma County joined with 12 other rural counties and lobbied the Board of Forestry to literally GUT the Fire Safe Road Regulations. And, the Supervisors are providing incentives for fire victims on substandard roads to build Accessory Dwelling Units, basically doubling the population that must be evacuated.

   Sonoma County’s General Plan Land Use Element Sections LU 35 and 44 state:

   a. LU 4.1: *“…assure that development only occurs when physical public services and infrastructure, including school and park facilities, public safety access and response times, water and wastewater management systems, drainage and roads are planned to be available in time to serve the projected development.”*

      LU-7d: *“Avoid new commercial, industrial, and residential land use designations in areas subject to “high” or “very high” fire hazards, as identified in the Public Safety Element.*”

4. **Odor and Air Quality Issues:** The Ordinance Framework should include an Odor Abatement section requiring monitoring, research and requirements for use of best available control technologies. Other entities throughout California require 1,000-foot setbacks from the property line for outdoor and hoop house cultivation and ordinances that require that no odor cross the property line. Reference Mary Plimpton’s 12/14/2021 email titled, “Scoping – Cannabis EIR – Odor/Air Quality with Attachment – Contract 12/14/2021 between the Carpentaria Association for Responsible Producers (CARP) Growers and Santa Barbara Coalition for Responsible Cannabis, Inc.

   This contract sets the example of supporting the implementation of best available technology through its mutual goal statement:

   a. *“To advance their collective efforts to prevent cannabis operations from causing adverse community odor impacts, to advance the development and swift implementation of advanced*

and evolving best available odor control technologies (BACT) and science-based objective odor monitoring technologies, to ensure timely and effective responses to odor episodes, and to promote transparency and cooperation between cannabis operators, the public, and the Coalition."

5. **Aesthetics:**

   Sonoma County has diligently protected its scenic corridors to ensure the rural aesthetics that tourists and citizens covet is protected.

   Issues with growing cannabis in Sonoma County necessitates that it be grown in pots inside hoop houses and surrounded by high, opaque fences creating what looks more like a commercial mini-storage facility – not agriculture. There is nothing natural about this industrial look.

   The Ordinance Framework needs to study the economic impact from converting rural country-sides into industrial developments covered in white plastic surrounded by solid, high fencing. This is a threat to the coveted character of Sonoma County.

6. **Significantly limit Ministerial Permits:** The Ordinance Framework must not re-create the false premise in the Chapter 38 draft, which alleged, in contrast to State law, that projects with fencing, 24-hour security, nuisance lighting and odor emissions, with increased traffic on substandard rural roads, increased fire risks and that create nuisance odors – operations that, by definition, change their surrounding environment - are candidates for "categorial exemptions" from CEQA. Outdoor and hoop house cannabis cultivation trigger project-specific CEQA requirements.

   Eliminate the practice of issuing multiple ministerial permits to separate growers on the same or adjacent parcels. This is a loophole which leads to cumulative impacts as it amplifies the impacts many times over, obfuscates liability for violations, and does not comply with project-specific CEQA review and cumulative impact review as currently required by State law. Stop multi-tenant ministerial permitting as these operations are in violation of the County's existing Ordinance, as well as State law – both the CEQA and Department of Cannabis Control regulations. It is telling, and embarrassing to learn that Sonoma County is the only CA entity to issue multi-tenant ministerial permits, to bypass State regulations.

   On-going analyses of these permits is likely to reveal additional violations. A preliminary analysis, with multiple attachments, was submitted to the BOS on 10/ 21/ 2021 and is titled, "Sonoma County Board of Supervisors October 26, 2021 Hearing on Cannabis Moratorium."

7. **Economic Analyses**: The Ordinance Framework and Program EIR require a baseline document of existing conditions. Given the recent revelations

that:
1) Sonoma County has issued hundreds of multi-tenant ministerial permits, with minimal to no environmental review, in violation of State and local laws and county ordinances; and
2) California has an oversupply of legal cannabis cultivation leading to a significant drop in prices with increased potential for bankruptcies, taxpayers must be informed whether taxpayers will have to pay for enforcement, clean-up and remediation.

The County has been literally flying blind on the fundamental economics of the cannabis industry. Without independent analyses, which informed Napa County BOS to limit cannabis cultivation to indoor cultivation primarily in industrial areas, public officials are making determinations as to how to spend taxpayer dollars based on information generated by the cannabis industry – self regulation is not an option.

Understanding the industry facilitates regulations that work as intended and limiting unintended consequences. The County must determine the number of acres per watershed that the County can permit in order to complete cumulative impact analyses. The public must be afforded an unbiased, peer reviewed and in-depth financial analysis defining the costs and benefits from commercial cannabis cultivation, including an economic outlook and forecast of future taxpayer costs including the cost of enforcement and eradication of illegal/unpermitted grows. See Rachel Zierdt's 12/13/2021 email titled, "Scoping – Cannabis EIR – Economic Analysis – Public Comment."

Lack of statewide planning has precipitated the oversupply of cannabis, one factor in the current free-fall in legal cannabis prices. The cannabis industry is calling for the government to provide grants, welfare subsidies and freedom from tax obligations. The wine industry is also facing a period of oversupply, competition from other wine areas and industry consolidation – can Sonoma County afford to exempt this industry from taxes as well? This is a slippery fiscal slope.

In summary: We trust the County Cannabis Program ordinance(s) and zoning code updates will be based on facts collected as part of the permitting process, and findings from technical analyses. The full Programmatic Environmental Impact Report will set siting criteria, setbacks, and performance standards. Thus, County decision-making regarding a new ordinance, amendments to existing ordinances and zoning codes must be science-based and comply with State requirements for CEQA review to ensure cannabis operation permits do not create project-specific or cumulative impacts**.**

Signed by Neighborhood Coalition Members,

Judith Olney, Deborah Eppstein, Marshall Behling et al - Neighborhood Coalition

Vi Strain, Veva Edelson et al. - Concerned Citizens of Bloomfield

Bill Krawetz, Anna Ransome et al. - Neighbors of West County NOW

Craig Harrison, Nancy & Brantly Richardson, et al. - Bennett Valley Residents for Safe Development

Mary Plimpton – Franz Valley

Rachel Zierdt – Coffee Lane Neighbors

Date: December 27, 2021
To: Sonoma County Board of Supervisors, Tennis Wick, Scott Orr, Crystal Acker
From: Neighborhood Coalition

Subject: **Neighborhood Coalition Input to Cannabis Ordinance Framework**

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Members of the NC coalition have been constructively participating in the formation of regulations for over five years. At the County's behest, we have volunteered for community planning groups, provided analyses to staff, participated in all public meetings, written letters and made endless suggestions as to how to account for neighborhood compatibility, assure cumulative impacts are measured and protect our watersheds – only to see most of our recommendations ignored.

We trust the County will address the issues raised in the 2021 administrative record. To this end, this letter incorporates by reference much of the legal and technical studies and input provided by community groups and their legal representatives addressing the requirements of and technical studies to be included in a Program EIR. These documents were provided in the spring to the Planning Commission and Board of Supervisors, as part of the summer Visioning Sessions, and for the October hearing on legal violations associated with multi-tenant ministerial permits and related moratorium.

Bring Current Violations into Compliance with State Law

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The County must change the initial term and renewal of permits to match the State License term of one year. Extending non-compliant permits for five years again opens the County to legal challenge. Compliance with State law will allow the County to monitor performance and adjust standards on compliance with water, odor control, plastic handling and disposal. Adjacent neighbors are frustrated at having to turn in

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These foundation studies must fully address existing conditions, especially as related to public utilities, groundwater, surface water, adequate road access, fire risk and public safety services. Fully analyze and proactively identify locations for cannabis cultivation that are least impactful on residences and agricultural, resource, commercial and industrial zoned parcels, plus set an acreage cap for each groundwater basin.

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predicated upon facts and expert opinion supported by facts. Mitigation measures must be adequate, measurable, and enforceable – noting that future mitigations are not allowed.

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And, it is well past time for the County to complete cumulative impact assessments to avoid creating areas of over concentration, as well as based on definition and analyses of the full development potential of all uses and activities within the cannabis cultivation, and processing program.

Input to the Scope of the Ordinance Framework

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   This industry is projected to grow tons of a new water-guzzling product, yet current analyses rely on water survey data from 1980. We face a historic drought emergency that will likely become the new normal, extend for multiple years, caused by climate change, that was never considered in that 1980 data, or the 20-year-old General Plan Environmental Impact Report (EIR).

   The PEIR should not move forward without evaluating our current water resources, determining if we have enough supply to meet current and projected demand in normal and drought years. Recently released reports on climate indicate a long-term drought is increasingly likely; issuing new permits prior to completing water availability scenarios is irresponsible – not to mention the GSAs 50-year precipitation model does not pass the red face test given it predicts only two years that will be dryer compared to last season.

   Maintain the Planning Commission's inserted prohibition on all cannabis cultivation in Sonoma County's Class 3 and 4 groundwater areas for all ministerial permits, and the County should assess water availability in all water zones as recommended by CDFW, before issuing new conditional use permits. And, prohibit trucking of water or recycled wastewater under all circumstances.

   Oregon recently allocated $1.5 million to address cannabis operations violations of people's water rights – this is a significant issue that must be addressed by Sonoma County as well. Require all wells to be independently monitored using a micro grid

network system. Take precautionary steps to ensure that residential and agricultural wells do not run dry due to cannabis groundwater extraction or catchment systems.

Water analyses should include, yet not be limited to the items addressed in the 12/14/ 2021 Neighbors of West County NOW submittal titled "Scoping – Cannabis EIR – Water Resources – Public Comment.

Address water availability, water demand, wastewater disposal and water quality protections as regulated by the State Water Resources Control Board and the Department of Water Resources. Address setbacks, groundwater pumping limits and other protections for biotic resources, riparian habitats and special status species as regulated by the CA Department of Fish and Wildlife and State Water Resources Control Board. Also address issues raised in the 10/16/2021 Neighborhood Coalition letter to California Water Board and North Coast Water Quality Control Board, titled "Sonoma County Cannabis Permitting Non-Compliance – Water Issues."

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   The Neighborhood Coalition supports analyses based on observable, measurable criteria, and land use processes to identify Cannabis Inclusion and Exclusion Zones. And, note that other neighborhoods may submit similar requests including two emails on 12/17/2021 with multiple attachments/maps: Bennett Valley Residents for Safe Development titled, "Scoping – Study Designating Exclusion and Inclusion Zones" and Concerned Citizens of Bloomfield titled, "Scoping – Cannabis EIR - Bloomfield Exclusion Zone- Public Comment."

3. **Wildfire Safety Issues:** The Neighborhood Coalition supports the northern and southern California Fire Safe Roads coalition's input to the Board of Forestry's 2021 State Minimum Fire Safe Regulations, including their request for an Environmental Impact Report. 12/16/2021 Deborah Eppstein summarized key points concerning wildfire and public safety risks in an email titled, "Scoping Wildfire Issues – Cannabis EIR".

Instead of following the protective policies in its General Plan, especially as they relate to intensive commercial development in high fire risk zones, Sonoma County joined with 12 other rural counties and lobbied the Board of Forestry to literally GUT the Fire Safe Road Regulations. And, the Supervisors are providing incentives for fire victims on substandard roads to build Accessory Dwelling Units, basically doubling the population that must be evacuated.

Sonoma County's General Plan Land Use Element Sections LU 35 and 44 state:

a. LU 4.1: *"…assure that development only occurs when physical public services and infrastructure, including school and park facilities, public safety access and response times, water and wastewater management systems, drainage and roads are planned to be available in time to serve the projected development."*

   LU-7d: *"Avoid new commercial, industrial, and residential land use designations in areas subject to "high" or "very high" fire hazards, as identified in the Public Safety Element.*"

4. **Odor and Air Quality Issues:** The Ordinance Framework should include an Odor Abatement section requiring monitoring, research and requirements for use of best available control technologies. Other entities throughout California require 1,000-foot setbacks from the property line for outdoor and hoop house cultivation and ordinances that require that no odor cross the property line. Reference Mary Plimpton's 12/14/2021 email titled, "Scoping – Cannabis EIR – Odor/Air Quality with Attachment – Contract 12/14/2021 between the Carpentaria Association for Responsible Producers (CARP) Growers and Santa Barbara Coalition for Responsible Cannabis, Inc.

This contract sets the example of supporting the implementation of best available technology through its mutual goal statement:

a. *"To advance their collective efforts to prevent cannabis operations from causing adverse community odor impacts, to advance the development and swift implementation of advanced and evolving best available odor control technologies (BACT) and science-based objective odor monitoring technologies, to ensure timely and effective responses to odor episodes, and to promote transparency and cooperation between cannabis operators, the public, and the Coalition."*

5. Aesthetics:

Sonoma County has diligently protected its scenic corridors to ensure the rural aesthetics that tourists and citizens covet is protected.

Issues with growing cannabis in Sonoma County necessitates that it be grown in pots inside hoop houses and surrounded by high, opaque fences creating what looks more like a commercial mini-storage facility – not agriculture. There is nothing natural about this industrial look.

The Ordinance Framework needs to study the economic impact from converting rural country-sides into industrial developments covered in white plastic surrounded by solid, high fencing. This is a threat to the coveted character of Sonoma County.

6. **Significantly limit Ministerial Permits:** The Ordinance Framework must not re-create the false premise in the Chapter 38 draft, which alleged, in contrast to State law, that projects with fencing, 24-hour security, nuisance lighting and odor emissions, with increased traffic on substandard rural roads, increased fire risks and that create nuisance odors – operations that, by definition, change their surrounding environment - are candidates for "categorial exemptions" from CEQA. Outdoor and hoop house cannabis cultivation trigger project-specific CEQA requirements.

   Eliminate the practice of issuing multiple ministerial permits to separate growers on the same or adjacent parcels. This is a loophole which leads to cumulative impacts as it amplifies the impacts many times over, obfuscates liability for violations, and does not comply with project-specific CEQA review and cumulative impact review as currently required by State law. Stop multi-tenant ministerial permitting as these operations are in violation of the County's existing Ordinance, as well as State law – both the CEQA and Department of Cannabis Control regulations. It is telling, and embarrassing to learn that Sonoma County is the only CA entity to issue multi-tenant ministerial permits, to bypass State regulations.

   On-going analyses of these permits is likely to reveal additional violations. A preliminary analysis, with multiple attachments, was submitted to the BOS on 10/ 21/ 2021 and is titled, "Sonoma County Board of Supervisors October 26, 2021 Hearing on Cannabis Moratorium."

7. **Economic Analyses**: The Ordinance Framework and Program EIR require a baseline document of existing conditions. Given the recent revelations that:
   1) Sonoma County has issued hundreds of multi-tenant ministerial permits, with minimal to no environmental review, in violation of State and local laws and county ordinances; and
   2) California has an oversupply of legal cannabis cultivation leading to a significant drop in prices with increased potential for bankruptcies, taxpayers must be informed whether taxpayers will have to pay for enforcement, clean-up and remediation.

   The County has been literally flying blind on the fundamental economics of the cannabis industry. Without independent analyses, which informed Napa County BOS to limit cannabis cultivation to indoor cultivation primarily in industrial areas, public officials are making determinations as to how to spend taxpayer dollars based on information generated by the cannabis industry – self regulation is not an option.

   Understanding the industry facilitates regulations that work as intended and limiting unintended consequences. The County must determine the number of acres per watershed that the County can permit in order to complete cumulative impact analyses. The public must be afforded an unbiased, peer reviewed and in-depth financial analysis defining the costs and benefits from commercial cannabis

cultivation, including an economic outlook and forecast of future taxpayer costs including the cost of enforcement and eradication of illegal/unpermitted grows. See Rachel Zierdt's 12/13/2021 email titled, "Scoping – Cannabis EIR – Economic Analysis – Public Comment."

Lack of statewide planning has precipitated the oversupply of cannabis, one factor in the current free-fall in legal cannabis prices. The cannabis industry is calling for the government to provide grants, welfare subsidies and freedom from tax obligations. The wine industry is also facing a period of oversupply, competition from other wine areas and industry consolidation – can Sonoma County afford to exempt this industry from taxes as well? This is a slippery fiscal slope.

In summary: We trust the County Cannabis Program ordinance(s) and zoning code updates will be based on facts collected as part of the permitting process, and findings from technical analyses. The full Programmatic Environmental Impact Report will set siting criteria, setbacks, and performance standards. Thus, County decision-making regarding a new ordinance, amendments to existing ordinances and zoning codes must be science-based and comply with State requirements for CEQA review to ensure cannabis operation permits do not create project-specific or cumulative impacts**.**

Signed by Neighborhood Coalition Members,

Judith Olney, Deborah Eppstein, Marshall Behling et al
Neighborhood Coalition

Vi Strain, Veva Edelson et al
Concerned Citizens of Bloomfield

Bill Krawetz, Anna Ransome et al
Neighbors of West County NOW

Craig Harrison, Nancy & Brantly Richardson, et al
Bennett Valley Residents for Safe Development

Mary Plimpton – Franz Valley

Rachel Zierdt – Coffee Lane Neighbors

From:	Gail Cafferata
To:	district5; district3; district4; Susan Gorin; David Rabbitt; Cannabis
Subject:	Kids" ED Visits for Cannabis Exposure Surged After Legalization in Canada | MedPage Today
Date:	Monday, January 10, 2022 6:30:38 PM
Attachments:	JAMA article on marijuana.pdf

EXTERNAL

Dear Supervisors and staff,

I am deeply distressed by your refusal for months and years to deny any permits for any marijuana dispensaries (and any agricultural permits) despite community opposition based in scientific evidence of its harm to health, water supplies, air and other aspects of environmental health, community safety, and criminal activity.

I retain hope that you believe in science, which has proven the dangers of legalized marijuana sales and (and growing) for children. Here is an article from the Journal of the American Medical Association showing that making marijuana widely available increases children's hospitalizations for marijuana ingestion. I also attach the complete JAMA article, FYI.

I strongly encourage you to read and digest this information. Without any change in your immoral

actions, I will work to vote you all out of office.

Sincerely,
Gail Cafferata

Click https://www.medpagetoday.com/pediatrics/generalpediatrics/96567 for the full story:

MedPage Today(R) provides physicians and other healthcare professionals real-time coverage of breaking medical news, the top stories in health and medicine, and interesting and illuminating opinion pieces from those working all over the medical map.

JAMA Network Open

Research Letter | Substance Use and Addiction

Unintentional Pediatric Cannabis Exposures After Legalization of Recreational Cannabis in Canada

Daniel T. Myran, MD, MPH; Nathan Cantor, MSc; Yaron Finkelstein, MD; Michael Pugliese, MSc; Astrid Guttmann, MDCM, MSc; Rebecca Jesseman, MA; Peter Tanuseputro, MD, MHSc

Introduction

Previous studies have documented increases in cannabis exposures among young children after legalization of recreational cannabis.[1-3] Increasing evidence has implicated commercially produced edible cannabis products as a key factor associated with these increases.[3] Canada took a 2-phased approach to legalizing recreational cannabis. Initially, the sale of cannabis flower, seeds, and oils was permitted, and after 1 year, this expanded to a wider variety of products, including cannabis edibles.[4] We evaluated changes in pediatric emergency department (ED) visits and hospitalizations due to cannabis exposures associated with these changes.

Methods

This repeated cross-sectional study was authorized under section 45 of Ontario's Personal Health Information Protection Act and approved by the privacy and legal office of ICES (formerly the Institute for Clinical Evaluative Sciences). Section 45 allows ICES to collect personal health information without consent for the purpose of health system evaluation and improvement. We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline for cross-sectional studies.

We identified all ED visits and related hospitalizations due to cannabis exposures among 2.35 million children aged 0 to 9 years in Ontario, Canada, between January 1, 2016, and March 31, 2021. We compared trends and characteristics of ED visits over 3 periods: prelegalization (January 2016-September 2018); the period after legalization of flower products, or period 1 (October 2018-January 2020); and the period after commercial edibles became available, or period 2 (February 2020-March 2021). Poisson models were used to calculate incidence rate ratios (IRRs) for change in monthly rates of visits. Health administrative data sets were linked using encoded identifiers and analyzed at ICES (eMethods in the Supplement). All tests of significance were 2-sided, and *P* values < .05 were considered statistically significant. Data analysis was conducted from June through August 2021 using Stata statistical software version 17.0 (StataCorp).

Results

There were 522 ED visits due to cannabis exposures among children (mean [SD] age, 3.8 [2.6] years; 281 visits [53.8%] among boys) including 81 visits during prelegalization, 124 visits during period 1, and 317 visits during period 2. The proportion of cannabis-related ED visits with hospitalization increased significantly after the introduction of edibles (122 visits [38.5%] during period 2 vs 29 visits [23.4%] during period 1 and 20 visits [24.7%] during the prelegalization period; *P* = .002). There were 19 ED visits (3.6%) with intensive care unit admission; no deaths were recorded (**Table**).

Rates of ED visits associated with cannabis exposures increased from January 2016 to March 2021 (**Figure**). Period 1 (IRR, 3.13; 95% CI, 2.37-4.16; *P* < .001) and period 2 (IRR, 9.12; 95% CI, 7.15-11.65; *P* < .001) were associated with increases in visits compared with the prelegalization period,

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

with a larger IRR for period 2. After adjusting for an increasing time trend in ED visits due to cannabis exposures throughout the study period, period 2 continued to be associated with an increase in visits (IRR, 2.23; 95% CI, 1.17-4.27; P = .01) (Table). Period 2 overlapped with the COVID-19 pandemic.

Table. Cannabis Exposures Among Children by Time Period

	Prelegalization[a]	Period 1[b]	Period 2[c]	P value[d]
Cannabis exposure ED visits by characteristic				
Total visits, No. (monthly mean)	81 (2.5)	124 (7.8)	317 (22.6)	NA
Age, mean (SD)	3.6 (2.8)	3.5 (2.8)	4.0 (2.5)	.18
Sex, No. (%)				
Boys	44 (54.3)	78 (62.9)	159 (50.2)	.054
Girls	37 (45.7)	46 (37.1)	158 (49.8)	
Hospitalized, No. (%)	20 (24.7)	29 (23.4)	122 (38.5)	.002
Cannabis ED exposure visits per 100 000 population members				
Monthly rate, mean (95% CI)	0.16 (0.11-0.21)	0.51 (0.43-0.59)	1.48 (1.30-1.66)	NA
Annualized rate	1.96	6.14	17.75	NA
IRR (95% CI)				
Unadjusted	1 [Reference]	3.14 (2.37-4.16)	9.12 (7.15-11.65)	Period 1: < .001
				Period 2: < .001
Adjusted for monthly time trend[e]	1 [Reference]	1.33 (0.85-2.10)	2.23 (1.17-4.27)	Period 1: .21
				Period 2: .01
Cannabis ED exposure visits per 1000 all-cause poisoning ED visits[f]				
Monthly rate, mean (95% CI)	6.84 (4.80-8.88)	28.85 (22.07-35.63)	95.03 (80.54-109.52)	NA
IRR (95% CI)				
Unadjusted	1 [Reference]	3.81 (2.88-5.04)	13.05 (10.22-16.66)	Period 1: .001
				Period 2: .001
Adjusted for monthly time trend[g]	1 [Reference]	1.50 (0.95-2.38)	2.87 (1.49-5.52)	Period 1: .08
				Period 2: .002

Abbreviations: ED, emergency department; IRR, incident rate ratio; NA, not applicable.

[a] 33 months: January 2016-September 2018.

[b] Legalization of flower-based cannabis products, 16 months: October 2018-January 2020.

[c] Introduction of legal commercial edible cannabis products, 14 months: February 2020-March 2021.

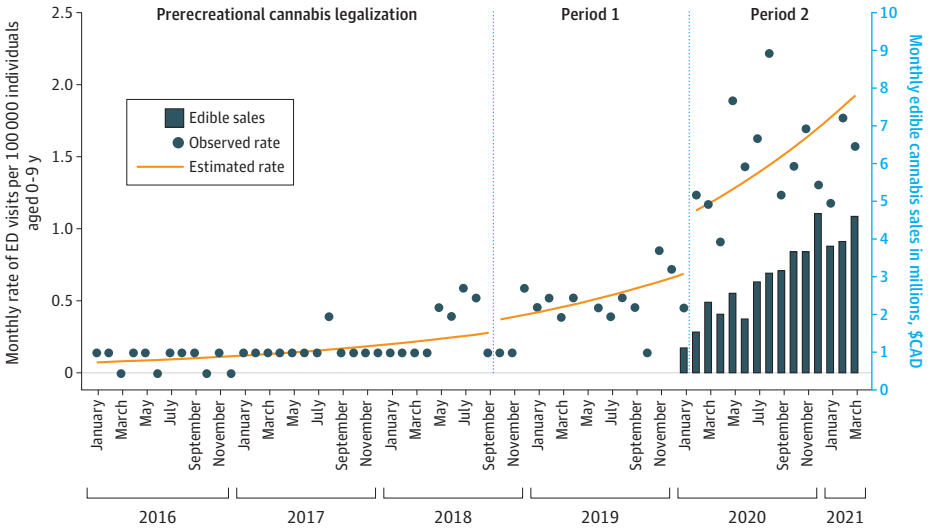
[d] Periods 1 and 2 are compared with the prelegalization period.

[e] IRR for monthly time trend: 1.04 (95% CI, 1.02-1.05; P < .001).

[f] ED visits related to all pharmaceutical and nonpharmaceutical poisonings.

[g] IRR for monthly time trend: 1.04 (95% CI, 1.02-1.06; P < .001).

Figure. Monthly Emergency Department (ED) Visits Due to Cannabis Exposures Among Children



Blue dots indicate observed rate; orange line, time-adjusted estimated rate; blue bars, monthly value of sales of legal commercial cannabis edible products (in millions $CAD); period 1, legalization of flower-based cannabis products; period 2, introduction of legal commercial edible cannabis products. To comply with privacy requirements at ICES (formerly the Institute for Clinical Evaluative Sciences), the rate of visits in months with 1 to 5 ED visits has been adjusted to represent the mean rate (0.14 monthly visits per 100 000 individuals) of all months during the study with 1 to 5 ED visits. The estimated trend line and analysis are based on unadjusted observed data.

During this time, pediatric ED visits due to cannabis exposures increased despite a decrease in total poisoning-related pediatric ED visits; the mean (SD) monthly count of visits was 312.3 (102.3) visits in the year prior to the pandemic vs 263.5 (100.4) visits during the first year of the pandemic.

Discussion

This repeated cross-sectional study found significant increases in the frequency and severity of ED visits due to cannabis exposures among children after the legalization of recreational cannabis. These findings suggest that the introduction of legal commercial edible cannabis products was a key factor associated with changes in ED visit frequency and severity. Rates of pediatric cannabis ED exposures found in this study were 7-fold higher than rates reported in Colorado after recreational cannabis legalization.[1] These population-level findings suggest that prior work from single centers may have underestimated the burden associated with pediatric cannabis exposures. Increases in ED visit frequency and severity occurred despite strict regulations that largely exceed US regulations (eg, a maximum of 10 mg of tetrahydrocannabinol per entire edible package, child-resistant packaging, and marketing restrictions) and consumer education campaigns.[5]

Our study was limited by lack of data on the source and type of cannabis ingested, and it is possible that cannabis from illicit sources and nonedible products contributed to the increase in visits. The legal cannabis retail market in Ontario has expanded rapidly since the start of period 2, and the number of legal cannabis stores is expected to increase 3-fold in the coming years.[6] Further regulatory measures, such as limiting formulations and appearance of commercial edibles, combined with education for parents and caregivers, may be required to decrease pediatric cannabis exposures.

ARTICLE INFORMATION

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Author Affiliations: Clinical Epidemiology Program, Ottawa Hospital Research Institute, Ottawa, Ontario, Canada (Myran, Cantor); Department of Pediatrics, University of Toronto, Toronto, Ontario, Canada (Finkelstein); ICES (formerly the Institute for Clinical Evaluative Sciences), Ontario, Canada (Pugliese, Guttmann); Canadian Centre on Substance Use and Addiction, Ottawa, Ontario, Canada (Jesseman); Department of Medicine, Ottawa Hospital Research Institute, University of Ottawa, Ottawa, Ontario, Canada (Tanuseputro).

Author Contributions: Dr Myran had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: Myran, Cantor, Tanuseputro.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Myran, Cantor.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Myran, Cantor, Pugliese.

Obtained funding: Myran, Cantor, Tanuseputro.

Administrative, technical, or material support: Cantor.

Supervision: Finkelstein, Guttmann, Jesseman, Tanuseputro.

Conflict of Interest Disclosures: None reported.

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Role of the Funder/Sponsor: The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Disclaimer: Parts of this material are based on data and information compiled and provided by the Canadian Institute for Health Information and the Ontario Ministry of Health. The analyses, conclusions, opinions, and statements expressed herein are solely those of the authors and do not reflect those of the funding or data sources; no endorsement is intended or should be inferred.

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SUPPLEMENT.

eMethods.
eReferences.

From:	Linda Bavo
To:	"Gail Cafferata"; district5; district3; district4; Susan Gorin; David Rabbitt; Cannabis
Subject:	RE: Kids" ED Visits for Cannabis Exposure Surged After Legalization in Canada | MedPage Today
Date:	Monday, January 10, 2022 9:40:57 PM

EXTERNAL

Thank you!!

-----Original Message-----
From: Gail Cafferata <revgailc@gmail.com>
Sent: Monday, January 10, 2022 6:31 PM
To: district5@sonoma-county.org; district3@sonoma-county.org; district4@sonoma-county.org; Susan Gorin <Susan.Gorin@sonoma-county.org>; David.Rabbitt@sonoma-county.org; Cannabis@sonoma-county.org
Subject: Kids' ED Visits for Cannabis Exposure Surged After Legalization in Canada | MedPage Today

Dear Supervisors and staff,

I am deeply distressed by your refusal for months and years to deny any permits for any marijuana dispensaries (and any agricultural permits) despite community opposition based in scientific evidence of its harm to health, water supplies, air and other aspects of environmental health, community safety, and criminal activity.

I retain hope that you believe in science, which has proven the dangers of legalized marijuana sales and (and growing) for children. Here is an article from the Journal of the American Medical Association showing that making marijuana widely available increases children's hospitalizations for marijuana ingestion. I also attach the complete JAMA article, FYI.

I strongly encourage you to read and digest this information. Without any change in your immoral

From:	Crystal Acker
To:	Cannabis
Subject:	FW: Evacuation models from Dr. Cova
Date:	Tuesday, January 11, 2022 8:04:24 AM
Attachments:	Cova TJ Community Egress Concepts 2021 copy.pdf Cova Report pdf July 6 2020 Guenoc valley.pdf 2020-07-06 CBD comments_ Guenoc Valley Mixed Use Development FEIR copy.pdf Tom Cova DOI 2005 Should Fire-Prone Communities Have a Maximum Occupancy.pdf

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From: Deborah Eppstein <deppstein@gmail.com>
Sent: January 10, 2022 6:48 PM
To: Scott Orr <Scott.Orr@sonoma-county.org>; Crystal Acker <Crystal.Acker@sonoma-county.org>
Subject: Fwd: Evacuation models from Dr. Cova

Hi Scott and Crystal- can you please include these documents in the scoping evaluations for the cannabis EIR and draft cannabis ordinance? These are the documents I referred to in my December 16 email on wildfire safety.

Thanks- and here's to a really good 2022

Best,
Debby

Begin forwarded message:

From: Deborah Eppstein <deppstein@gmail.com>
Subject: Evacuation models from Dr. Cova
Date: January 10, 2022 at 11:19:52 AM PST
To: Tennis Wick <Tennis.Wick@sonoma-county.org>

Dear Tennis,
In follow up, here is some useful information which should be and straightforward to implement on evacuation planning and modeling from Dr. Tom Cova, an evacuation planning expert from University of Utah.

The 1st attachment describes the model. I suggest starting here - it is readily understandable and should be applicable to development on all roads in the WUI in Sonoma County. This could form a basis for the evacuation planning for Sonoma County as well as determining safe levels of future development.

The 2nd attachment is Dr Cova's evacuation analysis that was convincing to the Lake County Judge in denying the EIR from the Guenoc Valley mixed use project proposal.

The 3rd attachment is the full document where analysis was included as Exhibit 1, and also contains Dr. Cova's full CV.
The 4th attachment is an earlier (2005) publication by Dr. Cova discussing concepts to consider to determine maximum development the WUI.

I look forward to herring your comments!

Thanks,
Debby
Deborah Eppstein
801-556-5004

7/6/2020

Sent via email and UPS

County of Lake
Board of Supervisors
Attn: Carol Huchingson, County Administrative Officer
255 N. Forbes Street
Lakeport, CA 95453
Carol.huchingson@lakecountyca.gov

Re: Guenoc Valley Mixed-Use Planned Development Project Final Environmental Impact Report, SCH No. 2019049134

Dear Supervisors:

These comments are submitted on behalf of the Center for Biological Diversity (the "Center") regarding the Guenoc Valley Mixed-Use Planned Development Project (the "Project"). These comments follow our April 21, 2020 comments on the Draft Environmental Impact Report ("DEIR") for the Project, in which we raised serious concerns that the Project would have significant environmental impacts and identified numerous deficiencies in the DEIR. Unfortunately, instead of taking the opportunity to conduct more rigorous environmental review or revise the Project to reduce its significant impacts, Lake County (the "County") has responded largely by downplaying, obscuring, or denying the deficiencies in its environmental review. Furthermore, in the County's rush to approve the Project, it has robbed the public of adequate time to review the expansive environmental documents associated with the Project. The County should not approve the Project or certify the FEIR until, at a minimum, the County has rectified these deficiencies; otherwise, the County will be in violation of the California Environmental Quality Act ("CEQA"), Public Resources Code § 21000 et seq., and California Code of Regulations, title 14, § 15000 et seq ("CEQA Guidelines").

The Center is a non-profit, public interest environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. The Center has over 1.7 million members and online activists throughout California and the United States. The Center has worked for many years to protect imperiled plants and wildlife, open space, air and water quality, and overall quality of life for people of California, including Lake County.

I. The EIR's Analysis of and Mitigation for the Project's Impacts on Biological Resources is Inadequate

A. The FEIR Fails to Adequately Assess Impacts to Sensitive Habitats and Aquatic Resources and Relies on Insufficient Mitigation Ratios to Address Impacted Resources

The FEIR fails to adequately assess and mitigate impacts to aquatic resources and sensitive habitats and disregards the best available science. The FEIR states that "a set mitigation ratio with monitoring, adaptive management, and minimum success criteria, as presented within the Draft EIR, serves to effectively offset impacts" (FEIR at 3-48), yet the mitigation ratios and steps to ensure effective, ecologically functional mitigation are insufficient. MM 3.4-17 only requires a mitigation ratio of 2:1 for preservation/restoration/enhancement, while the mitigation ratio for created habitat is only 1:1 for aquatic resources. In addition, only lands selected for preservation are to be approved by the County, and for enhanced/restored/created mitigation, the "minimum success criteria" that "Mitigation shall be deemed complete once the qualified biologist has determined that the success of restoration or habitat creation activities meets or exceeds 80 percent" is vague and insufficient. There are no "defined success criteria" for aquatic resources mitigation as the FEIR states (FEIR at 3-48). Defined success criteria are only provided in MM 3.4-15, which also has a low mitigation ratio of 2:1 for preservation/restoration, stating that achieving 75% acreage with the "monitoring biologist [] consider[ing] percent cover, species composition, overall health of plantings, and other indicators when determining success of establishment" (FEIR at 3.4-97). This is only provided for some, not all, of the sensitive habitats, and it hardly constitutes as providing defined success criteria. What species will be included when determining species composition? Native/invasive plants? Vertebrates? Invertebrates? Will presence/absence surveys take into account breeding individuals vs. foraging individuals? How will such data be collected? Will survey protocols follow agency guidelines? What time of day or during what season will surveys be conducted? What are "other indicators" to be used? Will functional hydrology and soil health be considered? The proposed mitigation leaves the reader with more questions than answers regarding whether impacts due to the Project will be avoided, and if impacts are unavoidable, if they will be adequately minimized or mitigated to less than significant.

The FEIR states that "Simply requiring mitigation to occur at high ratios with no scientific basis would not serve to ensure mitigation. Rather, a set mitigation ratio with monitoring, adaptive management, and minimum success criteria, as presented within the Draft EIR, serves to effectively offset impacts." (FEIR at 3-48). This argument misses the point of the Center's comments, and disregards scientific studies that specifically speak to the need for higher mitigation ratios (along with long-term monitoring, identified and measurable success criteria, and adaptive management strategies) to improve chances of adequately mitigating impacts to habitats and species (Sudol and Ambrose 2002; Windmiller and Calhoun 2007; Matthews and Endress 2008; Moilanen et al. 2009; Stein et al. 2018). The FEIR needs to take into account that, due to the proposed Project, habitat loss and species displacement are immediate, while any gains from their mitigation is uncertain. Moilanen et al. (2009) found that "very high offset ratios may be needed to guarantee a robustly fair exchange" and that "considerations of uncertainty, correlated success/failure, and time discounting should be included in the determination of the offset ratio to avoid a significant risk that the exchange is unfavorable for conservation in the long run." The FEIR fails to consider the best available science and adequately assess and

mitigate impacts to aquatic resources and other sensitive habitats.

Given the importance of these heterogenous and varying aquatic resources to numerous native, rare, and special-status animals and plants, connectivity, and overall biodiversity, the FEIR should provide higher mitigation ratios that take the types of mitigation to be implemented into consideration, as not all mitigation is created equal. Preservation of existing habitat where sensitive and/or special-status species are known to occur through avoidance should be the primary focus, as restoration, enhancement, and creation of habitats can have limited success due to the challenges of establishing the appropriate hydrology (Sudol and Ambrose 2002; Windmiller and Calhoun 2007; Matthews and Endress 2008; Stein et al. 2018). For example, riparian/stream habitats are difficult to replace or create because of their complex hydrological, physical, and biotic structure, and it can take many years before an established riparian mitigation site might (or might not) become as ecologically functional as the lost habitat (Sudol and Ambrose 2002; Ambrose et al. 2006; Bronner et al. 2013). Adaptive management, collecting measurable performance standards based on habitat functions to determine mitigation success, and improved documentation strategies are necessary to increase the success rate mitigation for aquatic resources and sensitive habitat types, like riparian mitigation sites (Sudol and Ambrose 2002; Ambrose et al. 2006; Matthews and Endress 2008; Bronner et al. 2013).

Thus, if compensatory mitigation includes enhanced, restored, or created habitats, higher mitigation ratios coupled with extended years of effective monitoring and adaptive management strategies are needed to improve chances of establishing equivalent ecological function as the lost habitat (Sudol and Ambrose 2002; Ambrose et al. 2006; Windmiller and Calhoun 2007; Matthews and Endress 2008; Moilanen et al. 2009; Bronner et al. 2013; Stein et al. 2018). Mitigation ratios of 2:1 for preservation or restoration/enhancement and 1:1 for created habitat with unspecified, measurable success criteria and no requirement to implement adaptive management strategies are insufficient and do not align with current scientific knowledge. Mitigation for aquatic resources (and other sensitive habitats) should be at least 3:1 with in-kind preservation, 5:1 with restoration/enhancement, and 10:1 with created habitat. All mitigation (preservation, restoration/enhancement, creation of habitat of aquatic resources as well as other sensitive natural communities) should be implemented in consultation with local and regional biologists, indigenous groups, and government agencies, and protected in perpetuity, and the mitigation on these lands should include funded long-term monitoring, specified measurable success criteria, and adaptive management strategies. If higher mitigation ratios are not feasible, the FEIR must provide evidence and analysis supporting that conclusion. With one third of America's plant and animal species vulnerable to impacts from human activity and one fifth at risk of extinction (Stein et al 2018), it is crucial that strategies to prevent further degradation and loss of remaining aquatic resources, sensitive habitats, and biodiversity are explicit and scientifically sound. Again, the FEIR fails to adequately assess and mitigate impacts to aquatic resources, and the proposed mitigation is not founded in the best available science.

B. The EIR's Setbacks are Insufficient to Effectively Mitigate Impacts to Aquatic Resources, Including Riparian Corridors (Streams and Associated Upland Habitat), Wetlands, Ponds, and Reservoirs

Riparian ecosystems have long been recognized as biodiversity hotspots performing important ecological functions in a transition zone between freshwater systems and upland habitats. As the Center previously commented, many species that rely on these aquatic habitats also rely on the adjacent upland habitats (*e.g*., riparian areas along streams, and grassland habitat adjacent to wetlands). In fact, 60% of amphibian species, 16% of reptiles, 34% of birds and 12% of mammals in the Pacific Coast ecoregion (which includes Lake County) depend on riparian-stream systems for survival (Kelsey and West 1998). Many other species, including mountain lions and bobcats, often use riparian areas and natural ridgelines as migration corridors or foraging habitat (Dickson et al, 2005; Hilty & Merenlender, 2004; Jennings & Lewison, 2013; Jennings & Zeller, 2017). Additionally, fish rely on healthy upland areas to influence suitable spawning habitat (Lohse et al. 2008), and agricultural encroachment on these habitats and over-aggressive removal of riparian areas have been identified as a major driver of declines in freshwater and anadromous fish as well as California freshwater shrimp (*e.g*., Stillwater Sciences 2002; Lohse et al. 2008; Moyle et al. 2011). Loss of biodiversity due to lack of habitat contributes to ecosystem degradation, which will diminish a multitude of ecosystem services in the long-term.

Yet the FEIR disregards the Center's previous comments that are supported by scientific literature, stating that "While the statements that the commenter makes may be true for a given species within a specific context, they generally do not apply within the context of the Proposed Project and Lake County on the whole." (FEIR at 3-49). This logic is flawed and unsupported. The Project is located in an area identified by scientists as having high terrestrial and riparian permeability and linkage potential (Gray et al. 2018) with heterogeneous habitats associated with aquatic resources (almost 200 acres of riparian stream habitat [if not more] as well as over 400 acres of emergent wetlands, over 650 acres of ponds and reservoirs, over 122 acres of jurisdictional wetlands, and over 10 acres of jurisdictional open waters in the Project area. Dismissing studies that clearly demonstrate that a wide variety of wildlife, including special-status species known or have the potential to occur in the Project area, require large areas of intact upland habitat connected to aquatic resources (*i.e.*, riparian habitat, emergent wetlands, vernal pools, etc.) to survive and sustain healthy populations and ecosystems highlights the FEIR's failure to adequately assess and mitigate impacts to biological resources in the Project area. Setbacks of 20-30 ft from aquatic resources are insufficient to support the entire life cycle and metapopulation dynamics of special-status species like western pond turtles (*Actinemys marmorata*) and foothill yellow-legged frogs (FYLF; *Rana boylii*), both known to occur in and adjacent to the Project area. The FEIR fails to use the best available science, and instead suggests that the numerous studies that report the importance of riparian habitats to biodiversity and the need for adequate connectivity between aquatic resources and upland habitat somehow do not apply to the Project area, even when the studies specifically look at special-status species known to occur in the Project area.

For example, several studies highlighted in the Center's previous comments discuss life history and migration patterns of western pond turtles and FYLF (Twitty et al. 1967; Holland 1994; Semlitsch and Bodie 2003; Bury and Germano 2008; Zaragoza et al. 2015). Western pond turtles are known to nest as far as 1,312 feet from aquatic habitat and can be found overwintering up to 1640 feet from aquatic habitat, as well as migrating over 3,280 feet (1 km) (Holland 1994; Zaragoza et al. 2015), and Bury and Germano (2008) found that "most individuals rapidly depart

basking sites when disturbed by either visual or auditory stimuli of people (e.g., waving an arm, shouting) at distances of over 100 m [(328 feet)].” Adult FYLF have been observed in abandoned rodent burrows and under logs as far as 100 m (328 feet) from streams (Zeiner 1988) and juvenile FYLF have been found up to 600 feet upslope from their natal stream channel (Twitty et al. 1967). Yet the FEIR states that “western pond turtles and foothill yellow-legged frog (both of which are CDFW species of special concern) are more restricted in their ability to move far from streams because of a higher probability of desiccation and lower probability of finding adequate refuge relative to other parts of their range” because “the majority of the perennial and intermittent streams in the Area of Potential Effects have narrow riparian zones because of the well-drained soils and high prevalence of surface rock” (FEIR at 3-50) without providing any information to support their claim. This is conjecture and not founded on any science. Larger setbacks at aquatic resources that take into account connectivity with heterogeneous habitats, especially where special-status species are known to occur, have the potential to occur, or historically occurred, are needed to adequately minimize impacts to the species, populations, and ecosystems. The FEIR fails to adequately assess and mitigate impacts to aquatic resources and associated special-status species.

The FEIR misleadingly states that the federally threatened California red-legged frog (CRLF, *Rana draytonii*) “does not occur on the Guenoc Valley Site and is not documented to occur in Lake County” (FEIR at 3-49). Guenoc Valley and much of Lake County are within the current and historical range of CRLF. In fact, there are several recorded observations of CRLF in Lake County.[1] And although CRLF were not encountered in several potential locations in the Plan area, it is misleading to state that CRLF do not occur there. According to the USFWS 2005 CRLF survey protocol, “Multiple survey visits conducted throughout the survey-year (January through September) increases the likelihood of detecting the various life stages of the CRF. For example, adult frogs are most likely to be detected at night between January 1 and June 30, somewhere in the vicinity of a breeding location, whereas, sub-adults are most easily detected during the day from July 1 through September 30.” (USFWS 2005). But only targeted nighttime amphibian visual encounter surveys were conducted August 14-16, 2018 and May 14-15, 2019, which is insufficient to determine the presence or potential presence of CRLF in or adjacent to the Project area (Appendix BRA1 at 16). The USFWS recommends up to eight surveys within six weeks to detect CRLF, with two day surveys and four night surveys recommended during the breeding season (January 1 – June 30) and one day and one night survey during the non-breeding season, with each survey taking place at least seven days apart. (USFWS 2005). Surveys were not conducted following USFWS guidance and recommendations to optimize chances of CRLF detection. In addition, surveys were conducted at “selected habitats across the Property,” but the locations of the surveys are not provided in the appendix (Appendix BRA1 at 16). To conclude that CRLF “does not occur on the Guenoc Valley Site” (FEIR at 3-49) is an overstatement, as surveys were not optimal, and even if presence was not detected, it could be that they were present, but the surveyors did not see them. The FEIR fails to adequately describe, assess, and mitigate impacts to CRLF and other sensitive species that rely on aquatic resources and associated upland habitat.

[1] Data are available from the MVZ Herp Collection (Arctos) database, the Global Biodiversity Information Facility (GBIF; www.gbif.org), and Amphibiaweb (www.amphibiaweb.org).

Given that CRLF were historically present and are currently potentially present in the County and suitable habitat is present at the Project site, adequate setbacks and connectivity should be implemented. In a study that found radiotracked CRLFs moving up to 2.8 km (~1.7 mi) and a median distance of movement of 150 m (~492 ft) from breeding ponds, researchers aptly state that "maintaining populations of pond-breeding amphibians requires that all essential habitat components be protected; these include (1) breeding habitat, (2) nonbreeding habitat, and (3) migration corridors. In addition, a buffer is needed around all three areas to ensure that outside activities do not degrade any of the three habitat components."(Fellers and Kleeman 2007). Thus, at aquatic resources where CRLF are observed, potentially present, or were historically present, setbacks should at least 500 ft. Ideally, buffers should be even greater to accommodate the furthest dispersers, as larger buffers would allow for increased chances for establishment or re-establishment in unoccupied habitats, as often happens in metapopulation dynamics, or to increase resilience to climate change (Semlitsch and Bodie 2003; Cushman 2006). Again, the FEIR fails to consider the best available science to adequately assess and mitigate impacts to aquatic resources and the rare, sensitive, or special-status species that rely on the aquatic resources and connectivity with upland habitat.

These are just a few examples of how the FEIR inadequately assesses and mitigates impacts to aquatic resources, special-status species, and sensitive habitats. Note that this is not a comprehensive list of inadequacies that need to be addressed for the FEIR to comply with CEQA.

C. The FEIR Fails to Adequately Assess and Mitigate Impacts to Wildlife Movement and Habitat Connectivity

The FEIR states that while the site is "relatively large" and within the Pacific Flyway, "the Proposed Project does not propose modification of waterbodies in such a way that would make them significantly less useful as stopover points for migratory birds" (FEIR at 3-45). However, the FEIR fails to consider that if these heterogeneous habitats, like wetlands, streams, riparian habitats, grasslands, etc., are degraded in and around the Project site, they will no longer be able to support the numerous migratory birds that traverse the Pacific Flyway. As discussed previously, science has shown that 20- to 30-foot setbacks from aquatic resources is insufficient to protect the water quality and biodiversity of these systems. Without healthy ecosystems that support the vegetation and food resources (invertebrates, fish, herps, etc.) that many migratory birds rely on for rest, recovery, and nesting, the habitats in and adjacent to the Project area would no longer provide much needed connectivity for hundreds of millions of birds that traverse the Pacific Flyway throughout the year.

The FEIR goes on to state that designated open space, MM 3.4-17, and 20- to 30-foot setbacks from aquatic resources provide for regional movement while also providing habitat for less mobile species, like western pond turtles and FYLF (FEIR at 3-45). However, as discussed previously, the FEIR fails to consider the best available science, and the low mitigation ratios and minimal setbacks from aquatic resources are insufficient to support special-status animals and plants and overall biodiversity and ecosystem function in the Project area. And although the FEIR provides 1:1 mitigation of removed open space to preserved open space, the mitigation ratio should be higher, especially if the removed open space includes aquatic resources, sensitive

habitats, or habitat that supports or may support special-status species and/or is important to connectivity. And, as mentioned previously, all mitigation (preservation, restoration/enhancement, creation of habitat of aquatic resources as well as other sensitive natural communities), in designated open space or otherwise, should be implemented in consultation with local and regional biologists, indigenous groups, and government agencies. Mitigation lands should be protected in perpetuity, and the mitigation on these lands should include funded long-term monitoring, specified measurable success criteria, and adaptive management strategies. The proposed amendment to the Open Space Preservation Plan should include prioritization of preserving designated open space and avoiding removal, but if development occurs in designated open space then higher mitigation ratios that include long-term monitoring and adaptive management should be required.

The FEIR fails to adequately assess and mitigate impacts to functional connectivity. Although identifying designated open space with a minimum width of 475 ft and proposing 300-foot wide habitat and residential habitat easements to make up the FEIR's proposed wildlife paths through the Project area is a good start towards mitigating impacts to wildlife connectivity, it is insufficient and does not adequately consider the best available science. No movement studies were conducted in the area to determine that animals would actually move through the proposed wildlife paths, and the FEIR fails to consider edge effects of human activities on wildlife, wildlife movement, and habitat connectivity. As mentioned in the Center's previous comments, edge effects of development in and adjacent to open space will likely impact key, wide-ranging predators, such as mountain lions and bobcats (Crooks 2002; Riley et al. 2006; Delaney et al. 2010; Lee et al. 2012; Smith et al. 2015; Vickers et al. 2015; Smith et al. 2017; Wang et al. 2017), as well as smaller species with poor dispersal abilities, such as song birds, small mammals, and herpetofauna (Cushman 2006; Slabbekoorn and Ripmeester 2008; Benítez-López et al. 2010; Kociolek et al. 2011). Negative edge effects from human activity, such as traffic, lighting, noise, domestic pets, pollutants, invasive weeds, and increased fire frequency, have been found to be biologically significant up to 300 meters (~1000 feet) away from anthropogenic features in terrestrial systems (Environmental Law Institute 2003). In addition, the FEIR fails to consider, assess, or mitigate impacts to identified riparian and terrestrial least-cost pathways adjacent to the Project area (FEIR Habitat and Connectivity Assessment Appendix at 19-21). Thus, it is unclear if wildlife would move through the proposed wildlife paths; impacts due to the proposed Project would not be adequately mitigated in areas where the width of the designated open space is 475 ft wide or in 300-foot wide habitat or residential habitat easements, and the Project could have impacts to riparian and terrestrial permeability adjacent to the Project area. Although MM 3.4-19 requires wildlife-friendly fencing in some portions of the Project area and MM 3.4-21 was added to mitigate impacts of domestic cats (FEIR at 3.4-102), it is not enough to minimize impacts of human activities on wildlife movement and habitat connectivity.

The proposed development and roadways will increase traffic and further fragment the landscape, which could affect the diverse animals and plants in the area. For instance, field observations and controlled laboratory experiments have shown that traffic noise can significantly degrade habitat value for migrating songbirds (Ware et al. 2015). Subjects exposed to 55 and 61 dBA (simulated traffic noise) exhibited decreased feeding behavior and duration, as well as increased vigilance behavior (Ware et al. 2015). Such behavioral shifts increase the risk of starvation, thus decreasing survival rates. Another study also highlighted the detrimental

impacts of siting development near areas protected for wildlife. The study noted that "Anthropogenic noise 3 and 10 dB above natural sound levels . . . has documented effects on wildlife species richness, abundance, reproductive success, behavior, and physiology" (Buxton et al. 2017). The study further noted that "there is evidence of impacts across a wide range of species [] regardless of hearing sensitivity, including direct effects on invertebrates that lack ears and indirect effects on plants and entire ecological communities (*e.g.*, reduced seedling recruitment due to altered behavior of seed distributors)" (Buxton et al. 2017). Moreover, human transportation networks and development resulted in high noise exceedances in protected areas (Buxton et al. 2017).

In addition, preliminary results from studies underway by researchers at UC Davis and University of Southern California, as well as those by other researchers, suggest that the light, noise, and other aspects of roads can have negative impacts on wildlife numbers and diversity near the roadways (Shilling 2020; Vickers 2020). The researchers found a significant difference between species richness and species type, with lower richness and fewer species at along roadsides compared to background areas 1 km away from the roads (Shilling 2020). They also found that as traffic noises surpassed 60 dBC, the number of visits by small to large mammals decreased, and most of the species in their study avoid traffic noise (Shilling 2020). It is clear that different species have variable sensitivities to noise and light associated with development and transportation infrastructure; this can lead to changes in species distributions and population health and survival, which can have ecosystem-level impacts (*e.g.*, Suraci et al. 2019). The FEIR fails to adequately assess and mitigate impacts of edge effects on functional connectivity.

Edge effects of human activities have also been documented specifically on mountain lions. One study found that mountain lions are so fearful of humans and noise generated by humans that they will abandon the carcass of a deer and forgo the feeding opportunity just to avoid humans (Smith et al. 2017).[2] The study concluded that even "non-consumptive forms of human disturbance may alter the ecological role of large carnivores by affecting the link between these top predators and their prey" (Smith et al. 2017). In addition, mountain lions have been found to respond fearfully upon hearing human vocalizations, avoiding the area and moving more cautiously when hearing humans (Smith et al. 2017; Suraci et al. 2019). Other studies have demonstrated that mountain lion behavior is impacted when exposed to other evidence of human presence, such as lighting or vehicles/traffic (Wilmers et al. 2013; Smith et al. 2015; Wang et al. 2017). Mountain lions are protected under Prop 117 as a "specially protected species," and although they do not receive California Endangered Species Act (CESA) protections in the Project area, mountain lions in Southern California and along the Central Coast are candidates for CESA listing. This highlights the importance of mountain lions in California ecosystems. As the last remaining wide-ranging top predator in the region, the ability to move through large swaths of interconnected habitat is vital for genetic connectivity and their long-term survival. Impacts to mountain lions in the region could have severe ecological consequences; loss of the ecosystem engineer could have ripple effects on other plant and animal species, potentially leading to a decrease in biodiversity and diminished overall ecosystem function. Many

[2] *See also* Sean Greene, "How a fear of humans affects the lives of California's mountain lions," *Los Angeles Times* (June 27, 2017), available at http://beta.latimes.com/science/sciencenow/la-sci-sn-pumas-human-noise-20170627-story.html.

scavengers, including California condors, kit foxes, raptors, and numerous insects, would lose a reliable food source (Ruth and Elbroch 2014; Barry et al. 2019). Fish, birds, amphibians, reptiles, rare native plants, and butterflies would potentially diminish if this apex predator were lost (Ripple and Beschta 2006; Ripple and Beschta 2008; Ripple et al. 2014). Therefore, new development projects must carefully consider impacts to movement and connectivity for these and other wide-ranging carnivores. The FEIR fails to adequately assess and mitigate impacts to wildlife connectivity.

The FEIR fails to consider the need for corridor redundancy (*i.e*. the availability of alternative pathways for movement). Corridor redundancy is important in regional connectivity plans because it allows for improved functional connectivity and resilience. Compared to a single pathway, multiple connections between habitat patches increase the probability of movement across landscapes by a wider variety of species, and they provide more habitat for low-mobility species while still allowing for their dispersal (Mcrae et al., 2012; Olson & Burnett, 2008; Pinto & Keitt, 2008). In addition, corridor redundancy provides resilience to uncertainty, impacts of climate change, and extreme events, like flooding or wildfires, by providing alternate escape routes or refugia for animals seeking safety (Cushman et al., 2013; Mcrae et al., 2008; Mcrae et al., 2012; Olson & Burnett, 2008; Pinto & Keitt, 2008). Although the FEIR proposes 300-foot wide habitat and residential habitat easements for the proposed wildlife paths, they are insufficient to overcome edge effects for many species' movement, leaving only one constrained north-south pathway through the Project area via the designated open space while east-west movement is almost completely severed.

Corridor redundancy is critical when considering the impacts of climate change on wildlife movement and habitat connectivity. Climate change is increasing stress on species and ecosystems, causing changes in distribution, phenology, physiology, vital rates, genetics, ecosystem structure and processes, and increasing species extinction risk (Warren et al. 2011). A 2016 analysis found that climate-related local extinctions are already widespread and have occurred in hundreds of species, including almost half of the 976 species surveyed (Wiens 2016). A separate study estimated that nearly half of terrestrial non-flying threatened mammals and nearly one-quarter of threatened birds may have already been negatively impacted by climate change in at least part of their distribution (Pacifici et al. 2017). A 2016 meta-analysis reported that climate change is already impacting 82 percent of key ecological processes that form the foundation of healthy ecosystems and on which humans depend for basic needs (Scheffers et al. 2016). Genes are changing, species' physiology and physical features such as body size are changing, species are moving to try to keep pace with suitable climate space, species are shifting their timing of breeding and migration, and entire ecosystems are under stress (Parmesan and Yohe 2003; Root et al. 2003; Parmesan 2006; Chen et al. 2011; Maclean and Wilson 2011; Warren et al. 2011; Cahill et al. 2012). Therefore, functional habitat connectivity is critical for many animals and plants to adapt to climate change. Again, the FEIR failed to use the best available science and adequately assess and mitigate impacts to wildlife movement and functional connectivity.

D. The FEIR Fails to Adequately Assess and Mitigate Impacts to the Western Bumble Bee (*bombus occidentalis occidentalis*), a Candidate Species Under the California Endangered Species Act

The FEIR fails to analyze the Project's potentially significant impacts on the Western bumble bee. The Western bumble bee (*Bombus occidentalis occidentalis*) was listed by the California Fish and Game Commission as a candidate species under CESA in June 2019. Accordingly, the species' status as a candidate requires that it be included among the species analyzed in the FEIR. (FEIR at 3.4-23; Fish & Game Code § 2068.) Yet the FEIR for the Project did not include any evaluation of the proposed Project's impacts on the western bumble bee. Although the species' historical distribution covers the area of the Project site (The Xerces Society for Invertebrate Conservation 2018), the FEIR is entirely silent on the species and fails to include it in the list of special status species considered in the FEIR (FEIR at 3.4-24). Habitat loss, degradation, and modification due to agricultural intensification and urban development and the use of chemical contaminants (*e.g.*, insecticides, herbicides, fungicides) pose a significant threat to the bee's ability to survive and reproduce (The Xerces Society for Invertebrate Conservation 2018), yet this special-status species is not mentioned in the FEIR. Thus, the FEIR fails to adequately describe, assess, and mitigate impacts to the western bumble bee, a candidate species under CESA.

II. The EIR's Analysis of and Mitigation for the Project's Greenhouse Gas Emissions Remains Inadequate

The FEIR's analysis of the proposed Project's GHG emissions fails to correct the numerous deficiencies we identified in our comments on the DEIR and remains inadequate. The FEIR confirms once more that the Project would result in significant amounts of GHG emissions during construction and operation of the Project. (See FEIR p. 3.7-11, Table 3.7-1A [total annual construction emissions of 22,509 MT; p. 3.7-15, Table 3.7-3 total Project operational emissions with mitigation of 30,846 MT annually].) Yet it does not properly analyze or fully mitigate all of the Project's significant GHG impacts. (See Pub. Res. Code § 21002; CEQA Guidelines § 15126.2.) In particular, the EIR makes no real effort to reign in the Project's astounding increase in Vehicle Miles Traveled ("VMT"), the largest contributor by far to the Project's overall GHG emissions. Additionally, its proposed mitigation for the Project's VMT and GHG emissions is vague, improperly deferred, and unenforceable and the EIR fails to consider all feasible mitigation and alternatives to reduce the Project's GHG emissions impacts to less than significant levels.

A. The EIR Fails to Provide Enough Information About its Emissions and Mitigation Calculations to Allow for Informed Decision-making

As we explained in our comments on the DEIR, the document fails to provide readers with information essential to understanding its analysis of the Project's GHG emissions; the County merely dismissed instead of correcting this shortcoming. Although the Response to Comments encourages readers to consult the 24 pages of tables in its Appendix AIR, these tables simply present readers with raw data and no means for interpreting or understanding it. (See DEIR Appendix AIR.) An EIR must "disclose the analytic route the agency traveled from evidence to action." (*California Clean Energy Committee v. City of Woodland* (2014) 225 Cal.App.4th 173, 205 [internal punctuation omitted].) The County's reliance on 24 pages of tables containing numeric inputs for the subsequent several hundred pages of tables that together

constitute the GHG emissions analysis does not adequately apprise the public of how the County calculated the Project's GHG emissions.

Again, as we pointed out in our prior comments, EIR makes the same omission with respect to the purported effectiveness of its proposed mitigation measures. The EIR claims that the mitigation measures it proposes will result in FEIR p. 3.7-14 (Table 3.7-3 claiming that, with mitigation, total project emissions will be reduced by 30% to 30,846 MT annually, down from 44,162 MT annually without mitigation [Table 3.7-2]). Despite our prior concerns, the EIR still fails entirely to disclose how it arrived at these calculations for quantifying the mitigation measures' effectiveness in reducing or avoiding GHG emissions. Mitigation measures' effectiveness and enforceability must be supported by substantial evidence in the record. *Sacramento Old City Assn. v. City Council* (1991) 229 Cal.App.3d 1011, 1027. The County's response to our comments on this issue (the relevant Response to Comment 10-22) is wholly inadequate—it did not address or even acknowledge our concern regarding the lack of evidence to support the County's conclusions about the measures' estimated GHG reductions.

The EIR should be revised to include this information and recirculated so that the public can adequately review and comment on this crucial aspect of the DEIR's GHG analysis.

B. The EIR's Mitigation for the Project's GHG Emissions is Inadequate, Unenforceable, Vague, and/or Improperly Deferred

As we pointed out in our comments on the DEIR, the proposed mitigation for the Project's significant GHG impacts is badly lacking. The County's failure to reduce the Project's GHG emissions to less than significant undermines achievement of the statewide goals for GHG emissions reductions, including the following:

- Assembly Bill 32 (2006) requires statewide greenhouse gas reductions to 1990 levels by 2020 and continued reductions beyond 2020.
- Senate Bill 32 (2016) requires at least a 40 percent reduction in greenhouse gas emissions by 2030.
- Pursuant to Senate Bill 375 (2008), the California Air Resources Board establishes greenhouse gas reduction targets for metropolitan planning organizations (MPOs) to achieve based on land use patterns and transportation systems specified in Regional Transportation Plans and Sustainable Community Strategies. Current targets for the largest metropolitan planning organizations range from 13% to 16% reductions by 2035.
- Executive Order B-30-15 (2015) sets a GHG emissions reduction target of 40 percent below 1990 levels by 2030.
- Executive Order S-3-05 (2005) sets a GHG emissions reduction target of 80 percent below 1990 levels by 2050.
- Executive Order B-16-12 (2012) specifies a GHG emissions reduction target of 80 percent below 1990 levels by 2050 specifically for transportation.
- Senate Bill 391 requires the California Transportation Plan to support 80 percent reduction in GHGs below 1990 levels by 2050.

- The California Air Resources Board Mobile Source Strategy (2016) describes California's strategy for containing air pollutant emissions from vehicles, and quantifies VMT growth compatible with achieving state targets.
- The California Air Resources Board's 2017 Climate Change Scoping Plan Update: The Strategy for Achieving California's 2030 Greenhouse Gas Target describes California's strategy for containing greenhouse gas emissions from vehicles, and quantifies VMT growth compatible with achieving state targets.

As the Center explains below, the County should revise its mitigation for the Project's GHG impacts to ensure that it complies with CEQA, adopt additional feasible mitigation measures to reduce the Project's impacts to less than significant levels, and recirculate a revised EIR for public review and comment on the additional mitigation measures.

i. The EIR's Mitigation for the Project's Mobile Source Emissions Remains Inadequate and the EIR Fails to Adopt All Feasible Mitigation to Reduce or Avoid the Project's Significant Impacts

The Project's remote location and residential/resort uses will result in a significant increase in mobile source emissions. The majority of trips generated by the project will originate far from the project thus giving rise to high total and per capita VMT. (See FEIR at 3.13-2 [showing that a majority of Project-generated trips will involve travel to or from areas located miles from the Project site, with 29% to/from Clearlake or North, and 19% south of Middletown].) Transportation-generated (i.e., "mobile") GHG emissions account for an astounding 24,585 $MTCO_2e$ annually—over 79% of the Project's total mitigated operational emissions of 30,846 $MTCO_2e$ annually. (FEIR at p. 3.7-15, Table 3.7-3) What's more, the FEIR acknowledges that "the Proposed Project would not meet the recommended OPR threshold of a 15 percent reduction in per capita VMT over existing conditions. This would be a significant impact." (FEIR at p. 13.3-28.) In fact, the Projects impacts are much worse—they result in an *increase* in per capita VMT in Lake County from existing conditions, in both the short and the long term. (FEIR at p. 3.13-28, Table 3.13-7.)

As the California Supreme Court has observed: "the Scoping Plan … assumes continued growth and depends on *increased efficiency* and conservation in land use and transportation from all Californians." (*Center for Biological Diversity v. Department of Fish & Wildlife* (2015) 62 Cal.4th 204, 220.) More recently, the Fourth District Court of Appeal strongly affirmed the importance of reducing VMT in order to meet the state's GHG reduction targets, as described in the CARB Scoping Plan. The Court explained:

> [T]he 2017 CARB Scoping Plan . . . is the state's blueprint for meeting GHG emission reduction targets. (*Center for Biological Diversity, supra*, 62 Cal.4th at p. 220.) The Scoping Plan recognizes that in the past, "development patterns have led to sprawling suburban neighborhoods, a vast highway system, growth in automobile ownership, and under-prioritization of infrastructure for public transit and active transportation." The Scoping Plan states, "VMT reductions are necessary to achieve the 2030 target and must be part of any strategy evaluated in this Plan." (Italics added.) The Scoping Plan emphasizes that "California must

> reduce demand for driving" and "lower-VMT future development patterns are essential to achieving public health, equity, economic, and conservation goals."
>
> "Local land use decisions play a particularly critical role in reducing GHG emissions associated with the transportation sector . . . .
>
> "While the State can do more to accelerate and incentivize these local decisions, local actions that reduce VMT are also necessary to meet transportation sector-specific goals and achieve the 2030 target under [Sen. Bill No. 32.] Through developing the Scoping Plan, CARB staff is more convinced than ever that, in addition to achieving GHG reductions from cleaner fuels and vehicles, California must also reduce VMT." (Italics added.)
>
> VMT reduction is an integral part of California's strategy to reach 2030 and 2050 GHG emission reduction targets.

(*Golden Door Props. v. County of San Diego* (June 12, 2020, Nos. D075328, D075478, D075504) ___Cal.App.5th___ [2020 Cal. App. LEXIS 529, at *117-118].)

The 11th annual California Green Innovation Index, which tracks the state's annual progress in reducing GHG emissions found in 2019 that

> [G]iven that transportation is by far the largest-emitting sector—and with most of the emissions coming from on-road light-duty passenger vehicles—the current upward trajectory of VMT and surface transportation GHG emissions [in California] cannot continue if the state is to meet its climate goals.

(Next 10 2019 at p. 31.)[3] As the OPR Technical Advisory states, meeting statewide targets for GHG reductions "will require substantial reductions in existing VMT per capita to curb greenhouse gases." (OPR Technical Advisory 2017, p. 7; see also CARB 2017, p. 75 [Scoping Plan stating that "VMT reductions are necessary to achieve the 2030 [GHG emissions] target."].)

Yet the Project completely disregards the need to *reduce* VMT in order to ensure that the state can meet its statewide GHG reduction targets. Instead it results in a sharp *increase* in daily per capita VMT in Lake County from existing conditions (FEIR at p. 3.13-28, Table 3.13-7), which it acknowledges as a significant impact (FEIR at p. 13.3-28). And the project does not commit to *any reductions in mobile source GHG emissions from mitigation measures.* (FEIR at pp. 3.7-14 to – [Tables 3.7-2 and 3.7-3 showing that "mitigated" and "unmitigated" mobile source GHG emissions *remain exactly the same*].) The County cannot simply abandon its obligation to reduce the Project's greenhouse gas emissions from mobile sources.

The EIR relies on GHG mitigation measure MM 3.7-1, which, with respect to the Project's mobile emissions states:

[3] As of 2011, The transportation sector was the largest single contributor to California GHG emissions, accounting for 37 percent of all emissions; passenger vehicles accounted for almost three quarters of this total. (PPIC 2011.)

Transportation Demand Management Measures
Implement Mitigation Measure 3.13-4 to develop and implement a transportation demand management plan to achieve a reduction in vehicle miles traveled as a result of the Proposed Project. At a minimum these measures will include:
- Dedicate on-site parking for shared vehicles (vanpools/carpools).
- Provide adequate, safe, convenient, and secure on-site bicycle parking and storage in the commercial portion of the project.
- Use of an electric fleet for internal transport vehicles (excluding trucks and other ranch vehicles for on-going agricultural and grazing activities) to the extent feasible (no less than 75 percent), including the golf course.

(FEIR at 3.7-16.) Measure 3.7-1 incorporates by reference traffic mitigation measure MM 3.13-4, which the FEIR claims "would also reduce project GHG emissions by reducing the overall mobile trips generated by the Proposed Project." (FEIR at 3.7-14.) While the County has made some minor wording changes to the text of MM 3.13-4 and included for the first time in the FEIR an administrative draft Transportation Demand Management plan ("TDM")[4], these changes do not remedy the concerns we raised in our DEIR comments that the proposed mitigation is vague, improperly deferred, unenforceable, and the EIR does not demonstrate that it will be effective.

At first blush, measures MM 3.7-1, MM 3.13-4 and the TDM may appear substantive, but a closer examination reveals the measures to be toothless and to fall short of CEQA's standards for mitigation. Examples of such shortcomings in MM 3.13-4 include, but are not limited to:

- *Provide Shuttle Service* – the provision notes that "There are currently no plans for Lake Transit to run buses along Butts Canyon Road near the project site and the nearest bus stops are about six miles away in Middletown. While it is possible Lake Transit might consider adding a stop on Butts Canyon Road in the future to serve project employees, it is our understanding that there is no funding available for it at this time." Yet it does not commit to funding, expanding, or improving transit options that would connect the Project to Middletown and Clearlake. The provision states that "Alternatively, the project could potentially provide a frequent direct weekday shuttle service specifically for employees," but does not require it. Nor does the provision require *any* transit options for Project site residents (as opposed to guests or employees).

[4] In response to our comments on the DEIR, the County belatedly published an Appendix TDM to the FEIR. This document does not allay our prior concerns that the County is impermissibly deferring transportation demand management measures. We note that FEIR Appendix TDM is marked on its first page as a "Confidential Administrative Draft" and watermarked as "DRAFT" on every page—undermining any claim that it is final and binding on the Applicant. Moreover, the EIR's mitigation measures do not require County *approval* of the TDM—only that it be "submitted" by the Applicant, after which the County "shall verify compliance with the plan" though the County apparently has no ability to disapprove an inadequate plan. (FEIR at 3.13-36.) Finally, MM 3.13-4 lists "strategies shall be identified within the TDM plan" but stops conspicuously short of actually *requiring* implementation of those strategies.

- *TDM Coordinator* – The provision states that "Management shall designate a "TDM coordinator" to coordinate, monitor and publicize TDM activities. The effectiveness of providing a TDM Coordinator on auto mode share is uncertain but is generally seen as a supportive measure." While this idea behind this provision is laudable, there is no evidence of its effectiveness at contributing anything toward reducing the Project's GHG emissions.

Similarly, Appendix TDM describes 15 "strategies" to reduce VMT, but does not contain the requisite performance criteria. The language used to describe the other "strategies" is generally vague, aspirational, and lacking in specifics or actual enforceable requirements.

Nor does the administrative draft TDM contain any quantitative target or performance criteria for ensuring that a certain number of VMT reductions are actually achieved. Although the TDM purports to implement a monitoring and reporting program, in the absence of such standards or performance criteria, any such activities are meaningless. The administrative draft TDM states, "The Project sponsor shall adjust the TDM plan based on the monitoring results if they demonstrate that measures in the TDM plan are not achieving the reduction goal." But crucially, *there is no reduction goal*. This vague language is no substitute for concrete performance standards. Furthermore, taken together, MM 3.7-1, 3.13-4, and the administrative draft TDM allow the project applicant in the future to determine the extent it believes it is "feasible" to reduce VMT, with little or no oversight by the County and without standards by which to determine feasibility. This approach violates CEQA's standards for mitigation measures. (*See Golden Door Props. v. County of San Diego* (June 12, 2020, Nos. D075328, D075478, D075504) ___Cal.App.5th___ [2020 Cal. App. LEXIS 529, at *73-*75.)

Feasible mitigation measures for reducing VMT-associated GHG emissions exist that were not considered or evaluated in the EIR. These include, but are not limited to:

- Committing to Transit options. (See OPR Technical Advisory 2017 at 22.) Although MM 3.13-4 states that the Project "could potentially provide a frequent direct weekday shuttle service specifically for employees" it makes no commitment to providing any such service. (FEIR at 3.13-37). The Project should commit to running daily shuttle services to Middletown (and Clearlake) that are available to members of the public, not just employees. The FEIR similarly states that "While it is possible Lake Transit might consider adding a stop on Butts Canyon Road in the future to serve project employees, it is our understanding that there is no funding available for it at this time." (Id.) The Project should commit to funding a Lake Transit stop and service along Butts Canyon Road to serve project employees and residents.
- Committing to a hard limit on the total number of available parking spots on site and committing a fixed minimum ratio (for example, at least one third) of those sites to being restricted to use by rideshare/carpool/EV vehicles. (See OPR Technical Advisory 2017, p. 23; see also CAPCOA 2010 p. 207 [measure 3.3.1 Limit Parking Supply].)
- Committing to other mitigation measures from the OPR Technical Manual (OPR Technical Manual 2017, pp. 22-23), including but not limited to:
    - Incorporating affordable housing into the project, and providing increased onsite workforce housing to reduce employee commuting. (See also CAPCOA 2010 p.

176 [measure 3.1.6 Integrate Affordable and Below Market Rate Housing].) The administrative draft TDM's proposed measure 1.3.1 ("Workforce Housing") is non-committal, stating only that the Project "will provide up to 35 housing units on-site" and "up to 50 housing units offsite."

- Increasing the diversity of non-residential and commercial uses on site to include uses such as grocery stores, daycare, etc., within walking distance from residences within the Project area, which can allow Project residents to find desired handle daily shopping and service needs without leaving the project area. (See CARB 2017 at 76, urging mitigation that uses "community design" to reduce VMT.)

- Offsets as a mitigation measure of last resort (see additional discussion below).

Although the EIR and administrative draft TDM give lip service to a handful of these measures—they do not actually develop them in any detail, impose performance standards, ensure that they are enforceable, or attempt to quantify or otherwise evaluate their effectiveness. The County therefore cannot and does not evaluate their feasibility. The EIR's failure to adopt all feasible mitigation measures to reduce the Project's significant VMT-related GHG emissions violates CEQA. (See Pub. Res. Code § 21002.)

ii. The EIR's Mitigation for the Project's Non-Mobile Source Operational GHG Emissions Remains Inadequate and the EIR Fails to Adopt All Feasible Mitigation to Reduce or Avoid the Project's Significant Impacts

The text changes to MM 3. 7-1's provisions relating to the Project's non-mobile source operational GHG emissions do not remedy the deficiencies we identified in our comments on the DEIR.

Moreover, the Project fails to incorporate—and the EIR fails to consider—all feasible measures that could considerably reduce the Project's significant non mobile source GHG emissions. In particular, the County should consider the use of a legally adequate carbon offset program to offset the Project's unmitigated GHG emissions. Although any offset scheme must be carefully tailored to comply with CEQA's requirements (*see generally Golden Door Props. v. County of San Diego* (June 12, 2020, Nos. D075328, D075478, D075504) ___Cal.App.5th___ [2020 Cal. App. LEXIS 529]), carbon offsets should be considered as a last option for mitigation where no other options are available or feasible. The County appears not to have considered this option or determined whether it is feasible.

C. The Addition of a Transportation Demand Management Plan for the First Time After the Close of the Public Review Period for the Draft EIR Is Significant New Information Requiring Recirculation

The County included the administrative draft Transportation Demand Management Plan for the Project for the first time with its publication of the FEIR. It provided no reason or justification why this document was not disclosed earlier and made available for review with the DEIR so that the public could adequately comment on it. A lead agency is required to recirculate an EIR when significant new information is added to the EIR after the draft EIR is made available for public review. (CEQA Guidelines § 15088.5.) New information includes changes

in the project or environmental setting as well as additional data or other information. (Id.) New information is significant where the EIR is changed in a way that deprives the public of a meaningful opportunity to comment. Here, the TDM is significant new information requiring recirculation and the opportunity for public comment. (*See Spring Valley Lake Association v. City of Victorville* (2016) 248 Cal.App.4th 91, 108 [recirculation required where stormwater management plan was redesigned and revisions analyzed the project's consistency with several general plan air quality policies and implementation measures].)

III. The FEIR Fails to Adequately Assess and Mitigate Impacts to Water Quality and Climate Change Resilience

As mentioned in the Center's previous comments, science has shown that implementing adequate buffers throughout the catchment or watershed in addition to around the reservoir(s) is an effective strategy to keep pollutants and sedimentation out of reservoirs (Norris 1993; Whipple Jr. 1993). Researchers suggest that to reduce sedimentation and pollution in drinking water supplies a minimum 300-foot buffer should be established around reservoirs, and larger buffer zones should be established around upstream channels and tributaries closer to pollution sources of sediment and other pollutants (Nieswand et al. 1990; Norris 1993; Whipple Jr. 1993). Yet the FEIR rejects this information because the Center's recommended setbacks, which are based on scientific studies, are "not based on local research near the Guenoc Valley Site or the wildlife species that may occur there" (FEIR at 3-50). This is dangerous and backwards logic that threatens safe drinking water for communities, basically assuming that the Project area is not similarly subject to physics, chemistry, or hydrogeomorphic processes that have shaped other riparian systems. Scientific evidence suggests that setbacks of 20 to 30 feet will not adequately protect water quality from degrading due to sediment, turbidity, and other types of pollution, such as excessive nutrients (nitrogen and phosphorous) and pesticides. Larger buffer zones at reservoirs and along streams and wetlands upstream of the reservoirs would provide more stream bank stabilization, water quality protection, groundwater recharge, and flood control both locally and throughout the watershed (Nieswand et al. 1990; Norris 1993; Whipple Jr. 1993; Sabater et al. 2000; Lovell and Sullivan 2006). They would also protect communities from impacts due to climate change by buffering them from storms, minimizing impacts of floods, and providing water storage during drought (Environmental Law Institute 2008). Thus, the FEIR should require a minimum 300-foot buffer around reservoirs with a minimum of 200-300-foot setbacks from streams and wetlands, depending on whether the habitat supports, has the potential to support, or historically supported special-status and/or sensitive species, or if it provides important habitat connectivity.

Other studies have shown that land use patterns at the watershed scale are correlated with water quality, carbon sequestration, and the level of species abundance and biodiversity (Pess et al. 2002; Opperman et al. 2005; Lohse et al. 2008; Padilla et al. 2010; Grantham et al. 2012). For example, higher levels of vineyard/agricultural conversion and exurban development within watersheds have been associated with increased fine sediment inputs to streams (Opperman et al. 2005; Lohse et al. 2008), reduced diversity of aquatic macroinvertebrates (Lawrence et al. 2011), reduced abundance and diversity of native fishes (Pess et al. 2002; Lohse et al. 2008), and reduced carbon sequestration (Padilla et al. 2010). Meanwhile, forest cover, which includes woodlands adjacent to aquatic resources, plays a critical role in maintaining important water

resources for clean drinking water and agriculture. Reduced forest/woodland cover has been shown to result in increased runoff (*i.e.*, pollutants such as pesticides and fertilizers flowing into groundwater and surface waterways), erosion, sedimentation, and water temperatures; changes in channel morphology; decreased soil retention and fertility; and decreased terrestrial and aquatic biodiversity (Brown and Krygier 1970; Pess et al. 2002; Dahlgren et al. 2003; Houlahan and Findlay 2004; Opperman et al. 2005; Lohse et al. 2008; Elliot 2010; Lawrence et al. 2011; Moyle et al. 2011; Zhang and Hiscock 2011; Jedlicka et al. 2014). In addition, forests and woodlands are an important carbon sink that can help moderate the impacts of climate change (Padilla et al. 2010; Pan et al. 2011), and some researchers argue that at a global scale, trees are linked to increased precipitation and water availability (Ellison et al., 2012). These studies indicate that land use planning needs to consider impacts at the watershed scale to implement effective environmental protections that actually safeguard important natural resources like water quality and erosion control. Again, by implementing insufficient setbacks of 20-30 ft for aquatic resources and providing insufficient mitigation for oak woodlands and other vegetation and natural communities that stabilize soils, maintain high water quality, and sequester carbon without considering the watershed-level impacts, the FEIR fails to adequately assess and mitigate impacts to aquatic resources, water quality, and climate change resilience.

IV. The FEIR's Water Supply Analysis is Inadequate

The FEIR's water supply analysis fails to clearly demonstrate to the public and decision-makers that there will be sufficient long-term supplies to service the Project. The Project will use surface water rights previously granted for the Project site, but the FEIR and Water Supply Assessment ("WSA") are internally inconsistent in the quantities of surface water available. Furthermore, the FEIR and WSA fail to discuss the viability of long-term appropriations under existing permits in light of climate change's current and future impacts on regional surface water supplies in the Putah creek watershed.

A. The FEIR Fails to Properly Assess the Impacts of Climate Change on the Project's Surface Water Supply

The FEIR fails to adequately consider the impacts of climate change on the availability of increasingly scarce water resources in the western U.S. during the lifespan of the Project. California law requires agencies to discuss and disclose a proposed project's long-term future water supply. (See *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 430-432 (hereinafter "*Vineyard*"); Water Code § 10910.) The FEIR finds the Project will have less than a significant impact on water supply related to sufficiency of water supply. (FEIR at 3.14-15.) This finding is based on the WSA, which describes the surface water rights that will provide non-potable water to a significant portion of the Project site. (WSA at 22.) The WSA does not discuss how climate change will the attendant shifts in precipitation regimes will impact the amount of water ***actually available*** under the existing appropriative rights. This shortcoming undermines the accuracy of the water supply analysis, and the finding of no significant impact based thereon.

Significant for the State, as well as the Project area, is climate change's impact on water supply. The Intergovernmental Panel on Climate Change ("IPCC") specifically identified the

American West as vulnerable, warning, "Projected warming in the western mountains by the mid-21st century is very likely to cause large decreases in snowpack, earlier snow melt, more winter rain events, increased peak winter flows and flooding, and reduced summer flows . . . ." (IPCC 2007b.) Recently, researchers found that an increase in atmospheric greenhouse gases has contributed to a "coming crisis in water supply for the western United States. . . ." (Barnett 2008.) Using several climate models and comparing the results, the researchers found that "warmer temperatures accompany" decreases in snow pack and precipitation and the timing of runoff, impacting river flow and water levels. (Barnett 2008.) These researchers concluded with high confidence that up to 60 percent of the "climate related trends of river flow, winter air temperature and snow pack between 1950-1999" are human induced. (Barnett 2008.) This, the researchers wrote, is "not good news for those living in the western United States." (Barnett 2008.)

The California Center on Climate Change has also recognized the problem climate change presents to the state's water supply and predicts that if GHG emissions continue under the business-as-usual scenario, snowpack could decline up to 70-90 percent, affecting winter recreation, water supply and natural ecosystems. (Cayan 2007.) Climate change will affect snowpack and precipitation levels, and California will face significant impacts, as its ecosystems depend upon relatively constant precipitation levels and water resources are already under strain. (Cayan 2007.) The decrease in snowpack in the Sierra Nevada will lead to a decrease in California's already "over-stretched" water supplies. (Cayan 2007.) It could also potentially reduce hydropower and lead to the loss of winter recreation. (Cayan 2007.) All of this means "major changes" in water management and allocation will have to be made. (Cayan 2007.) Thus, climate change may directly affect the ability to supply clean, affordable water to the residents, or change how the Project will utilize water, and it may also impact other activities outside the Project area, such as agriculture or offsite residential use.

B. The FEIR Fails to Demonstrate How Much Surface Water Will Actually be Available at Full Build-out of the Project

The FEIR and WSA base the analysis of surface water supplies on the assumption that the maximum amount that can be appropriated under existing permits will be available throughout the 20-year planning horizon. The future water supplies identified in an EIR "must bear a likelihood of actually proving available; speculative sources and unrealistic allocations ('paper water') are insufficient bases for decision-making under CEQA." (*Vineyard*, 40 Cal.4th at 432.) The discussion of the impacts related to likely future supplies must include an analysis of the "circumstances affecting the likelihood of the water's availability." (*ibid*.) Here, the WSA states that 10,394.5 acre-feet per year ("AFY")[5] are authorized for diversion and storage (WSA at 51), and 7,360 AFY are available to be withdrawn from storage (WSA at 52) in a normal year under current permits. While the WSA contains projections for available non-potable surface supply within the place of use ("POU") in critical dry and multiple dry year scenarios, any decrease due to dry conditions is calculated based on the maximum permitted appropriation amount. (*id*.) The WSA does not clearly demonstrate the historic yearly diversions under the existing permits. Instead, the WSA provides a table accounting for usage and carryover storage

[5] This total amount also includes 560 AFY from riparian rights along Bucksnort creek.

from 2011 to 2018. (WSA at 37.) This table does not illustrate how much water was diverted from the Putah creek watershed in any of those years. Such information would demonstrate how much of the total appropriative rights are actually received, and how those amounts, and the resulting carryover storage, compare to projected demand for non-potable use within the POU. Without accurate accounting of likely future supplies, the supply-demand projections in the WSA (WSA at 57) are unverifiable, rendering the FEIR's conclusions about water supply unsupported by substantial evidence.

The FEIR's analysis of non-potable surface water supplies is further undermined by internal inconsistencies regarding how much water is lost from reservoirs each year due to seepage and evaporation. Factual inconsistencies render the FEIR inadequate as an informational document. (*Vineyard*, 40 Cal.4th at 439 ["Factual inconsistencies and lack of clarity in the FEIR leave the reader—and the decision makers—without substantial evidence for concluding that sufficient water is, in fact, likely to be available …"].) The WSA contains different data regarding how much water was lost from reservoir storage each year due to evaporation and seepage, then uses a projection that is significantly lower than observed rates of loss when calculating available supplies to be withdrawn each year during Project operation. (WSA a 37-39.) The WSA projects normal year supply of 7,360 AFY, which accounts for 1,770 AFY of evaporative losses. (WSA at 39.) But the WSA also notes that reservoir losses were observed to be 2,320 AFY from 2009-2013 and 2,700 AFY for 2014-2018. (WSA at 37.) Further muddying the waters, Table 4-5 demonstrates usage and carryover storage for Project site reservoirs between 2011 and 2018, and the average loss from evaporation and seepage during that period is approximately 2,827 AFY. (WSA at 38.) The WSA doesn't explain how the 1,770 AFY number was calculated, nor does it address how that number is significantly different from the actual losses observed for Project site reservoirs. This lack of clarity is significant, when considering the narrow supply and demand margins for non-potable surface water in the POU during single dry, and multiple dry water years. Specifically, the WSA assessment anticipates a non-potable surplus in the POU of 573 AF in a single dry year, and 973 AF in multiple dry years by 2040. (WSA at 58.) These surplus amounts vanish when accounting for how much evaporative/seepage loss actually occurred on the Project site between 2011 and 2018.[6] The inaccurate accounting of available non-potable surface supplies within the POU leads the WSA to report a surplus in drought years, when in fact, there would be a deficiency under those scenarios when using historic evaporative/seepage losses for reservoirs on the Project site. This undermines the conclusion that sufficient non-potable surface water exists to serve the Project's demand within the POU.

The shortcomings in the WSA's analysis of available non-potable surface supplies within the POU are not rectified by the potential availability of groundwater. As noted above, the EIR must demonstrate how it will supply the Project's water through the 20-year planning horizon, and if there is uncertainty about the availability of supply, alternatives must be discussed and the impacts of their provision disclosed. (See *Vineyard*, 40 Cal.4th at 432.) If the EIR plans to supplement non-potable demand within the POU with groundwater, that amount of groundwater must be quantified and disclosed to the public in the EIR. While the EIR concludes there is

[6] Using actual average evaporative/seepage losses of 2,827 AFY, instead of the unsupported 1,770 AFY projection, the available supplies would be 1,057 AFY less than projected in all water year categories.

sufficient groundwater to the serve the Project's demands, specifically all potable demand and non-potable outside the POU (WSA at 54-55), the amount that will be used is critical in long-term regional supply analysis. As the EIR points out, Lake County is not required to have a Groundwater Sustainability Plan ("GSP") in place under the Sustainable Groundwater Management Act ("SGMA"). (FEIR at 3.9-19.) Nevertheless, the Lake County Groundwater Management Plan ("GMP") seeks to implement "County-wide initiatives to better understand and manage groundwater." (FEIR at 3.9-19.) The County's ability to coordinate groundwater management within the groundwater basin(s) necessitates a clear and accurate description of how much groundwater the Project will use. Unfortunately, the inadequate surface water supply analysis creates uncertainty in the Project's future supplies, and the potential availability of groundwater supplements was not quantified nor assessed in the EIR.

V. The EIR Lacks an Adequate Analysis of the Project's Impacts Relating to Wildfire and Emergency Evacuation

The Center's comments on the DEIR identified numerous inadequacies and shortcomings in the County's analysis of the Project's impacts relating to wildfire and wildfire emergency evacuation. Among other things, the DEIR failed to acknowledge the likelihood that the Project would increase the chance of wildfires while simultaneously impairing evacuation routes for existing residents. Unfortunately, the FEIR's response to comments and minor changes to the EIR and Wildfire Prevention Plan do nothing to remedy these deficiencies. Tellingly, the Planning Commission's staff report for the Project acknowledges (pp. 16-17) that "[i]n 2015, Lake County suffered three separate wildfires that burned approximately 171,000 acres of wild land, forest, and residential property, and resulted in the cumulative loss of 1,329 homes and damage of over 70 commercial properties." As we explained in our previous comments, the extremely high risk of wildfire in the area and the past history of large-scale repeated burnings at the Project site make it especially imperative that the County prepare an EIR that adequately discloses and analyzes the Project's wildfire impacts, and considers mitigation and alternatives to reduce these impacts.

A. The EIR Continues to Ignore and Obscure the Increase in Fire Risk Resulting from the Project

The FEIR remains deficient because it fails to acknowledge or adequately analyze the increased risk of wildfire that results from development and increasing the intensity of use in undeveloped areas subject to wildfire. Indeed, the FEIR continues to downplay or ignore this effect, claiming, once more and without support, that the Project would *reduce* wildfire risk on the Project site. (FEIR at 3.16-10.) This conclusion is patently defective. The County cannot continue to ignore the abundant evidence in the record that locating homes in the wildland urban interface increases the risk of wildfire ignition.

In its comments on the DEIR, the Center submitted extensive evidence to the County, including numerous published, peer-reviewed studies by the nation's preeminent experts on wildfires, of the scientific consensus that housing and human infrastructure in fire-prone wildlands are the main drivers of fire ignitions and structure loss. (See, e.g., Syphard, et al. 2019.) The FEIR's Response to Comments does not address, discuss, or even acknowledge any

of this evidence. Instead, the FEIR's Response to Comments states merely, "The risk of human ignition of wildfires is considered in Impact 3.16-5 and addressed in the Wildfire Prevention Plan (Appendix FIRE of the Draft EIR)." (FEIR at 3-57 [Response O10-27].) But the County's response does not address the Center's comments. Instead of responding to the comment, or even addressing the effect of development in the Wildland Urban Interface on fire ignition risk, the County merely points to its Wildfire Prevention Plan. (FEIR at 3-57 [Response O10-28].) While a project-specific Wildfire Prevention Plan can conceivably reduce a project's wildfire impacts as compared to a hypothetical project without any wildfire prevention measures, the Wildfire Prevention Plan does not address—and the EIR does not disclose—the Project's potential to increase wildfire ignitions *as compared to existing conditions on the Project site*.

The County cannot ignore away the overwhelming evidence that that growth in the wildland-urban interface "often results in more wildfire ignitions, putting more lives and houses at risk." (Radeloff et al. 2018.) Developing housing in locations in California that currently have low or no density—such as the current Project site—dramatically *increases* the number of fires and the amount of area burned. *See* Keeley 2005; *see also* Syphard et al. 2013; Syphard et al. 2007 [stating that ninety-five percent of California's fires are caused by human activity].) Common anthropogenic causes of fire include arson/incendiary, equipment use, debris burning, smoking, vehicles, fireworks, electricity, and outdoor cooking. Additionally, structure fires can spread and initiate wildland fires.[7]

Drs. Alexandra Syphard and Jon Keeley, wildfire ecology experts who have been studying California wildfires and the relationship between wildfire and human activity for decades and have published hundreds of studies on the topic collectively, reiterate in an April 20, 2020 email that 95% of fires in California have been caused by humans, and when ignitions align with severe weather conditions, impacts are the most severe. (Syphard 2020.) They also state "as humans move farther east and into wildlands the likelihood of ignitions moving into those areas also increases." (Id.) There is insurmountable evidence from numerous studies which find that placing more sprawl development in fire-prone landscapes increases wildfire risk. The FEIR fails to consider the available science to adequately assess and mitigate the increase in wildfire risk due to the Project.

As one California court recently put it when finding the County of San Diego's EIR for a residential development project inadequate on these very grounds:

> [T]here is no discussion in the EIR of whether or how adding 1400 new residents into the area will affect the likelihood of wildfires. Adding this many residents into the Harmony Grove Project area is bound to affect the likelihood of fire given that, according to one report, 95% of modern wildfires in California are started by people. . . .The EIR should have addressed the issue. Although the EIR discusses

[7] In addition to the human-ignited 2015 Valley Fire, which we discussed in our comments on the DEIR, Lake County's 2016 Clayton Fire, which burned nearly 4,000 acres and destroyed 300 structures, was also human-ignited, according to Cal Fire. (CAL FIRE 2016.)

> what will be done to deal with wildfires, it does not address how adding new residents will affect the potential for wildfires to start.

(*Elfin Forest Harmony Grove Town Council v. County of San Diego* San Diego Sup. Ct. Case No. 37-2018-00042927-CU-TT-CTL, minute order dated Feb. 20, 2020 [included as reference].) Similarly here the EIR fails to address how adding up to 4,000 new residents to this demonstrably wildfire-prone location will affect the potential for wildfires to start.

Because it fails to acknowledge the significant wildfire impacts from increased risk of human ignition as a result of the Project, the EIR also fatally fails to mitigate them or consider alternatives to the Project that would reduce these impacts.

B. The EIR's Mitigation for the Project's Wildfire Impacts is Inadequate

As with the DEIR, the FEIR proposes only a single mitigation measure—MM 3.16-2—to reduce the Project's operational wildfire impacts (a single additional measure purports to mitigate all wildfire impacts from Project construction). (DEIR at 3.16-15 to -16.) As the Center previously commented:

> The [EIR] relies on MM 3.16-2 ("Post Wildfire Emergency Response") as the sole mitigation measure to reduce Impacts 3.16-4 and 3.16-5, which involve exposure of people and structures to wildfire. Yet, the measure is toothless and virtually meaningless; it defers preparation of the plan to an uncertain date, contains no standards to guide its preparation, is not enforceable, and does not include any concrete measures that can be shown to actually reduce wildfire impacts. In short, it fails to comply with *any* of CEQA's requirements for mitigation in an EIR.

The County did not respond to the Center's comments about the inadequacy of MM 3.16-2, or the untenability of relying on measure provides for the future preparation of a *post-wildfire* impacts study to reduce the risk of exposure from wildfires. Nor did the County make any attempt to defend MM 3.16-2's adequacy. Instead, the County apparently disclaims it, stating "No mitigation is identified because the Wildfire Prevention Plan adequately reduces the impact." (FEIR RTC, Response O10-30 [stating also, "Mitigation Measures 3.16-1 and 3.6-2 . . . alone would not be adequate, as the commenter notes."].) It then deflects to the Wildfire Prevention Plan (which, for the reasons described below is inadequate). The County cannot ignore the shortcomings in its mitigation measure MM 3.16-2—upon which the EIR relies to find that the Project's wildfire impacts would be less than significant—simply by pointing to *other* mitigation in the EIR.

i. The EIR Fails to Demonstrate That its Wildfire Prevention Plan Will "Reduce Wildfire Risks" to Less Than Significant

Like the DEIR, the FEIR continues to rely on a revised Wildfire Prevention Plan to "reduce risks in the area." (FEIR at 3.16-10.) The revised plan is included as the FEIR's Appendix FIRE. In our comments on the DEIR, we pointed out the Wildfire Prevention Plan's numerous flaws including a lack of evidence showing that its mitigation measures would be

effective; its vague, ill-defined, or improperly deferred measures; and the fact that most of its measures are not enforceable. In response, the plan was revised such that its property boundary fire breaks around homes will ostensibly be required prior to home construction and to make external sprinklers a requirement for some structures.

While commendable, these changes do not remedy the Wildfire Protection Plan's shortcomings. For example, the irrigated vineyards and grazing that make up two of the Wildfire Prevention Plan's three wildfire "prevention strategies" remain vague, ill-defined, and lack enforcement mechanisms or meaningful performance criteria to evaluate their effectiveness. (FEIR Appendix FIRE at p. 15.) And there are still no assurances that many of the measures will actually be implemented. For example, a substantial portion of the plan's projected irrigated "fire breaks" which it relies on to "reduc[e] the spread of wildfires throughout the site" are only "potential" vineyards. (FEIR Appendix FIRE at pp. 19, 2 [identifying "potential irrigated vineyards fire breaks" that will be leased and managed by third parties].)

The Wildfire Prevention Plan is also vague and aspirational at the level of individual residential units. We identified this shortcoming in our DEIR comments, pointing out for example that the plan states only that: "If a wildfire occurs, it poses a considerable risk to residential homes and their occupants. Homeowners *will be advised* to implement various wildfire prevention strategies." (FEIR Appendix FIRE at p. 23 [unchanged from the draft included with the DEIR].) The document then goes on to suggest "various [landscaping] strategies [that] can reduce wildfire risk where establishing a new landscape design." (*Id.* at p. 25.) Finally, the document notes that "residential buildings will abide by" state building codes (*id.* at p. 28) and suggests "interior strategies," such as smoke detectors, for reducing fire risk (*id.* at p. 29). But as Syphard and Keely explain, new construction built to state building codes "is not a panacea" and "MANY of the houses destroyed [in wildfires in California between 2013 and 2018] were newly built." (Syphard 2020.)

In response to the Center's concerns about the enforceability of measures to reduce wildfire risk, the FEIR claims that the mitigation measures imposed in the Wildfire Prevention Plan are enforceable because "Implementation of the Wildfire Prevention Plan (Revised Appendix FIRE of the Final EIR) will be made a condition of project approval, and therefore will be enforceable by the County." (FEIR RTC at 3-57.) First, this appears to be incorrect; the draft Conditions of Approval document published as Exhibit 15 to the Planning Commission's Staff Report for the Project is entirely silent as to the Wildfire Prevention Plan. Second, even if the Conditions of Approval did require "implementation" of the Wildfire Prevention Plan, the plan's measures themselves are largely optional or advisory and use aspirational, not mandatory, language.[8] (See FEIR Appendix FIRE at p. 28 [listing a "selection of strategies to prevent fires" none of which, except for exterior sprinklers, are required to be implemented by homeowners].) The EIR's failure to include enforceable, concrete mitigation with measurable performance standards violates CEQA. (*City of Santee v. Cnty. of San Diego* (1989) 214 Cal.App.3d 1438, 1454-55.)

[8] As we mentioned in our comments on the DEIR, oversight of the [Wildfire Prevention Plan's] management, operations, and enforcement will be in the hands and at the discretion of the future Homeowner's Association; this remains true of the revised Wildfire Prevention Plan (FEIR Appendix FIRE at p. 3), and the FEIR's Response to Comments did not address this comment.

Moreover, as the Center explained in its comments on the DEIR, the Wildfire Prevention Plan contains no data or analysis to support the EIR's conclusions that implementing the plan will reduce wildfire risk in any meaningful way. Instead, it provides only vague discussions of the measures that it claims can ameliorate wildfire risk, without making any attempt to quantify these assertions or support them with evidence. (The problem is compounded by the lack of any modeling of current or post-project wildfire behavior on the Project site, described in more detail below.) The FEIR makes no attempt to rectify this shortcoming or supply the missing evidence. Bare conclusions, even if true, are insufficient to fulfill the informational purpose of an EIR. (*Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 736.) The EIR's error is only compounded by the Wildfire Prevention Plan's failure to address or acknowledge the increase in wildfire risk that will result from the Project's increased potential for human ignitions.

C. The EIR Fails to Analyze the Impact to Biological Resources from Increased Fire Risk Resulting from the Project

The FEIR fails to account for the impact to biological resources from increased fire risk from the Project. As the Center pointed out in its comments on the DEIR, wildfires can be disastrous for plant and animal life. If native habitat fire regimes are disrupted, the habitats they provide can become degraded and when fires occur too frequently, type conversion occurs and the native shrublands are replaced by non-native grasses and forbs that burn more frequently and more easily, ultimately eliminating native habitats and biodiversity while increasing fire threat over time. The FEIR completely ignores the evidence submitted by the Center, including numerous peer-reviewed journal articles, that demonstrates the harms to wildlife, habitat, and connectivity from wildfires.

Instead, in its Response to Comments, the FEIR states that "Effects of changes in wildfire frequency and intensity on biological resources, including habitat, are acknowledged in the discussion of effects related to climate change on page 3.7-3 of the Draft EIR." (FEIR RTC at 3-57 [Response O10-29].) It goes on to claim that because the EIR finds "the Proposed Project would not result in significant impacts associated with wildfire ignition, additional discussion regarding the indirect consequences of wildfire on biological habitats is not warranted." (*Id*.) But merely acknowledging that climate change will likely result in wildfire frequency and intensity and stating that it may have an effect on biological resources is not a substitute for evaluating the impact that the Project's increased risk of wildfire ignitions will have on wildlife and habitat. The EIR should be revised to include this analysis and recirculated.

D. The EIR's Description of Existing Wildfire Conditions on the Project Site is Inadequate

The Wildfire Prevention Plan and EIR fail to adequately describe the existing wildfire conditions on the Project site. It is standard practice when preparing an EIR for a residential development project of this size and scope for experts to use modeling software, such as the industry-standard FlamMap, BehavePlus, or similar programs, to provide fire behavior modeling for the Project site. The analysis typically includes descriptions of the Project's site's topography, fuel loads, and wind patterns, and uses those inputs to anticipate wildfire conditions under various scenarios. For example, the Wildfire Protection Plan for the 2,135-home, 1,985-

acre Newland Sierra housing development in San Diego County, used both FlamMap and BehavePlus to estimate fire spread rate, flame length, and ember "spotting" distance. (Dudek 2018a. at p. 35; see also Dudek 2018b. [Fire Protection Plan for Otay Village 14 residential development in San Diego County, using BehavePlus modeling])[9]

In sharp contrast, the FEIR's Wildfire Prevention Plan is strikingly devoid of detail. Although it contains generalized descriptions of the site's vegetation, wind patterns and topography (FEIR Appendix FIRE at pp. 10-14), *it makes no attempt to use this information to model likely fire conditions on the project site*. This is industry standard, critical information and, again, frequently and typically performed by agencies conducting environmental review for housing developments of this size and scope. The County should withhold approval of the project until it performs this critical analysis—including fire spread rates, fire direction, flame-length, and ember "spotting" distance under various scenarios on the Project site—and discloses it to the public in a recirculated EIR. The County has no excuse for failing to supply this analysis.

E. The EIR Fails to Analyze the Project's Impacts to Community Safety During a Wildfire Evacuation

In response to the Center's request that the County prepare a project-specific wildfire evacuation analysis and plan that addresses the Project's impacts on wildfire evacuation safety and times for Project residents and existing nearby residents, the County merely brushed off the Center's concerns, pointing again to the Wildfire Prevention Plan. However, that plan is *entirely silent* on the issue of evacuation and evacuation routes in the event of a wildfire. A mere four pages of the Wildfire Prevention Plan (consisting mostly of graphics) are devoted to "Wildfire Emergency Response," but these four pages focus entirely on fire suppression and response activities and *do not address resident evacuation at all*. (FEIR Appendix FIRE at 31-35.) We remain deeply concerned that the EIR makes no effort to calculate or disclose how adding a permanent population of 4,000 residents, plus additional thousands of visitors, will affect evacuation times and effectiveness for *new and existing residents* in, and in the vicinity of, the Project site.

As Dr. Thomas Cova is a leading expert on environmental hazards, transportation, and geographic information systems with a particular focus on wildfire evacuation planning, analysis, and modeling, whose work has been cited in EIRs for large scale residential development projects in California. Dr. Cova reviewed the FEIR for the Project (including Appendix FIRE) and provided comments in its evacuation analysis in a report attached as Exhibit 1 ("Cova Report"). As the Cova Report explains:

> Although the County is correct that there are numerous variables that inform estimates of evacuation times, this does not justify the decision to not perform an evacuation analysis. Project-specific evacuation analysis and modeling is not only

[9] The Center provides this documentation only to demonstrate that performing this type of analysis of fire conditions is not only possible—it is typical. The Center does not contend that this document's analysis is accurate or adequate. The Newland Sierra project was rejected by voter referendum in March 2020, in large part due to public concerns over fire safety.

> possible, agencies frequently perform it, especially for largescale residential and mixed-use development projects similar to the Guenoc Valley project.

(Exhibit 1 at 3 [stating also that "it is critical that the County evaluate lead time and evacuation time for the Guenoc Valley project under a range of likely scenarios."].)

Notwithstanding the EIR's failure to analyze the Project's impacts to community safety in the event of a wildfire, it is clear that the impacts will be significant. (Exhibit 1 at pp. 3-4.) As expert Dr. Cova explained, "there are numerous possible wildfire scenarios in this area under which emergency managers and evacuees would have less than the time it would take to evacuate the Guenoc Valley site" and "there is strong evidence that evacuation times could exceed lead times for the project, which could pose a serious threat to public safety." (*Id*. at pp. 4-5.) This is compounded by the fact that the Project site's evacuees must all travel through the bottleneck of Butts Canyon Rd., after leaving the Project site, providing "very limited directional egress for a community of this size given the wide range of locations and directions that a wildfire might approach the project ." (Exhibit 1 at p. 2.) It is unconscionable that despite this evidence of significant impacts to public safety if the Project is built, the FEIR does not disclose the effect on on evacuation times from adding thousands of additional residents to the Project area.

Furthermore, the FEIR's Responses to Comments failed to squarely address the concerns the Center raised regarding wildfires and community safety. Instead, the Response to Comments side-stepped or ignored our comments. In particular, in our comments on the DEIR we asked (underlined):

<u>What are the pre- and post-Project expected evacuation times for residents (both Project residents and nearby affected existing residents) fleeing wildfire in the vicinity of the Project site?</u> The County responded by stating that "While the County has performed extensive planning for wildfire safety and evacuation, it has not projected evacuation times, due to the number of variables." (FEIR RTC O20-31.) The fact that there are a "number of variables" does not excuse the County from performing this critical analysis. As the Cova Report explained, lead agencies frequently undertake this type of analysis for large scale residential development projects. For example, the EIR for the 2,135-home, 1,985-acre Newland Sierra housing development in San Diego County included a project-specific evacuation plan that, *inter alia*, estimated the total number of vehicles on the project site, estimated the time required to evacuate everyone from the project site, and estimated the roadway capacity in the event of an evacuation. (Dudek 2017.)[10] The County cannot simply throw up its hands and declare that this routine analysis is not possible here. The public has a right to know how the Project will affect evacuation times for Project residents and existing residents in the vicinity.

<u>What will the Level of Service be for emergency egress routes from the Project vicinity in the event a wildfire-driven evacuation becomes necessary?</u> The County's response stated that the Level of Service "would not be likely to be relevant in a rural area during a wildfire emergency,

[10] Again, the Center provides this document only to demonstrate that this performing this type of project-specific evacuation analysis is both possible and typical. The Center does not contend that this document's analysis is accurate or adequate.

as shown on these tables, levels of service at project intersections on evacuation routes would generally be acceptable." (FEIR RTC O20-31.) This is patently incorrect. The tables referenced by the County's response indicate that the intersection at Butts Canyon Rd. and Hwy 29 will drop from current peak-hour levels to an "F" rated[11] Level of Service, with 50-minute delays. Given that Butts Canyon Rd. is the *only* egress road for the Project, in the event of a wildfire evacuation requiring project residents (and other nearby residents using Butts Canyon Rd. east of Hwy 29) to evacuate westward, several thousand residents will need to pass through this intersection. If such an evacuation event were to occur during peak-hour times, 50 additional minutes' worth of delay at this intersection would have a significant impact on evacuee safety. The EIR does not disclose this impact or attempt to mitigate it.

What, if any, alternative evacuation routes will be available for residents and nearby community members in the event that Project-generated evacuation traffic makes Butts Canyon Rd. and/or Hwy 29 or 175 impassable? The County's response provides a link to the Lake County Evacuation Map (which shows no alternative evacuation routes for the Project site), and states, "[t]his map shows all of the existing and potential evacuation routes serving the county and the project site." In so doing, the County entirely sidesteps the question and—like the EIR—fails to disclose that there is no alternative evacuation route in the event that Butts Canyon Rd. becomes impassable due to gridlock, vehicle collisions, being overtaken by wildfire, or other reasons.[12] As the Cova Report explains: "[I]n the event of a wildfire, *all evacuation traffic from the project site must flow through Butts Canyon Road, a two lane rural highway*. This is a significant bottleneck and there are no alternative evacuation routes in the event that Butts Canyon Road becomes impassable." (Cova Report at 2 [emphasis in original].) Accordingly, the County has failed in its obligation to consider alternatives to the Project to mitigate the Project's significant impacts community safety.

What effect will resident evacuation on Butts Canyon Rd. and/or Hwy 29 or 175 have on the ability and timing for first responders who are responding to wildfire in the vicinity of the Project? The County simply stated: "evacuation in the event of a wildfire is managed by the Lake County Sheriff's Department in coordination with other emergency responders through the Emergency Services agency." This statement of jurisdictional responsibility does not even attempt to answer the Center's question about the *impact* that traffic from the Project site will have on response times for first responders attempting to provide fire suppression or medical assistance.

Finally, in response to our request for project specific analysis, the County's Response to Comments refers readers to a hyperlink to a webpage with the Lake County Community Wildfire Prevention Plan. (FEIR RTC at 3-59.) But as we explained in our previous comments, this plan was prepared in August 2009, prior to the Project, and does not anticipate or address the Project in any way nor account for the thousands of additional evacuees and vehicles *from this Project* that will flood the region in the event of a wildfire in the vicinity of the Project. It does not and cannot substitute for the project-specific analysis that CEQA requires. As with the EIR found

[11] An "F" rated Level of Service means that the intersection suffers from "extreme congestion, with very high delays and long queues unacceptable to most drivers." (FEIR at 3.13-12 [Table 3.13-3].)

[12] As the Camp Fire and Tubbs Fire recently demonstrated, vehicle-clogged roadways overtaken by fire in an evacuation is an especially dangerous scenario. (Arthur 2019, Diskin 2019.)

deficient in *California Clean Energy Commission v. County of Placer* (Dec. 22, 2015, No. C072680) ___Cal.App.5th___ [2015 Cal. App. Unpub. LEXIS 9360, at *1, *78] the FEIR still says "nothing about the impact of the increased population density created by the Project on emergency evacuations in the event a wildfire does occur, nothing about the effect of such evacuations on access for emergency responders and suggested no mitigation measures to address any such concerns."

The public—including future residents of the Project, and existing residents nearby who will be relying on Butts Canyon Rd. for evacuation—have a right to know the full extent of the Project's impacts on wildfire evacuation. The County's failure to analyze or disclose these impacts prejudicially impedes informed decision-making and informed public participation. (*See Sierra Club v. County of Fresno*, (2018) 6 Cal.5th 502, 515.)

F. The EIR Fails to Adequately Evaluate the Project's Cumulative Wildfire Impacts

As we pointed out in our comments on the DEIR, the EIR provides only a single, conclusory paragraph dismissing cumulative wildfire impacts with virtually no analysis. The FEIR acknowledges that "Development of these [other planned] projects [in the near vicinity] would introduce new people and infrastructure to the area. Increased development could potentially add more opportunities for igniting fires, more fuel, and make emergency response operations more complex." (FEIR at 3.16-15.) Then, it concludes, without further analysis and in reliance on its own Wildfire Prevention Plan and two mitigation measures that cumulative wildfire impacts from the Project will be less than significant. (Id.) The FEIR's Response to Comments essentially concedes that its cumulative analysis adds nothing to its analysis of the Project's individual. Quoting the FEIR, the Response to Comments states, "[b]ecause of the discussed factors, the Proposed Project in combination with future projects in the region will not create a significant impact." (FEIR RTC Response O10-32.) But the "discussed factors" is merely a reference to the EIR's analysis of the Project's individual impacts. Merely mentioning two other projects in the vicinity and concluding that there can be no cumulative wildfire impacts is no substitute for the analysis that CEQA and the CEQA guidelines require. The EIR should be revised and recirculated to correct this deficiency.

VI. Conclusion

Thank you for the opportunity to submit comments on the Final Environmental Impact Report for the Guenoc Valley Mixed-Use Planned Development Project. The Center urges the Board not to approve this Project, and at the very least to delay its consideration of the Project until the public has had adequate time to review and comment on the voluminous FEIR and other documents.

Given the possibility that the Center will be required to pursue legal remedies in order to ensure that the County complies with its legal obligations including those arising under CEQA, we would like to remind the County of its duty to maintain and preserve all documents and communications that may constitute part of the "administrative record" of this proceeding. The administrative record encompasses any and all documents and communications that relate to any and all actions taken by the County with respect to the Project, and includes "pretty much

everything that ever came near a proposed [project] or [] the agency's compliance with CEQA . . . ." (*County of Orange v. Superior Court* (2003) 113 Cal.App.4th 1, 8.) The administrative record further includes all correspondence, emails, and text messages sent to or received by the County's representatives or employees, that relate to the Project, including any correspondence, emails, and text messages sent between the County's representatives or employees and the Applicant's representatives or employees. Maintenance and preservation of the administrative record requires that, *inter alia*, the County (1) suspend all data destruction policies; and (2) preserve all relevant hardware unless an exact replica of each file is made.

Please do not hesitate to contact the Center with any questions at the number or email listed below.

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Exhibit 1

Cova Report

Prepared by Thomas J. Cova, Ph.D., Evacuation Consultant, Salt Lake City, UT

Dated: July 2, 2020

Subject: Evacuation analysis and planning for the proposed Guenoc Valley Mixed Use Planned Development Project in Lake County, CA

SUMMARY

I have reviewed the Environmental Impact Report (EIR) and Wildfire Prevention Plan for the Guenoc Valley project. The Guenoc Valley project site is in a very high fire hazard area evidenced by recent fast-moving, intense wildfires in the Project vicinity that caused loss of life. The project is large and proposes to add thousands of people to a very sparsely populated area with a limited transportation network. The EIR does not evaluate or disclose the wildfire evacuation risks associated with introducing this many people and vehicles to the project area and does not include a detailed wildfire evacuation plan to protect the safety of the residents. Prior to approving the project, the County should prepare a project-specific evacuation plan that addresses, at a bare minimum: 1) the possible range of evacuation times for residents and visitors, 2) the possible range of lead times available to act in an urgent wildfire, 3) the pattern of evacuation road traffic on primary access roads from the site to major evacuation routes in the Countywide evacuation plan, and 3) detailed alternative plans for protecting residents and visitors when roads become impassible or the time required to evacuate is greater than the time available.

ANALYSIS

The Project Configuration Allows Only One Evacuation Route for Several Thousand Residents

The Guenoc Valley Site consists of 16,000 acres in southwest Lake County, California. The project will include 400 hotel rooms, 450 guest resort residential units, 1400 residential estates, and 500 workforce co-housing units. The EIR proposes 753 total parking spaces for Phase 1 but does not mention how many there might be when the project is complete or how many vehicles are likely to be on the project site, on average, after the project is complete. However, given the number of proposed units (and conservatively assuming one vehicle per unit when California's average number of vehicles per household is two), the site is likely to house at least 2750 vehicles on site when it is completed (i.e. 400 + 450 + 1400 + 500). While some of these units may have no vehicles, and others may have 2 or more, a range of at least two to three thousand vehicles is a reasonable starting assumption for evacuation planning for this project.

Access to the project site is via Butts Canyon Road from Middletown (7 miles to the west), although Butts Canyon Road continues south from the project site to Pope Valley (12 miles to its south). There are no alternative routes in or out of the project site. The Final EIR's Response to Comments O10-31 references the Lake County Evacuation map and states:

> *Regarding the commenter's question "what, if any, alternative evacuation routes will be available for residents and nearby community members in the event that Proposed Project-generated evacuation traffic makes Butts Canyon Rd. and/or Hwy 29 or 175 impassable", as noted on page 3.16-7 of the Draft EIR, the Lake County Wildfire Protection Plan provides an evacuation route map (URL in figure 1). This map shows all of the existing*

and potential evacuation routes serving the county and the project site. The Wildfire Prevention Plan for the Proposed Project includes plans for determining whether evacuation routes are unsafe, and designated meeting locations.

An excerpt of this map around the project site is provided in Figure 1. The map shows that the initial evacuation route is Butts Canyon Road north (and then to SR-29 North or South or SR-175 north), or south to Pope Valley (not shown on map because it's in Napa County). There are no evacuation routes to the east or north of the project site, so evacuees would have to travel southwest to Butts Canyon Road and then either northwest to Middletown or southeast to Pope Valley. This is very limited directional egress for a community of this size given the wide range of locations and directions that a wildfire might approach the project.

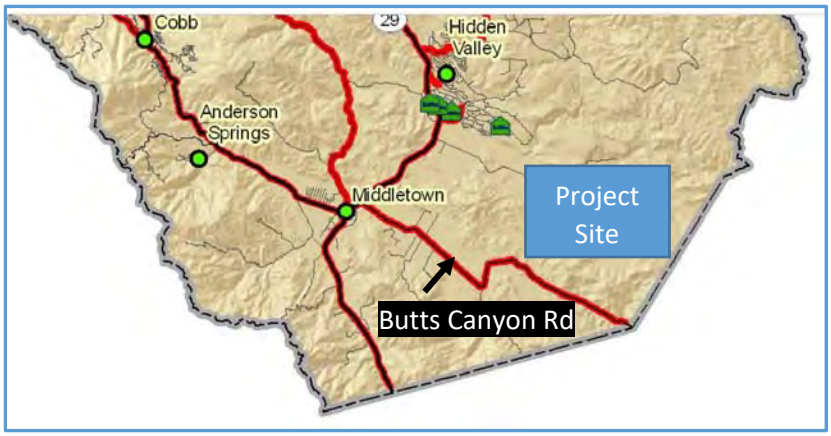

Figure 1. An excerpt taken from the Lake County evacuation map does not show an evacuation route in the project area. (URL: http://www.lakecountyca.gov/Assets/County+Site/Fire+Safe+Council/cwpp/Evacuation.jpg).

In other words, in the event of a wildfire, all evacuation traffic from the project site must flow through Butts Canyon Road, a two lane rural highway. This is a significant bottleneck and there are no alternative evacuation routes in the event that Butts Canyon Road becomes impassable.

The EIR Does Not Analyze the Project's Wildfire Evacuation Impacts

The project configuration presents an immediate concern due to the limited evacuation egress for project residents and workers trying to reach Butts Canyon Road in an urgent evacuation. Given this concern, and the history of wildfires on the project site, it is critical that the County perform a project-specific wildfire evacuation analysis that includes available lead times and evacuation times under a variety of scenarios.

As noted in the Final EIR Response to Comments O10-31, the time necessary to safely clear the project site can vary according to a number of factors:

Regarding the commenter's question "what are the pre- and post-Project expected evacuation times for residents (both Project residents and nearby affected existing residents) fleeing wildfire in the vicinity of the Project site," evacuation times would vary

based on a large number of factors, including day of the week, time of day, the fire's location, behavior, winds, and terrain. While the County has performed extensive planning for wildfire safety and evacuation, it has not projected evacuation times, due to the number of variables.

Although the County is correct that there are numerous variables that inform estimates of evacuation times, this does not justify the decision to not perform an evacuation analysis. Project-specific evacuation analysis and modeling is not only possible, agencies frequently perform it, especially for largescale residential and mixed-use development projects similar to the Guenoc Valley project.

The Project's Wildfire Evacuation Impacts Are Significant

There are two key variables that determine the success of an evacuation in getting residents to safety: the time available to protect people (lead time) and the time it takes to protect them (evacuation time). Some of the variables mentioned by the County above (e.g. fire location, behavior, winds and terrain) are important inputs for estimating the lead time that would be available to protect residents. A fire that ignites near the project site (location) and spreads rapidly towards it (winds, behavior, terrain, direction) may offer little time for emergency managers to conduct an orderly evacuation of the site. Similarly, the day-of-week and time-of-day are variables affecting the evacuation time. For example, the number of evacuees (residents and visitors) and vehicles that might be on the project site due to weekends, holidays, or events (e.g. sports, music, weddings) will affect the evacuation time.

Wildfire safety hazards arise when the lead time is less than the evacuation time, and the difference between the two is a primary cause of fatalities in evacuations. For example, in the 2018 Camp Fire in Paradise, the city evacuation plan called for 2 to 3 hours to safely evacuate the town (evacuation time), but the fire only offered 1.5 hours from its ignition to its impact on structures on the east side of Paradise (lead time). Because of the large number of residents and vehicles that will be added to the area by the project and the recent history of intense, fast-moving wildfires (see the Wildfire Prevention Plan), it is critical that the County evaluate lead time and evacuation time for the Guenoc Valley project under a range of likely scenarios.

Gross estimates for evacuation time can be calculated using simple assumptions about warning time, response time, vehicle loading, and road capacity. Figure 2 shows the proposed transportation network on the south end of the project that would provide emergency access to Butts Canyon Road (the evacuation route from the project to Middletown or Pope Valley). Note that there are three access points to the project site along Butts Canyon Road (BCR) labeled *Primary Entrance Option 1 (PE1), Primary Entrance Option 2 (PE2), and Secondary Entrance (SE).* Although PE1 and PE2 provide two access points, they quickly merge into one access road to the northeast which create a bottleneck for evacuation purposes. This means that there are effectively two means of egress to Butts Canyon Road from the project: the Primary Exit (PE), which splits and leads to two access points, and the Secondary Exit (SE).

Assuming that the PE and SE both have one traffic lane out each (leaving one lane for emergency vehicle ingress, as is typical), and assuming that each exiting lane can serve a range of 600 to 1200 vehicles per hour (vph) depending on many factors (e.g. merging, intersection control, car-following behavior), then the total egress from the site to BCR could range from 1200 to a high of 2400 vph. In supply-demand terms, this would be an estimate of the "supply" available to serve the evacuees as they leave the site.

As noted above, there could be a range of 2000-3000 vehicles on the project site depending on the time of day, day of week, or special events, and this would be the "demand" in an evacuation. Dividing the vehicle demand by the exit road supply, the minimum time to evacuate this site could range from an ideal case of lower demand and higher capacity (2000 vehicles / 2400 vph = 0.83 hours) to a much worse case of higher demand and lower capacity (3000 vehicles / 1200 vph = 2.5 hours).

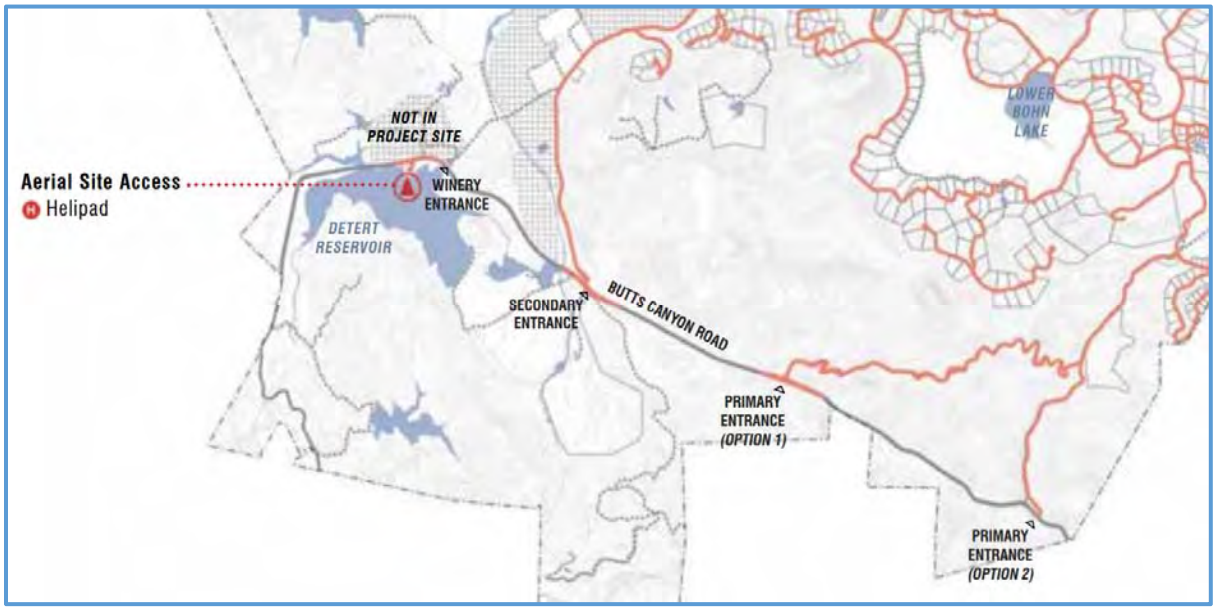

Figure 2. The transportation network that will connect the project site to Butts Canyon Road.

As noted above the second factor that influences the outcome of a wildfire evacuation is the lead time. The question becomes one of whether a wildfire in the vicinity of the project site might offer less than the time to evacuate the community (1 to 2.5 hours), leaving some evacuees at risk of being caught in-transit when the wildfire overtakes the community. This presents an extremely high safety threat. When persons are in vehicles on a road when fire is burning in the immediate area, visibility conditions may become so poor that the vehicles drive off the road or crash into other vehicles and/or flames and heat may overcome the occupants. On-road fatalities occurred, for example, during the 2003 Cedar Fire in San Diego County and the 2018 Camp Fire originating in Paradise. The EIR and Wildfire Prevention Plan provide little detail and no modeling regarding wildfire behavior and spread rate. However, based on the wildfire history of this region as detailed in the EIR and Wildfire Prevention Plan, there are numerous possible wildfire scenarios in this area under which emergency managers and evacuees would have less than the time it would take to evacuate the Guenoc Valley site.

Additionally, the 2.5 hour evacuation time could be much longer if warning time is prolonged or key intersections are not controlled by law enforcement. These intersections include the two PE's and the SE, as well as the point where BCR intersects with Highway 29. If traffic flow problems occur at any of these locations due to adverse events (e.g. wildfire blocking an exit, abandoned vehicles, or gridlock),

the evacuation could lead to fatalities similar to the 2018 Camp Fire in Paradise or the 2017 Tubbs Fire in Santa Rosa.

In short, the County did not perform a project-specific wildfire evacuation analysis. Even in the absence of such analysis, there is strong evidence that evacuation times could exceed lead times for the project, which could pose a serious threat to public safety.

The EIR's Description of Shelter-in-Place Strategies Is Inadequate

As scenarios can be identified where not everyone in the project site would be able to get out in time, the Final EIR (p. 3.16-9) mentions six designated shelter-in-place meeting and staging areas as a back-up option:

> *"The Community Wildfire Protection Plan identifies evacuation routes in the County. Butts Canyon Road is identified as an emergency evacuation route. Depending on where the fire is located, people at the Guenoc Valley Site would be directed to exit the site via the primary roadways to Butts Canyon Road or as a last resort would shelter in place at the six Designated Meeting and Staging Areas. As shown on Figure 2-10, the Proposed Project includes an extensive circulation system with roadways large enough for emergency access vehicles. In addition, these roadways would typically have 50 feet of defensible space cleared on each side of the roadway for a total fire break of 150 feet. Impacts to adopted emergency response or evacuation plans would be less-than-significant. Impacts related to traffic and emergency routes are addressed in Section 3.13 Transportation and Traffic.*
>
> *Depending on the circumstances of a wildfire emergency, it may be difficult to evacuate. In this situation, residents, visitors, and employees will be directed to gather at designated meeting & staging areas where they will be provided information and assistance.*

These six designated meeting and staging areas (DMSA) are shown in Figure 2-10 in the EIR but the locations are vague and the capacities are not given. In order to be effective, these DMSAs would need to be easily accessible (including for disabled people and pedestrians) and provide enough protection for residents to survive a wildfire with an intensity in line with recent past wildfires. Additionally, it is critical that the location of, and access routes to, DMSAs are well publicized and made clear to residents and visitors to the project site through education, signage, and other means. The lack of adequate description in the EIR or Wildfire Prevention Plan of the DMSAs' location, capacity, and protection level is a significant shortcoming; these should be addressed in detail in a project-specific evacuation analysis and plan.

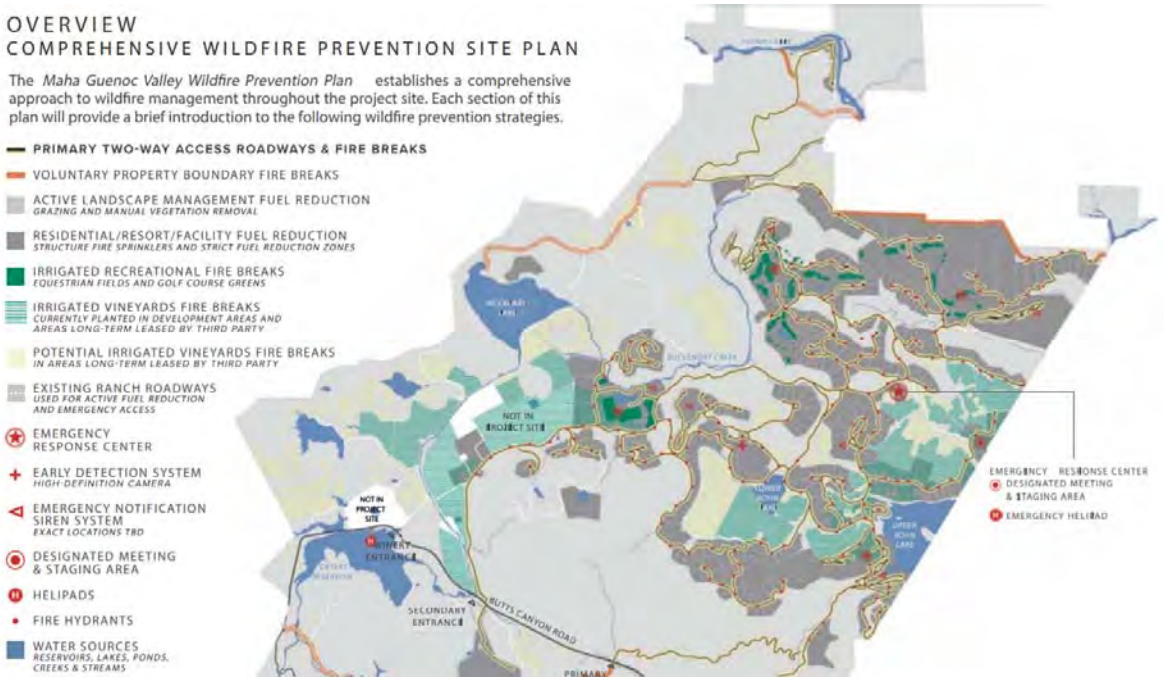

Figure 3. The designated meeting and staging areas are not very visible or easy to assess.

CONCLUSION

The Guenoc Valley project anticipates housing thousands of residents and visitors on a Project site historically susceptible to fire and in a region where large-scale wildfire evacuations have recently been necessary. The project offers only two primary means of egress to Butts Canyon Road, which only offers one direction for evacuees to escape (southwest) from the project site, and then only two directions to travel from there (northwest or southeast on Butts Canyon Road). The evacuation vehicle capacity offered by these roads is relatively low, and a rough estimate is that they could serve 1200 to 2400 vehicles departing per hour. On a given summer weekend day, it's not unlikely that it could take a few hours to evacuate this project site, and there are numerous plausible wildfire scenarios where this much time might not be available. Shelter-in-place is likely to be used in some scenarios where not everyone can evacuate in time, but it is not taken very seriously in the EIR or Wildfire Prevention Plan, which do not describe the access, capacity, and protection level that the various staging areas would offer. I strongly recommend that the County prepare a detailed and comprehensive evacuation plan for this project.

Thomas J. Cova, Ph.D.

CREDENTIALS

I received a Doctor of Philosophy (Ph.D.) degree from the University of California Santa Barbara in 1999 in the field of Geography; a Masters of Science (M.S.) degree from the same university in 1995; and a Bachelor's of Science (B.S.) degree in Computer and Information Science from the University of Oregon in 1986. I am currently a Professor of Geography and the University of Utah. My expertise is in environmental hazards, transportation, and geographic information systems with a particular focus on wildfire evacuation planning, analysis, and modeling. I proposed a set of standards for transportation egress (exit capability) in wildfire areas that was adopted by the National Fire Protection Agency in 2008 in their Standards for the Protection of Life and Property in Wildfires. I received research grants from the National Science Foundation to study: 1) the 2003 Southern California Wildfires, 2) Protective Action Decision Making in regards to evacuation versus shelter-in-place, and 3) Protective Action Triggers (decision points regarding when to order an evacuation). In 2017 I published an article with my collaborators on warning triggers in environmental hazards that described the issues that arise in deciding when to order an evacuation or other protective action.[1] In 2013, along with my collaborators, I analyzed community egress in fire-prone areas of the western U.S. to identify those that might face difficulty evacuating due to traffic congestion.[2] In 2011, I developed a decision model with my collaborators to aid in deciding whether evacuation or shelter-in-place is the best decision in a wildfire.[3] My work has been cited in fire evacuation plans prepared in conjunction with Environmental Impact Reports in California.

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[1] Cova, T. J., Dennison, P. E., Li, D., Drews, F. A., Siebeneck, L. K., & Lindell, M. K. (2017). Warning triggers in environmental hazards: who should be warned to do what and when? *Risk Analysis*, 37(4), 601-611.

[2] Cova, T.J., Theobald, D.M., Normal, J.B., Siebeneck, L.K. (2013) Mapping evacuation vulnerability in the western US: the limits of infrastructure. *GeoJournal*, 78(2): 273-285.

[3] Cova, T.J., Dennison, P.E., Drews, F.A. (2011) Modeling evacuate versus shelter-in-place decisions in wildfires. *Sustainability*, 3(10): 1662-1687.

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Education

1999	Ph.D., Geography, University of California Santa Barbara. Dissertation: *A general framework for optimal site search*.
1995	M.A., Geography, University of California Santa Barbara. Thesis: *A spatial search for neighborhoods that may be difficult to evacuate.*
1986	B.S., Computer and Information Science, University of Oregon. Minor in math; emphasis in software engineering.

Research and Teaching Interests

Environmental Hazards, Emergency Management, Geographic Information Science, Transportation, Sustainability, Coupled Natural-Human Systems.

Professional Experience

2012 –	Professor, Department of Geography, University of Utah.
2005 – 2012	Associate Professor, Department of Geography, U. of Utah.
1999 – 2005	Assistant Professor, Department of Geography, U. of Utah.
1993 – 1996	Research Assistant, National Center for Geographic Information and Analysis (NCGIA), UC Santa Barbara.
1992 – 1997	Teaching Assistant, Department of Geography, UCSB.
1987 – 1992	Systems Analyst, Matthew Bender & Co., Oakland, California.

Other Professional Activities

2014 – 2018	Director, *Certificate in Environmental Hazards & Emergency Management*, Department of Geography, University of Utah.
2003 – 2018	Director, *Center for Natural & Technological Hazards*, Department of Geography, University of Utah.

2001 – 2016 Director, Certificate in Geographic Information Science, Department of Geography, University of Utah.

2011 – 2013 Chair, Hazards, Disasters & Risk Specialty Group, Association of American Geographers, Washington, D.C.

2007 – 2008 Program Chair, 5th International Conference in Geographic Information Science (GIScience 2008), Park City, Utah.

2005 – 2008 Chair (Vice Chair, Past Chair), GIS Specialty Group, Association of American Geographers, Washington, D.C.

2005 – 2008 Chair, Research Projects Committee, University Consortium for Geographic Information Science (UCGIS).

2004 – 2006 Secretary/Treasurer, GIS Specialty Group, Association of American Geographers, Washington, D.C.

2001 – 2003 Academic Councilor, GIS Specialty Group, Association of American Geographers, Washington, D.C.

1999 – 2003 Associate Director for Research, Center for Natural & Technological Hazards, Department of Geography, U of Utah.

Editorial Board Memberships

2020 – *International Journal of Geographical Information Science*

2018 – *Journal of Applied Geography*

2011 – *Journal of Geography & Natural Disasters*.

2011 – 2014 *Journal of Spatial Science*

2009 – 2011 *Professional Geographer*

2001 – 2004 *Computers, Environment & Urban Systems*

Professional Honors and Awards

2016 Excellence in Mentoring Award, College of Social & Behavioral Science (CSBS), University of Utah.

2014 – 2016 Advisor, *Enabling the Next Generation of Hazards Researchers*, D. Thomas, S. Brody, & B. Gerber (PIs), National Science Foundation, CMMI-IMEE.

2008 – 2010 Mentor, *Enabling the Next Generation of Hazards Researchers*, Tom Birkland (PI), National Science Foundation, CMMI-IMEE.

2005 John I. Davidson Award for Practical Papers, American Society for Photogrammetry & Remote Sensing – with P. Sutton and D. Theobald.

2005 Leica Geosystems Award for Best Scientific Paper in Remote Sensing, American Society for Photogrammetry & Remote Sensing (ASPRS) – with P. Sutton and D. Theobald.

2003 – 2005 Fellow, *Enabling the Next Generation of Hazards Researchers*, Raymond Burby (PI), National Science Foundation, CMMI-IMEE.

2003 University Consortium for Geographic Information Science (UCGIS) Young Scholar's Award.

1996 – 1999 Dwight D. Eisenhower Doctoral Fellowship, National Highway Institute, Federal Highway Admin., Dept. of Transportation.

1995 International Geographic Information Foundation (IGIF) Award for Best Student Paper, GIS/LIS '95, Nashville, TN.

1995 Outstanding Student in Transportation, UC Santa Barbara, Western Coal Transportation Association.

RESEARCH AND SCHOLARSHIP

Edited volumes and special issues

2017 Cova, T.J. and Tsou, M., *GIS Methods and Techniques*. Vol 1. in *Comprehensive Geographic Information Systems, B. Huang (EIC).* Oxford:Elsevier.

2011 Cova, T.J. and Miles, S.B. (Eds). *Disaster Risk Reduction and Sustainable Development*, Sustainability (ISSN 2071-1050).

2008 Cova, T.J., Miller, H., Beard, K., Frank, A., Goodchild, M. (Eds.), *Geographic Information Science: 5th International Conference (GIScience 2008),* Park City, Utah. Lecture Notes in Computer Science 5266, Springer-Verlag, Berlin.

Journal articles
(Student advisees underlined)

2019 Li, D., Cova, T.J., Dennison, P.E. Why do we need a national address point database to improve wildfire public safety in the US? *International Journal of Disaster Risk Reduction, https://doi.org/10.1016/j.ijdrr.2019.101237*

2018 Li, D., Cova, T.J., Dennison, P.E. Setting wildfire evacuation triggers by coupling fire and traffic simulation models: a spatio-temporal GIS approach. *Fire Technology, 55: 617-642*.

2017 Li, D., Cova, T.J., Dennison, P.E. Setting wildfire evacuation triggers using reverse geocoding. *Applied Geography*, 84: 14-27.

2017 Cova, T.J., Dennison, P.E., Li, D., Drews, F.A., Siebeneck, L.K., Lindell, M.K., Warning triggers in environmental hazards: who should be warned to do what and when? *Risk Analysis*, 37(4): 601-611.

2016 Nicoll, K.A., Cova, T.J., Siebeneck, L.K., Martineau, E. Assessing "preparedness elevated": seismic risk perception and household adjustment in Salt Lake City, Utah. *Journal of Geography & Natural Disasters, 6: 168.*

2015 Li, D., Cova, T.J., Dennison, P.E., A household-level approach to staging wildfire evacuation warnings using trigger modeling. *Computers, Environment, & Urban Systems,* 54:56-67.

2015 Drews, F.A., Siebeneck, L.K., Cova, T.J., Information search and decision making in computer based wildfire simulations. *Journal of Cognitive Engineering and Decision Making*. 9(3): 229-240.

2015 Hile, R. and Cova, T.J. (2015) Exploratory testing of an artificial neural network classification for enhancement of the social vulnerability index. *ISPRS International Journal of Geo-Information,* 4(4): 1774-1790.

2014 Drews, F.A., Musters, A., Siebeneck, L.K., and Cova, T.J. Environmental factors that affect wildfire protective-action recommendations. *International Journal of Emergency Management,* 10(2): 153-168.

2014 Siebeneck, L.K., and Cova, T.J. Risk communication after disaster: re-entry following the 2008 Cedar River Flood. *Natural Hazards Review,* 15: 158-166.

2014 Dennison, P.E., Fryer, G.K., and Cova, T.J., Identification of fire fighter safety zones using lidar, *Environmental Modelling and Software*, 59: 91-97.

2013 Fryer, G., Dennison, P.E. and Cova, T.J. Wildland firefighter entrapment avoidance: modeling evacuation triggers. *International Journal of Wildland Fire,* 22(7): 883-893.

2013 Cova, T.J., Theobald, D.M, Norman, J., and Siebeneck, L.K., Mapping wildfire evacuation vulnerability in the western US: the limits of infrastructure. *Geojournal*, 78(2): 273-285.

2012 Siebeneck, L.K. and Cova, T.J., Spatial and temporal variation in evacuee risk perception throughout the evacuation and return-entry process. *Risk Analysis*, 32(9), 1468-1480.

2011 Cova, T.J., Dennison, P.E., Drews, F.A., Modeling evacuate versus shelter-in-place decisions in wildfires. *Sustainability,* 3(10): 1662-1687.

2011 Cao, L., Cova, T.J., Dennison, P.E., and Dearing, M.D., Using MODIS imagery to predict hantavirus risk. *Global Ecology and Biogeography,* 20: 620-629.

2011 Kobayashi, T., Medina, R., and Cova, T.J., Visualizing diurnal population change in urban areas for emergency management. *Professional Geographer*, 63: 113-130.

2011 Larsen, J.C., Dennison, P.E., Cova, T.J., Jones, C. Evaluating dynamic wildfire evacuation trigger buffers using the 2003 Cedar Fire. *Applied Geography,* 3: 12-19.

2010 Pultar, E., Cova, T.J., Yuan, M., and Goodchild, M.F., EDGIS: a dynamic GIS based on space-time points. *International Journal of Geographical Information Science*, 24: 329-346.

2010 Moffatt, S.F. and Cova, T.J., Parcel-scale earthquake loss estimation with HAZUS: a case-study in Salt Lake County, Utah. *Cartography and Geographic Information Science*, 37: 17-29.

2010 Anguelova, Z., Stow, D.A., Kaiser, J., Dennison, P.E., Cova, T.J., Integrating fire behavior and pedestrian mobility models

to assess potential risk to humans from wildfires within the US-Mexico border zone. *Professional Geographer*, 62: 230-247.

2009 Cova, T.J., Drews, F.A., Siebeneck, L.K. and Musters, A., Protective actions in wildfires: evacuate or shelter-in-place? *Natural Hazards Review*, 10(4): 151-162.

2009 Pultar, E., Raubal, M., Cova, T.J., Goodchild, M.F. Dynamic GIS case studies: wildfire evacuation and volunteered geographic information. *Transactions in GIS*, 13: 84-104.

2008 Siebeneck, L.K., and Cova, T.J., An assessment of the return-entry process for Hurricane Rita 2005. *International Journal of Mass Emergencies and Disasters*, 26(2): 91-111.

2007 Goodchild, M.F., Yuan, M., and Cova, T.J., Towards a theory of geographic representation. *International Journal of Geographical Information Science*, 21(3): 239-260.

2007 Kim, T.H., and Cova, T.J., Tweening grammars: deformation rules for representing change between discrete geographic entities. *Computers, Environment & Urban Systems,* 31(3): 317-336.

2007 Dennison, P.E., Cova, T.J., and Moritz, M.A., WUIVAC: A wildfire evacuation trigger model applied in strategic scenarios. *Natural Hazards*, 40, 181-199.

2007 VanLooy, J. and Cova, T.J., A GIS-based index for comparing airline flight path vulnerability to volcanoes. *Professional Geographer*, 59(1): 74-86.

2006 Sutton, P.C., Cova, T.J., Elvidge, C., Mapping "Exurbia" in the conterminous U.S. using nighttime satellite imagery. *Geocarto International*, 21(2): 39-45.

2006 Kim, T.H., Cova, T.J., and Brunelle, A., Exploratory map animation for post-event analysis of wildfire protective action recommendations. *Natural Hazards Review*, 7(1): 1-11.

2005 Cova, T.J., Dennison, P.E., Kim, T.H., and Moritz, M.A., Setting wildfire evacuation trigger-points using fire spread modeling and GIS. *Transactions in GIS*, 9(4): 603-617.

2005 Cova, T.J., Public safety in the urban-wildland interface: Should fire-prone communities have a maximum occupancy? *Natural Hazards Review*, 6(3): 99-108.

2004 Cova, T.J., Sutton, P.A, Theobald, D.M., Exurban change detection in fire-prone areas with nighttime satellite imagery. *Photogrammetric Engineering & Remote Sensing,* 70: 1249-1257.

2003 Cova, T.J., and Johnson, J.P., A network flow model for lane-based evacuation routing. *Transportation Research Part A: Policy and Practice*, 37: 579-604.

2002 Cova, T.J. and Johnson, J.P., Microsimulation of neighborhood evacuations in the urban-wildland interface. *Environment and Planning A,* 34: 2211-2229.

2002 Cova, T.J. and Goodchild, M.F., Extending geographic representation to include fields of spatial objects. *International Journal of Geographic Information Science,* 16: 509-532.

2000 Cova, T.J., and Church, R.L., Contiguity constraints for single-region site search problems. *Geographical Analysis*, 32: 306-329.

2000 Church, R.L., and Cova, T.J., Mapping evacuation risk on transportation networks with a spatial optimization model. *Transportation Research Part C: Emerging Technologies*, 8: 321-336.

2000 Cova, T.J., and Church, R.L., Exploratory spatial optimization in site search: a neighborhood operator approach. *Computers, Environment, & Urban Systems*, 24: 401-419.

2000 Radke, J., Cova, T.J., Sheridan, M.F., Troy, A., Lan, M., and Johnson, R., Application challenges for GIScience: implications for research, education, and policy for risk assessment, emergency preparedness and response, *Urban and Regional Information Systems Association (URISA) Journal*, 12: 15-30.

1997 Cova, T.J., and Church, R.L., Modeling community evacuation vulnerability using GIS. *International Journal of Geographical Information Science*, 8: *763-784.*

Book Chapters and Sections

2019 Cova, T.J., *Evacuation*. Encyclopedia of Wildfires and Wildland-Urban Interface (WUI) Fires.

2017 Cova, T.J., Data model: o-fields and f-objects. The International Encyclopedia of Geography, 1-5.

2016 Cova, T.J., Evacuation Planning, in *Encyclopedia of Transportation*, SAGE Publications, M. Garrett (ed.), pp.

2004 Cova, T.J., and Conger, S., Transportation hazards, in *Handbook of Transportation Engineering*, M. Kutz (ed.), pp. 17.1-17.24.

1999 Cova, T.J., GIS in emergency management. In *Geographic Information Systems: Principles, Techniques, Applications, and Management*, Longley, P., Goodchild, M.F., Maguire D., Rhind D. (eds), pp. 845-858.

Conference Papers and Posters

2019 Cova, T.J., Geosimulating hazard warning triggers: geometry, dynamics, and timing. *GeoCompuation '19*, September 19, Queenstown, New Zealand.

2015 Li, D., Cova, T.J., Dennison, P.E., An open-source software system for setting wildfire evacuation triggers. ACM SIGSPATIAL EM-GIS'15, November 3, 2015, Seattle, WA.

2013 Cova, T.J., Dennison, P.E., and Drews, F.A. Protective-action Triggers: Modeling and Analysis. *Natural Hazards Workshop*, University of Colorado, Boulder, July (poster).

2012 Cova, T.J., Dennison, P.E., and Drews, F.A. Protective-action Triggers. *Natural Hazards Workshop*, University of Colorado, Boulder, July (poster).

2012 Cova, T.J., Dennison, P.E., and Drews, F.A. Protective-action Triggers. National Science Foundation-CMMI Innovation Conference, Boston, July (poster).

2009 Siebeneck, L.K. and Cova, T.J. Current Research at the Center for Natural and Technological Hazards. *Natural Hazards Workshop*, U. of Colorado, Boulder, July (poster).

2008 Cova, T.J. et al., Protective actions in wildfire: the incident commander perspective. *Pacific Coast Fire Conference*, San Diego, November (poster).

2005 Yuan, M., Goodchild, M.F., Cova, T.J., Towards a general theory of geographic representation in GIS (poster*). Conference on Spatial Information Theory (COSIT) 2005*, Ellicottville, New York, September (poster).

2005 Kim, T.H., and Cova, T.J., Tweening Grammars: Deformation Rules for Representing Change between Discrete Geographic Entities*. Geocomputation 2005,* Ann Arbor, MI, August*.*

2001 Cova, T.J. and Johnson, J.P., Evacuation analysis and planning tools inspired by the East Bay Hills Fire, *California's 2001 Wildfire Conference: 10 years after the 1991 East Bay Hills Fire*, Oakland, October.

2001 Hepner, G.F., Cova, T.J., Forster, R.R., and Miller, H.J., Use of remote sensing and geospatial analysis for transportation hazard assessment: an integrated university, government and private sector consortium, *IEEE/ISPRS Joint Workshop on Remote Sensing and Data Fusion over Urban Areas Proceedings*, IEEE-01EX482,Rome, Italy, pp.241-244.

2000 Atwood, G., and Cova, T.J., Using GIS and linear referencing to analyze the 1980s shorelines of Great Salt Lake, Utah, USA. *4th International Conference on Integrating GIS and Environmental Modeling (GIS/EM4): Problems, Prospects and Research Needs*. Banff, Alberta, Canada, September 2-8.

1997 Cova, T.J., and Church, R.L., An algorithm for identifying nodal clusters in a transportation network. *University Consortium for Geographic Information Science (UCGIS) Summer Retreat*, Bar Harbor, Maine, June 15-21.

1995 Cova, T.J., and Church, R.L., A spatial search for neighborhoods that may be difficult to evacuate, *Proceedings GIS/LIS '95*, ACSM/ASPRS, Nashville, TN, vol. 1, 203-212.

1995 Goodchild, M.F., Cova, T.J. and Ehlschlaeger, C., Mean geographic objects: extending the concept of central tendency to complex spatial objects in GIS, *Proceedings GIS/LIS '95*, ACSM/ASPRS, Nashville, TN, vol. 1, 354-364.

1994 Cova, T.J. and Goodchild, M.F., Spatially distributed navigable databases for intelligent vehicle highway systems, *Proceedings GIS/LIS '94*, ACSM, Phoenix, AZ, 191-200.

Other Publications

2018 Wei, R., Golub, A., Wang, L., Cova, T.J. *Evaluating and enhancing public transit systems for operational efficiency and access equity.* TREC Final Report, NITC-RR-1024.

2018 Wei, R., Golub, A., Wang, L., Cova, T.J. *Integrated performance measures: transit equity & efficiency*. TREC Final Report, NITC-RR-1024.

2008 Siebeneck, L.K. and Cova, T.J. Risk perception associated with the evacuation and return-entry process of the Cedar Rapids, Iowa flood. Quick Response Research Report, Natural Hazards Center, University of Colorado, Boulder.

2006 Cova, T.J., *Concerning Stonegate and Public Safety*. North County Times, San Diego, California, Nov. 3.

2002 Cova, T.J., Like a bat out of hell: simulating wildfire evacuations in the urban interface, *Wildland Firefighter Magazine*, November, 24-29.

2000 Cova, T.J., When all hell breaks loose: firestorm evacuation analysis and planning with GIS, *GIS Visions Newsletter*, August, The GIS Cafe.

2000 Cova, T.J. (2000) Wildfire evacuation. *New York Times letter to the Editor*, June 6.

1996 Church, R., Cova, T., Gerges, R., Goodchild, M., Conference on object orientation and navigable databases: report of the meeting. *NCGIA Technical Report 96-9.*

1994 Church, R., Coughlan, D., Cova, T., Goodchild, M., Gottsegen, J., Lemberg, D., Gerges, R., Caltrans Agreement 65T155, Final Report, *NCGIA Technical Report 94-6*.

Invited Lectures, Presentations and Participation

2019 “Public safety in the wildland-urban interface.” Department of Geography, University of Alabama, Tuscaloosa, November.

2019 “Public safety in the wildland-urban interface.” Department of Geography, Texas A&M (TAMU), College Station, February.

2018 “ESRI Science Symposium.” Panelist, ESRI Conference, San Diego, July.

2018 "Public safety in the wildland-urban interface." Living with Fire in California's Coast Ranges, Sonoma, May.

2017 "Improving situational awareness in wildfire evacuations with volunteered geographic information." NSF IBSS/IMEE Summer Workshop, San Diego, August.

2014 "Modeling adaptive warnings with geographic trigger points." Department of Geography, SDSU, San Diego, CA, April 18.

2013 "Wildfires and geo-targeted warnings." Geo-targeted Alerts and Warnings Workshop. *National Academy of Sciences*, Washington DC, February 21-22.

2012 "Evacuation planning in the wildland-urban interface." California Joint Fire Science Program, Webinar Speakers Series, September.

2010 "Evacuating threatened populations in disasters: space, time & information." University of Minnesota, Spatial Speakers Series (Geography/CS/CE), April.

2009 "The art and science of evacuation modeling." Utah Governor's Conf. in Emergency Management, Provo, May.

2008 "GIScience and public safety." Brigham Young University, November.

2007 "Fire, climate and insurance." Panel Discussion. Leonardo Museum, Salt Lake City, November.

2007 "GIScience and public safety." University of Northern Iowa, April.

2006 "Evacuation and/or Shelter in Place." Panel Discussion, Firewise Conference: Backyards & Beyond, Denver, CO, Nov.

2006 "Evacuation modeling and planning." Colorado Springs Fire Department, Colorado Springs, CO, October.

2006 "Evacuation modeling and planning." Sante Fe Complexity Institute, Sante Fe, NM, August.

2006 "Evacuation modeling and planning." Colorado Wildfire Conference. Vail, CO, April, $1000.

2006 "Dynamic GIS: in search of the killer app." Center for Geocomputation, National U. of Ireland, Maynooth, April.

2006 “Setting wildfire evacuation trigger points with GIS.” University Consortium for Geographic Information Science, Winter meeting, Washington, DC.

2005 “Setting wildfire evacuation trigger points with GIS.” Pennsylvania State University, State College, PA, November.

2004 “The role of scale in ecological modeling,” NSF PI meeting for Ecology of Infectious Diseases, Washington D.C., September.

2004 “The 2003 Southern California wildfires: Evacuate and/or or shelter-in-place,” Natural Hazards Workshop, Boulder, CO.

2004 “When all hell breaks loose: new methods for wildfire evacuation planning,” colloquium, Department of Geography, University of Denver, February.

2004 “When all hell breaks loose: new methods for wildfire evacuation planning,” Colorado Governor’s Conference and Colorado Emergency Management Association (CEMA) Conference, Boulder, CO, February.

2004 “When all hell breaks loose: new methods for wildfire evacuation planning,” colloquium, Department of Geography, University of California Los Angeles, February.

2003 “When all hell breaks loose: new methods for wildfire evacuation planning,” colloquium, Natural Resources Ecology Lab (NREL), Colorado State University, April.

2003 “When all hell breaks loose: new methods for wildfire evacuation planning,” Departmental colloquium, Department of Geography, University of Arizona, January.

2002 “When all hell breaks loose: new methods for wildfire evacuation planning,” Departmental colloquium, Department of Geography, Western Michigan University, November.

2001 "Regional evacuation analysis in fire-prone areas with limited egress," Departmental colloquium, Department of Geography, University of Denver, May.

2000 “Integrating Site Search Models and GIS,” Colloquium, Department of Geography, Arizona State University, Feb.

1999 “Site Search Problems and GIS,” Colloquium, Department of Geography, University of Utah.

1996 "A spatial search for neighborhoods that may be difficult to evacuate," Colloquium, Department of Geography, UC Santa Barbara.

1995 "A spatial search for neighborhoods that may be difficult to evacuate," Regional Research Lab, Bhopal, India.

1995 "A spatial search for neighborhoods that may be difficult to evacuate," Indian Institute of Technology, Bombay. India.

Papers Presented at Professional Conferences

2018 Cova, T.J., GIScience & Emergency Management: where do we go from here? Association of American Geographers Annual Meeting, New Orleans, LA, April.

2017 Cova, T.J., Simulating warning triggers. Association of American Geographers Annual Meeting, Boston, MA, CA, April.

2016 Cova, T.J., Spatio-temporal representation in modeling evacuation warning triggers. Association of American Geographers Annual Meeting, San Francisco, CA, March.

2015 Cova, T.J. and Jankowski, P., Spatial uncertainty in object-fields: the case of site suitability. Association of American Geographers Annual Meeting, Chicago, IL, April.

2014 Cova, T.J. and Jankowski, P., Spatial uncertainty in object-fields: the case of site suitability. International Conference on Geographic Information Science (GIScience '14), Vienna, Austria, September.

2013 Cova, T.J., Dennison, P.E. and Drews, F.A., Protective-action triggers: modeling and analysis. *Association of American Geographers Annual Meeting*, Los Angeles, CA, April.

2012 Cova, T.J., Dennison, P.E. and Drews, F.A., Protective-action triggers. Poster presented at the Natural Hazards Workshop, University of Colorado, Boulder, July.

2012 Cova, T.J., Dennison, P.E. and Drews, F.A., Protective-action triggers. Poster presented at the NSF CMMI Innovation Conference, Boston, July.

2012 Cova, T.J., Dennison, P.E. and Drews, F.A., Protective-action triggers, *Association of American Geographers Annual Meeting,* New York, NY, February.

2011 Cova, T.J., Modeling stay-or-go decisions in wildfires, *Association of American Geographers Annual Meeting,* Seattle, WA, April.

2010 Cova, T.J., Theobald, D.M. and Norman, III, J., Mapping wildfire evacuation vulnerability in the West, *Association of American Geographers Annual Meeting,* Wash. D.C., April.

2010 Cova, T.J., and Van Drimmelen, M.N., Family gathering in evacuations: the 2007 Angora Wildfire as a case study. *National Evacuation Conference*, New Orleans, February.

2010 Siebeneck, L.K., Cova, T.J., Drews, F.A., and Musters, A. Evacuation and shelter-in-place in wildfires: The incident commander perspective. *Great Basin Incident Command Team Meetings*, Reno, April.

2009 Cova, T.J. et al., Protective action decision making in wildfires: the incident commander perspective. *Association of American Geographers Annual Meeting,* Las Vegas, March.

2009 Siebeneck, L.K. and Cova, T.J. Using GIS to explore evacuee behavior before, during and after the 2008 Cedar Rapids Flood. *Association of American Geographers Annual Meeting*, Las Vegas, March.

2009 Lindell, M.K., Prater, C.S., Siebeneck, L.K. and Cova, T.J. Hurricane Ike Reentry. *National Hurricane Conference*, Austin, March.

2008 Cova, T.J., Simulating evacuation shadows, *Association of American Geographers Annual Meeting,* Boston, April.

2007 Cova, T.J., An agent-based approach to modeling warning diffusion in emergencies, *Association of American Geographers Annual Meeting,* San Francisco, March.

2006 Cova, T.J., New GIS-based measures of wildfire evacuation vulnerability and associated algorithms. *Association of American Geographers Annual Meeting,* Denver, March.

2005 Cova, T.J., Dennison, P.E., Kim, T.H., and Moritz, M.A., Setting wildfire evacuation trigger-points using fire spread

modeling and GIS. *Association of American Geographers Annual Meeting,* Denver, March.

2004 Cova, T.J., Sutton, P.C., and Theobald, D.M. Light my fire proneness: residential change detection in the urban-wildland interface with nighttime satellite imagery, *Association of American Geographers Annual Meeting*, Philadelphia, March.

2004 Cova, T.J. and Johnson, J.P., A network flow model for lane-based evacuation routing. *Transportation Research Board (TRB) Annual Conference*, Washington, D.C., January.

2003 Cova, T.J. Lane-based evacuation routing, *Association of American Geographers Annual Meeting*, New Orleans, March.

2002 Cova, T.J., Extending geographic representation to include fields of spatial objects, *GIScience 2002*, Boulder, September.

2002 Husdal, J. and Cova, T.J., A spatial framework for modeling hazards to transportation systems, *Association of American GeographersAnnual Meeting,* Los Angeles, March.

2001 Cova, T.J. and Johnson, J.P., Evacuation analysis and planning tools inspired by the East Bay Hills Fire, *California's 2001 Wildfire Conference: 10 years after the 1991 East Bay Hills Fire*, Oakland, October.

2001 Cova, T.J., Husdal, J., Miller, H.J., A spatial framework for modeling hazards to transportation networks, *Geographic Information Systems for Transportation Conference (GIS-T 2001*), Washington DC, April.

2001 Cova, T.J., Miller, H.J., Husdal, J., A spatial framework for modeling hazards to transportation systems, *Association of American Geographers Annual Meeting*, New York, New York, February.

2000 Cova, T.J., Church, R.L., Goodchild, M.F., Extending geographic representation to include fields of spatial objects, *GIScience 2000,* Savannah, Georgia, November.

2000 Cova, T.J. Microscopic simulation in regional evacuation: an experimental perspective, *Association of American Geographers Annual Meeting*, Pittsburgh, Pennsylvania, March.

1999 Cova, T.J., and Church, R.L., “Exploratory spatial optimization and site search: a neighborhood operator approach,” *Geocomputation ’99*, Mary Washington College, Fredricksburg, Virginia.

1999 Cova, T.J., and Church, R.L., “Integrating models for optimal site selection with GIS: problems and prospects,” *Association of American Geographer Annual Meeting*, Honolulu, Hawaii, March 29.

1998 Cova, T.J., and Church, R.L., “A spatial analytic approach to modeling neighborhood evacuation egress,” *Association of American Geographers Annual Meeting,* Boston, Massachusetts.

1997 Church, R.L., and Cova, T.J., “Location search strategies and GIS: a case example applied to identifying difficult to evacuate neighborhoods,” *Regional Science Association Annual Meeting*, November, Buffalo.

1997 Cova, T.J. and Church, R.L., “An algorithm for identifying nodal clusters in a transportation network,” *University Consortium for Geographic Information Science (UCGIS) Summer Retreat*, Bar Harbor, June.

1996 Cova, T.J., Church, R.L., “A spatial search for difficult neighborhoods to evacuate using GIS,” *GIS and Hazards Session*, *Association of American Geographers Annual Meeting*, Charlotte, April.

1995 Cova, T.J., Church, R.L., “A spatial search for neighborhoods that may be difficult to evacuate,” *GIS/LIS ’95*, Nashville, November.

1995 Goodchild, M.F., Cova, T.J. and Ehlschlaeger, C., “Mean geographic objects: extending the concept of central tendency to complex spatial objects in GIS,” *GIS/LIS ‘95*, Nashville, November.

1994 Cova, T.J. and Goodchild, M.F., “Spatially distributed navigable databases for intelligent vehicle highway systems,” *GIS/LIS ’94*, Phoenix, November.

Grants

Externally funded

2019 – Cova, T.J. (PI), Collins, T.W., Grineski, S.E., Norton, T., *Enabling the Next Generation of Hazards Researchers*. National Science Foundation. Division of Civil, Mechanical & Manufacturing Innovation (CMMI): Humans, Disasters & the Built Environment (HDBE), $480,634.

2018 – Smith, K. (PI), Cova, T.J., Waitzman, N., Perlich, P., Kowaleski-Jones, L. Research Data Center: Wasatch Front Research Data Center. National Science Foundation, Division of Social Economic Sciences, $298,625.

2017 – 2019 Shoaf, K. (PI) and Cova, T.J. *RAPID: Evacuation Decision-making process of Hospital Administrators in Hurricane Harvey*. National Science Foundation, Civil Mechanical and Manufacturing Innovation – Infrastructure Management and Extreme Events, $49,301.

2011 – 2015 Cova, T.J. (PI), Dennison, P.E. and Drews, F.A., *Protective action triggers*. National Science Foundation, Civil Mechanical and Manufacturing Innovation – Infrastructure Management and Extreme Events, $419,784.

2012 – 2014 Cova, T.J. (PI), *State Hazard Mitigation Mapping II.* Utah Division of Emergency Management, $51,608.

2011 – 2012 Cova, T.J. (PI), *State Hazard Mitigation Mapping.* Utah Division of Emergency Management, $51,608.

2007 – 2010 Cova, T.J. (PI) and Drews, F.A. *Protective-action decision making in wildfires.* National Science Foundation, Civil Mechanical and Manufacturing Innovation – Infrastructure Management and Extreme Events, $288,438.

2004– 2006 Yuan, M. (PI), Goodchild, M.F., and Cova, T.J. *Integration of geographic complexity and dynamics into geographic information systems,* National Science Foundation, Social and Behavioral Science—Geography and Spatial Sci., $250,000.

2003– 2004 Cova, T.J. (PI) *Mapping the 2003 Southern California Wildfire Evacuations*, National Science Foundation, Small Grants for Exploratory Research (SGER), CMMI-IMEE, $14,950.

2003 –2008 Dearing, M.D. (PI), Adler, F.R., Cova, T.J., and St. Joer, S. *The effect of anthropogenic disturbance on the dynamics of*

Sin Nombre, National Science Foundation and NIH, Ecology of Infectious Diseases, $1,933,943.

2000–2004 Hepner, G.F. (PI), Miller, H.J., Forster, R.R., and Cova, T.J. *National Consortium for Remote Sensing in Transportation: Hazards (NCRST-H),* U.S. Department of Transportation, $437,659.

2000–2001 Cova, T.J. (PI) *Modeling human vulnerability to environmental hazards*, Salt Lake City and Federal Emergency Management Agency (FEMA), $20,000.

Internally funded

2004 Cova, T.J. (PI) and Sobek, A. *DIGIT Lab GPS Support*, U. of Utah Technology Instrumentation Grant, $15,000.

2003 Cova, T.J. (PI) *New methods for wildfire evacuation analysis*, Proposal Initiative Grant, College of Social and Behavioral Science, University of Utah, $4000.

1999 Cova, T.J. (PI) *Microscopic traffic simulation of regional evacuations: computational experiments in a controlled environment*, Faculty Research Grant (FRG), University Research Committee, University of Utah, $5980.

1999 Cova, T.J. (PI) *Regional evacuation analysis in fire prone areas with limited egress*, Proposal Initiative Grant, College of Social and Behavioral Science, University of Utah, $4000.

Media Outreach

2019 Krieger, L., "Camp Fire: when survival means shelter." *San Jose Mercury News*, Feb. 3.

2018 Romero, S., Arango, T., and Fuller, T. "A frantic call, a neighbor's knock, but few official alerts as wildfire closed in." *New York Times*, Nov. 21.

2018 Serna, J., St. John, P., Lin, R-G. "Disaster after disaster, California keeps falling short on evacuating people from harm's way." *Los Angeles Times*, Nov. 28.

2018 Simon, M. "How California needs to adapt to survive future fires." *Wired Magazine*, Nov. 15.

2018 O'Neill, S. "Year-round wildfire season means always living evacuation ready." Morning Addition, *National Public Radio*, Sep. 25.

2017 Mortensen, M. "System used for Amber Alerts can also warn of other emergencies." Utah Public Radio, Dec. 19.

2013 Ryman, A. and Hotstege, S. "Yarnell evacuation flawed and chaotic, experts say." *Arizona Republic and USA Today*, Nov.

2013 Bryson, D., and Campoy, A. "Quick fire response pays off: Colorado credits early alerts with limiting deaths from state's worst-ever blaze." *The Wall Street Journal*, June 17.

2013 Beri, A. "Due to the sequester: people are going to be unsafe, homes are going to burn." *Tampa Bay Times*, Feb.

2012 Zaffos, J. "What the High Park Fire can teach us about protecting homes." *High Country News*, July.

2012 Meyer, J.P. and Olinger, D., "Tapes show Waldo Canyon fire evacuations delayed two hours." *The Denver Post*. July.

2011 Siegel L, and Rogers, N. "Monitoring killer mice from space." *USA Today*, *SLTribune, Fox 13 News, KCPW*, Feb. 15.

2010 Cowan, J., "Esplin defends stay or go policy." *Australian Broadcast Corporation (ABC)*, April 30.

2010 Bachelard, M., "Should the fire-threatened stay or go? That is still the question." *The Age*, Australia, May 2.

2008 Boxall, B., "A Santa Barbara area canyon's residents are among many Californian's living in harm's way in fire-prone areas." *Los Angeles Times*, July 31.

2007 Welch, W.M. et al., "Staggering numbers flee among fear and uncertainty." *USA Today*, Oct. 24.

2007 Krasny, M., "Angora Wildfire Panel Discussion." *KQED Radio*, San Francisco, June 27.

2004 Wimmer, N., "Growing number of communities pose fire hazard." *KSL Channel 5,* Salt Lake City, July 22.

2004 Disaster News Network, "The face of evacuation procedures might be changing as a result of lessons learned from last year's fierce wildfires in California."

2004 Perkins, S., "Night space images show development." *Science News*, Week of April 3rd, 165 (14): 222.

2003 Keahey, J., "Canyon fire trap feared." *SL Tribune*, June.

TEACHING AND MENTORING

Undergraduate Courses

Geoprogramming (~30 students)
Introduction to Geographic Information Systems (~60 students).
Human Geography (~40 students).
Geography of Disasters and Emergency Management (~20 students).
Methods in GIS (~40 students).

Graduate Courses

GIS & Python (~20 students)
Spatial Databases (~30 students)
Seminars: Hazards Geography, Transportation, Vulnerability, GIScience.

Graduate Student Advising

Chaired Ph.D. Committees

2017-	Coleman, A.	Geographic data fusion for disaster management
2016	Li, D.	Modeling wildfire evacuation triggers as a coupled natural-human system (Asst. Professor South Dakota State University)
2010	Siebeneck, L.	Examining the geographic dimensions of risk perception, communication and response during the evacuation and return-entry process. (Assoc. Professor, U. of North Texas)
2010	Cao, L.	Anthropogenic habitat disturbance and the dynamics of hantavirus using remote sensing, GIS, and a spatially explicit agent-based model. (Postdoc, Kelly Lab, UC Berkeley)

Chaired M.S. committees

2019-	Riyadh, A.	Flood resilience in Dhaka, Bangladesh
2018-	Huang, Z.	Autonomous vehicles in hurricane evacuation.
2019	Kar, A.	Optimal vehicle routing in disasters
2017	Yi, Y.	A web-GIS application for house loss notification in wildfires
2017	Latham, P.	Evaluating the effects of snowstorm frequency and depth on skier behavior in Big Cottonwood Canyon, Utah
2016	Bishop, S.	Spatial access and local demand for emergency medical services in Utah
2015	Hile, R.	Exploratory testing of an artificial network classification for enhancement of a social vulnerability index
2015	Unger, C.	Creating spatial data infrastructure to facilitate the collection and dissemination of geospatial data to aid in disaster management
2014	Klein, K.	Tracking a wildfire in areas of high relief using volunteered geographic information: a viewshed application
2012	Amussen, F.	Greek island social networks and the maritime shipping dominance they created (technical report)
2012	Martineau, E.	Earthquake risk perception in Salt Lake City, Utah
2010	Smith, K.	Developing emergency preparedness indices for local government

2010	VanDrimmelen, M.	Family gathering in emergencies: the 2007 Angora Wildfire as a case study
2007	Pultar, E.	GISED: a dynamic GIS based on space-time points
2007	Siebeneck, L.	An assessment of the return-entry process for Hurricane Rita, 2005
2007	Johnson, J.	Microsimulation of neighborhood-scale evacuations
2004	Chang, W.	An activity-based approach to modeling wildfire evacuations

Membership on Ph.D Committees

2017	Campbell, M.	Wildland firefighter travel times
2016	Zhang, L.	Economic geography of China
2015	Huang, H.	Spatial analysis and economic geography
2014	Lao, H.	Spatial analysis, GIS, and economic geography
2013	Burgess, A.	Hydrologic implications of dust in snow in the Upper Colorado River Basin
2012	Davis, J.	
2012	Li, Y.	
2011	Hadley, H.	Transit sources of salinity loading in the San Rafael River, Upper Colorado River Basin, Utah
2009	Medina, R.	Use of complexity theory to understand the geographical dynamics of terrorist networks
2008	McNeally, P.	Holistic geographical visualization of spatial data with applications in avalanche forecasting
2008	Sobek, A.	Generating synthetic space-time paths using a cloning algorithm on activity behavior data
2007	Clay, C.	Biology
2006	Backus, V.	Assessing connectivity among grizzly bear populations near the U.S.-Canada border
2006	Atwood, G.	Shoreline superelevation: evidence of coastal processes of Great Salt Lake, Utah
2006	White, D.	Chronic technological hazard: the case of agricultural pesticides in the Imperial Valley, California
2005	Ahmed, N.	Time-space transformations of geographic space to explore, analyze and communicate transportation systems
2004	Shoukrey, N.	Using remote sensing and GIS for monitoring settlement growth expansion in the eastern part of the Nile Delta Governorates in Egypt (1975-1998)
2004	Hernandez, M.	A Procedural Model for Developing a GIS-Based Multiple Natural Hazard Assessment: Case Study-Southern Davis County, Utah
2003	Wu, Y-H.	Dynamic models of space-time accessibility

2003	Hung, M.	Using the V-I-S model to analyze urban environments from TM imagery
2002	Baumgrass, L.	Initiation of snowmelt on the North Slope of Alaska as observed with spaceborne passive microwave data

Membership on M.S. Committees

2015	Farnham, D.	Food security and drought in Ghana
2015	Fu, L.	Analyzing route choice of bicyclists in Salt Lake City
2014	Li, X.	Spatial representation in the social interaction potential metric: an analysis of scale and parameter sensitivity
2013	Johnson, D.	Parks, Recreation & Tourism
2012	Fryer, G.	Wildland firefighter entrapment avoidance: developing evacuation trigger points utilizing the WUIVAC fire spread model.
2011	Groeneveld, J.	An agent-based model of bicyclists accessing light-rail in Salt Lake City
2011	Matheson, D.S.	Evaluating the effects of spatial resolution on hyperspectral fire detection and temperature retrieval
2010	Larsen, J.	Analysis of wildfire evacuation trigger-buffer modeling from the 2003 Cedar Fire, California.
2010	Smith, G.	Development of a flash flood potential index using physiographic data sets within a geographic information system
2010	Song, Y.	Visual exploration of a large traffic database using traffic cubes
2010	Evans, J.	Parks, Recreation & Tourism
2008	Naisbitt, W.	Avalanche frequency and magnitude: using power-law exponents to investigate snow-avalanche size proportions through time and space.
2008	Kim, H.C.	Civil Engineering
2007	Gilman, T.	Evaluating transportation alternatives using a time geographic accessibility measure
2004	Baurah, A.	An integration of active microwave remote sensing and a snowmelt runoff model for stream flow prediction in the Kuparak Watershed, Arctic Alaska
2004	Bosler, J.	A Development Response to Santaquin City's Natural Disasters.
2004	Bridwell, S.	Space-time masking techniques for privacy protection in location-based services

2004	Deeb, E.	Monitoring Snowpack Evolution Using Interferometric Synthetic Aperture Radar (InSAR) on the North Slope of Alaska, USA
2004	Sobek, A.	Access-U: a web-based navigation tool for disabled students at the University of Utah
2003	Barney, C.	Locating hierarchical urban service centers along the Wasatch Front using GIS location-allocation algorithms
2002	Koenig, L.	Evaluation of passive microwave snow water equivalent algorithms in the depth hoar dominated snowpack of the Kuparuk River Watershed, Alaska, USA
2002	Larsen, C.	Family & Consumer Studies
2002	Krokoski, J.	Geology & Geophysics
2000	Granberg, B.	Automated routing and permitting system for Utah Department of Transportation
2000	Bohn, A.	An integrated analysis of the Tijuana River Watershed: application of the BASINS model to an under-monitored binational watershed

Graduate student awards

2015	R. Hile., M.A. Geography: Jeanne X. Kasperson Award, Hazards, Risk & Disasters Specialty Group, Association of American Geographers.
2015	D. Li, Ph.D. Geography: Jeanne X. Kasperson Award, Hazards, Risk & Disasters Specialty Group, Association of American Geographers.
2012	K. Klein, M.A. Geography: *Jeanne X. Kasperson Award*, Hazards, Risk & Disasters Specialty Group, Association of American Geographers.
2010	L. Cao, Ph.D. Geography: *Student Paper Award*, Spatial Analysis and Modeling (SAM) Specialty Group, Association of American Geographers.
2008	L. Siebeneck, M.A. Geography: *Jeanne X. Kasperson Award*, Hazards Specialty Group, Association of American Geographers.
2007	E. Pultar, M.A. Geography: *Best Paper*, GIS Specialty Group, Association of American Geographers.
2006	J. VanLooy (not primary advisor): *Best Paper*, Rocky Mountain Regional Meeting, Association of American Geographers.

Undergraduate Mentoring and Advising

2015	Mentor, Marli Stevens, Undergraduate Research Opportunity Program: “Margin of Licensed Dog and Cat Populations and Adoptions from Animal Shelters in Utah in 2013-2014.”

2015— Advisor, Undergraduate Hazards & Emergency Management Certificate students (~10 students so far).

2006—2010 Advisor, Stewart Moffat, Honor's B.S. in Undergraduate Studies: Disaster Management (published journal article).

2005—2007 Advisor, Brian Williams, B.S. in Undergraduate Studies: Comprehensive Emergency Management.

2001— Advisor, Undergraduate GIS Certificate Students (> 100 students).

Junior Faculty Mentoring

2017— Andrew Linke, Department of Geography, University of Utah
2014—2017 Ran Wei, Department of Geography, University of Utah
2011—2014 Steven Farber, Department of Geography, University of Utah
2009—2011 Scott Miles, Dept. of Geography, Western Washington U.
2009—2011 Timothy W. Collins, Department of Sociology, UT El Paso

SERVICE

Referee Duties

Journals
Applied Geography
Annals of the Association of American Geographers
Cartographica
Computers Environment & Urban Systems
Disasters
Environmental Hazards: Policy and Practice
Geographical Analysis
Geoinformatica
International Journal of Geographical Information Science
Journal of Geographical Systems
Journal of Transport Geography
Natural Hazards
Natural Hazards Review
Networks and Spatial Economics
Photogrammetric Engineering and Remote Sensing
Professional Geographer
Society & Natural Resources
Transportation Research A: Policy & Practice
Transportation Research B: Methodological
Transportation Research C: Emerging Technologies
Transactions in GIS

National Science Foundation Panels
Decision Risk and Uncertainty (1)
Geography and Spatial Science, Doctoral Dissertation Improvement Grant (4)
Civil & Mech. Systems – Infrastructure Management and Extreme Events (2)
Civil & Mech. Systems - Rural Resiliency (1)
NSF and NIH: Big Data (1)
Hazards SEES: Type 2 (1)

Proposals
Center for Disaster Management & Humanitarian Assistance
Faculty Research Grants, University of Utah (3)

External Promotional Reviews
Full Professor (5), Associate Professor (12)

Activities at Professional Conferences

2000 – 2018	**Paper session co-organizer, chair,** "Hazards, GIS and Remote Sensing" session, Annual Meeting of the Association of American Geographers.
2002 – 2003	**Paper session organizer, chair, and judge, "**GIS Specialty Group Student Paper Competition," Association of American Geographers Annual Meeting.
1999	**Paper session organizer**, "Location Modeling and GIS," Annual Meeting of the Association of American Geographers, Honolulu, Hawaii, March.

University Service

2019 –	RPT Standards Committee, Office of the AVP for Faculty
2014 – 2017	Member, Academic Senate
2014 – 2017	Member, University Promotion & Tenure Advisory Committee (UPTAC)
2011 –	Member, Social Science General Education Committee
1999 – 2009	Delegate, University Consortium for GIScience
2013	Member, Graduate Research Fellowship (GRF) Committee
2010 – 2012	Member Student Evaluations Committee, Undergrad. Studies
2009 – 2012	Member, Graduate Council, College of Soc. and Beh. Science
2003 – 2004	Member, Instit. Review Board (IRB) Protocol Committee
2001 – 2004	Member, Social Science General Education Committee

College Service: Social & Behavioral Science

2014 –	Chair, Review, Promotion & Tenure Committee
2012 – 2014	Member, College Review, Promotion, & Tenure Committee
2015	Member, Superior Teaching Committee
2011 – 2012	Chair, Superior Teaching Committee

2007 Member, Search Committee, Inst. of Public and Intern Affairs
2005, 2006 Member, Superior Research Committee
2002, 2004 Member, Superior Teaching Committee

Departmental Service: Geography

2015 – Member, Undergraduate Committee
2014 –2017 Representative, University Academic Senate
2014 – Director, Certificate in Hazards & Emergency Management
2014 Author, Proposal for Cert. in Hazards & Emergency Manage.
2012 – Chair, Review, Promotion & Tenure Committee
2013 Chair, Search Committee for GIScience Position
2012 Co-author, Proposal for MS in GIScience
2011 – 2012 Director of Graduate Studies
2010 Search Committee Chair, Human Geography Position
2004 – 2015 Member, Graduate Admissions Committee
2004 – 2008 Member, Colloquium Committee
2000 – Chair, Geographic Information Science Area Committee

Cova Report

July 6, 2020 Page 39

Prepared by Thomas J. Cova, Ph.D., Evacuation Consultant, Salt Lake City, UT Dated: July 2, 2020

Subject: Evacuation analysis and planning for the proposed Guenoc Valley Mixed Use Planned Development Project in Lake County, CA

SUMMARY

I have reviewed the Environmental Impact Report (EIR) and Wildfire Prevention Plan for the Guenoc Valley project. The Guenoc Valley project site is in a very high fire hazard area evidenced by recent fast- moving, intense wildfires in the Project vicinity that caused loss of life. The project is large and proposes to add thousands of people to a very sparsely populated area with a limited transportation network. The EIR does not evaluate or disclose the wildfire evacuation risks associated with introducing this many people and vehicles to the project area and does not include a detailed wildfire evacuation plan to protect the safety of the residents. Prior to approving the project, the County should prepare a project- specific evacuation plan that addresses, at a bare minimum: 1) the possible range of evacuation times for residents and visitors, 2) the possible range of lead times available to act in an urgent wildfire, 3) the pattern of evacuation road traffic on primary access roads from the site to major evacuation routes in the Countywide evacuation plan, and 3) detailed alternative plans for protecting residents and visitors when roads become impassible or the time required to evacuate is greater than the time available.

ANALYSIS

The Project Configuration Allows Only One Evacuation Route for Several Thousand Residents

The Guenoc Valley Site consists of 16,000 acres in southwest Lake County, California. The project will include 400 hotel rooms, 450 guest

resort residential units, 1400 residential estates, and 500 workforce co-housing units. The EIR proposes 753 total parking spaces for Phase 1 but does not mention how many there might be when the project is complete or how many vehicles are likely to be on the project site, on average, after the project is complete. However, given the number of proposed units (and conservatively assuming one vehicle per unit when California's average number of vehicles per household is two), the site is likely to house at least 2750 vehicles on site when it is completed (i.e. 400 + 450 + 1400 + 500). While some of these units may have no vehicles, and others may have 2 or more, a range of at least two to three thousand vehicles is a reasonable starting assumption for evacuation planning for this project.

Access to the project site is via Butts Canyon Road from Middletown (7 miles to the west), although Butts Canyon Road continues south from the project site to Pope Valley (12 miles to its south). There are no alternative routes in or out of the project site. The Final EIR's Response to Comments O10-31 references the Lake County Evacuation map and states:

Regarding the commenter's question "what, if any, alternative evacuation routes will be available for residents and nearby community members in the event that Proposed Project-generated evacuation traffic makes Butts Canyon Rd. and/or Hwy 29 or 175 impassable", as noted on page 3.16-7 of the Draft EIR, the Lake County Wildfire Protection Plan provides an evacuation route map (URL in figure 1). This map shows all of the existing

and potential evacuation routes serving the county and the project site. The Wildfire Prevention Plan for the Proposed Project includes plans for determining whether evacuation routes are unsafe, and designated meeting locations.

An excerpt of this map around the project site is provided in Figure 1. The map shows that the initial evacuation route is Butts Canyon Road

north (and then to SR-29 North or South or SR-175 north), or south to Pope Valley (not shown on map because it's in Napa County). There are no evacuation routes to the east or north of the project site, so evacuees would have to travel southwest to Butts Canyon Road and then either northwest to Middletown or southeast to Pope Valley. This is very limited directional egress for a community of this size given the wide range of locations and directions that a wildfire might approach the project.

Figure 1. An excerpt taken from the Lake County evacuation map does not show an evacuation route in the project area. (URL: http://www.lakecountyca.gov/Assets/County+Site/Fire+Safe+Council/cwpp/Evacuation.jpg).

In other words, in the event of a wildfire, all evacuation traffic from the project site must flow through Butts Canyon Road, a two lane rural highway. This is a significant bottleneck and there are no alternative evacuation routes in the event that Butts Canyon Road becomes impassable.

The EIR Does Not Analyze the Project's Wildfire Evacuation Impacts

The project configuration presents an immediate concern due to the limited evacuation egress for project residents and workers trying to reach Butts Canyon Road in an urgent evacuation. Given this concern, and the history of wildfires on the project site, it is critical that the County perform a project- specific wildfire evacuation analysis that includes available lead times and evacuation times under a variety of scenarios.

As noted in the Final EIR Response to Comments O10-31, the time necessary to safely clear the project site can vary according to a number of factors:

Regarding the commenter's question "what are the pre- and post-Project expected evacuation times for residents (both Project residents and nearby affected existing residents) fleeing wildfire in the vicinity of the Project site," evacuation times would vary

based on a large number of factors, including day of the week, time of day, the fire's location, behavior, winds, and terrain. While the County has performed extensive planning for wildfire safety and evacuation, it has not projected evacuation times, due to the number of variables.

Although the County is correct that there are numerous variables that inform estimates of evacuation times, this does not justify the decision to not perform an evacuation analysis. Project-specific evacuation analysis and modeling is not only possible, agencies frequently perform it, especially for largescale residential and mixed-use development projects similar to the Guenoc Valley project.

The Project's Wildfire Evacuation Impacts Are Significant

There are two key variables that determine the success of an evacuation in getting residents to safety: the time available to protect people (lead time) and the time it takes to protect them (evacuation time). Some of the variables mentioned by the County above (e.g. fire location, behavior, winds and terrain) are important inputs for estimating the lead time that would be available to protect residents. A fire that ignites near the project site (location) and spreads rapidly towards it (winds,

behavior, terrain, direction) may offer little time for emergency managers to conduct an orderly evacuation of the site. Similarly, the day-of-week and time-of-day are variables affecting the evacuation time. For example, the number of evacuees (residents and visitors) and vehicles that might be on the project site due to weekends, holidays, or events (e.g. sports, music, weddings) will affect the evacuation time.

Wildfire safety hazards arise when the lead time is less than the evacuation time, and the difference between the two is a primary cause of fatalities in evacuations. For example, in the 2018 Camp Fire in Paradise, the city evacuation plan called for 2 to 3 hours to safely evacuate the town (evacuation time), but the fire only offered 1.5 hours from its ignition to its impact on structures on the east side of Paradise (lead time). Because of the large number of residents and vehicles that will be added to the area by the project and the recent history of intense, fast-moving wildfires (see the Wildfire Prevention Plan), it is critical that the County evaluate lead time and evacuation time for the Guenoc Valley project under a range of likely scenarios.

Gross estimates for evacuation time can be calculated using simple assumptions about warning time, response time, vehicle loading, and road capacity. Figure 2 shows the proposed transportation network on the south end of the project that would provide emergency access to Butts Canyon Road (the evacuation route from the project to Middletown or Pope Valley). Note that there are three access points to the project site along Butts Canyon Road (BCR) labeled *Primary Entrance Option 1 (PE1), Primary Entrance Option 2 (PE2), and Secondary Entrance (SE).* Although PE1 and PE2 provide two access points, they quickly merge into one access road to the northeast which create a bottleneck for evacuation purposes. This means that there are effectively two means of egress to Butts Canyon Road from the project: the Primary Exit (PE), which splits and leads to two access points, and the Secondary Exit (SE).

Assuming that the PE and SE both have one traffic lane out each (leaving one lane for emergency vehicle ingress, as is typical), and assuming that each exiting lane can serve a range of 600 to 1200 vehicles per hour

(vph) depending on many factors (e.g. merging, intersection control, car-following behavior), then the total egress from the site to BCR could range from 1200 to a high of 2400 vph. In supply-demand terms, this would be an estimate of the "supply" available to serve the evacuees as they leave the site.

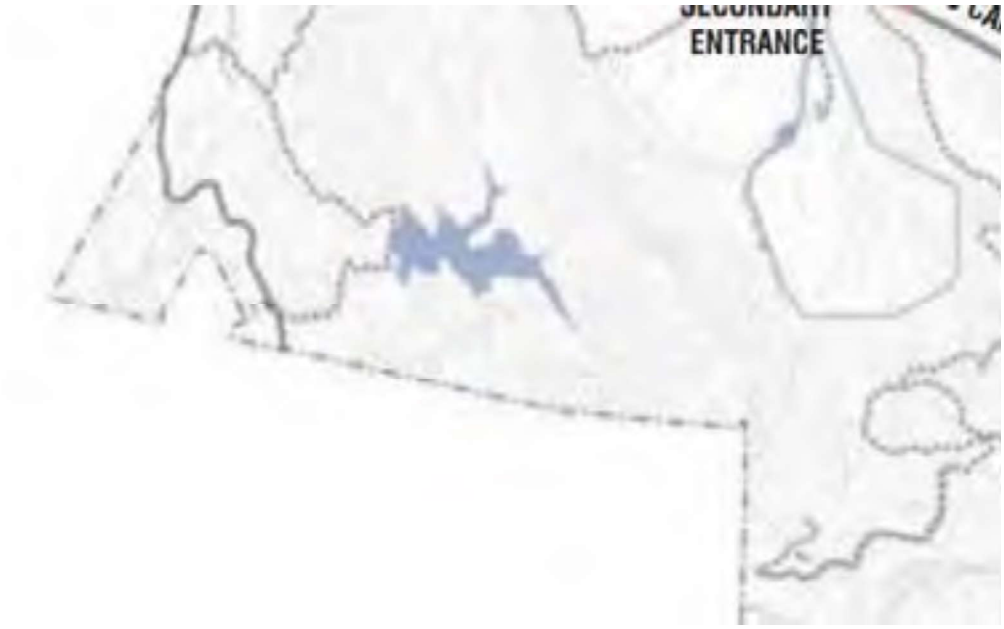
3

As noted above, there could be a range of 2000-3000 vehicles on the project site depending on the time of day, day of week, or special events, and this would be the "demand" in an evacuation. Dividing the vehicle demand by the exit road supply, the minimum time to evacuate this site could range from an ideal case of lower demand and higher capacity (2000 vehicles / 2400 vph = 0.83 hours) to a much worse case of higher demand and lower capacity (3000 vehicles / 1200 vph = 2.5 hours).

Figure 2. The transportation network that will connect the project site to Butts Canyon Road.

As noted above the second factor that influences the outcome of a wildfire evacuation is the lead time. The question becomes one of whether a wildfire in the vicinity of the project site might offer less than the time to evacuate the community (1 to 2.5 hours), leaving some evacuees at risk of being caught in- transit when the wildfire overtakes the community. This presents an extremely high safety threat. When persons are in vehicles on a road when fire is burning in the immediate area, visibility conditions may become so poor that the vehicles drive off the road or crash into other vehicles and/or flames and heat may overcome the occupants. On-road fatalities occurred, for example, during the 2003 Cedar Fire in San Diego County and the 2018 Camp Fire originating in Paradise. The EIR and Wildfire Prevention Plan provide little detail and no modeling regarding wildfire behavior and spread rate. However, based on the wildfire history of this region as detailed in the EIR and Wildfire Prevention Plan, there are numerous possible wildfire scenarios in this area under which emergency managers and evacuees would have less than the time it would take to evacuate the Guenoc Valley site.

Additionally, the 2.5 hour evacuation time could be much longer if warning time is prolonged or key intersections are not controlled by law enforcement. These intersections include the two PE's and the SE, as well as the point where BCR intersects with Highway 29. If traffic flow problems occur at any of these locations due to adverse events (e.g. wildfire blocking an exit, abandoned vehicles, or gridlock),



the evacuation could lead to fatalities similar to the 2018 Camp Fire in Paradise or the 2017 Tubbs Fire in Santa Rosa.

In short, the County did not perform a project-specific wildfire evacuation analysis. Even in the absence of such analysis, there is strong evidence that evacuation times could exceed lead times for the project, which could pose a serious threat to public safety.

The EIR's Description of Shelter-in-Place Strategies Is Inadequate

As scenarios can be identified where not everyone in the project site would be able to get out in time, the Final EIR (p. 3.16-9) mentions six designated shelter-in-place meeting and staging areas as a back-up option:

"The Community Wildfire Protection Plan identifies evacuation routes in the County. Butts Canyon Road is identified as an emergency evacuation route. Depending on where the fire is located, people at the Guenoc Valley Site would be directed to exit the site via the primary roadways to Butts Canyon Road or as a last resort would shelter in place at the six Designated Meeting and Staging Areas. As shown on Figure 2-10, the Proposed Project includes an extensive circulation system with roadways

large enough for emergency access vehicles. In addition, these roadways would typically have 50 feet of defensible space cleared on each side of the roadway for a total fire break of 150 feet. Impacts to adopted emergency response or evacuation plans would be less-than-significant. Impacts related to traffic and emergency routes are addressed in Section 3.13 Transportation and Traffic.

Depending on the circumstances of a wildfire emergency, it may be difficult to evacuate. In this situation, residents, visitors, and employees will be directed to gather at designated meeting & staging areas where they will be provided information and assistance.

These six designated meeting and staging areas (DMSA) are shown in Figure 2-10 in the EIR but the locations are vague and the capacities are not given. In order to be effective, these DMSAs would need to be easily accessible (including for disabled people and pedestrians) and provide enough protection for residents to survive a wildfire with an intensity in line with recent past wildfires. Additionally, it is critical that the location of, and access routes to, DMSAs are well publicized and made clear to residents and visitors to the project site through education, signage, and other means. The lack of adequate description in the EIR or Wildfire Prevention Plan of the DMSAs' location, capacity, and protection level is a significant shortcoming; these should be addressed in detail in a project-specific evacuation analysis and plan.

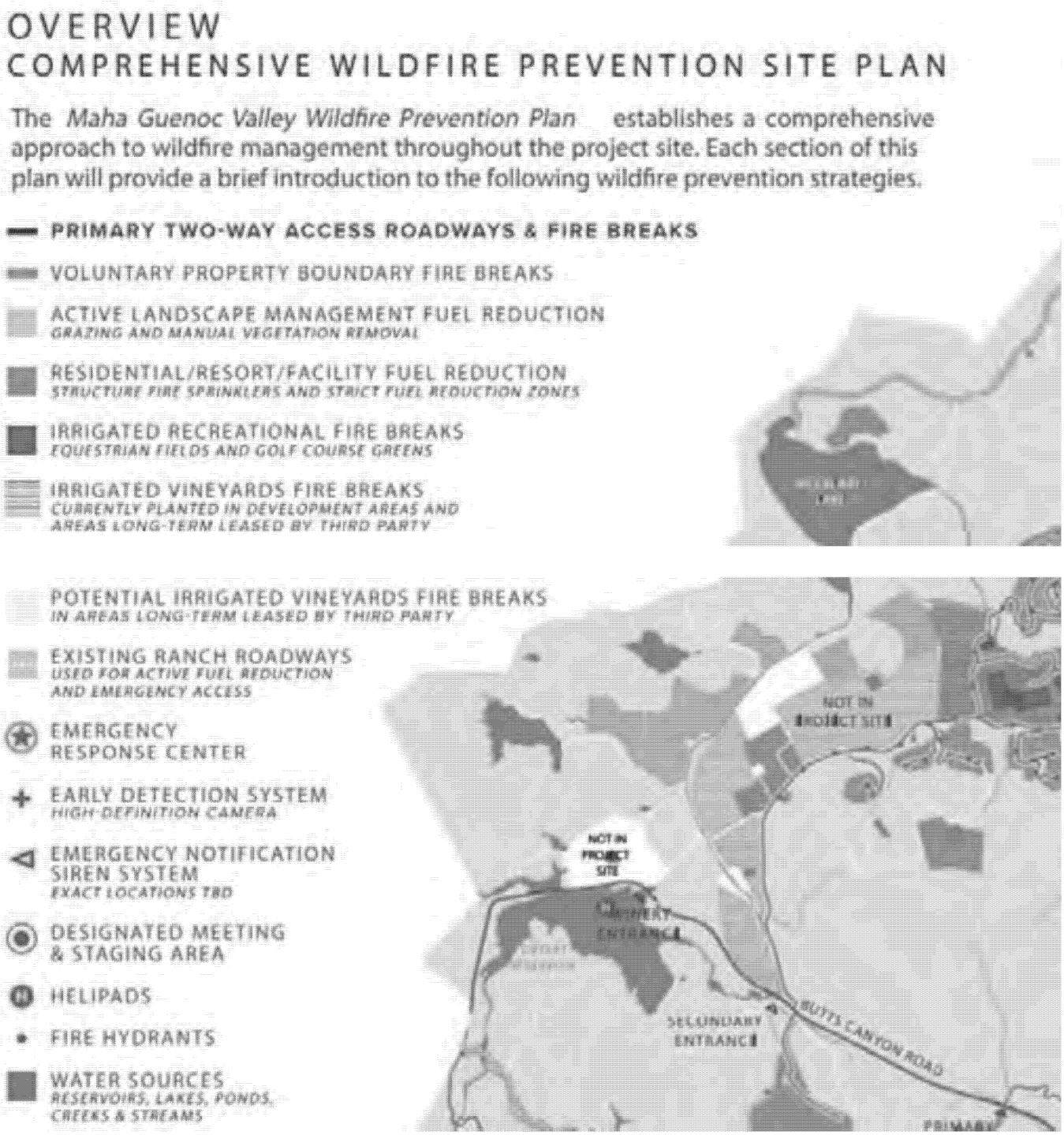


Figure 3. The designated meeting and staging areas are not very visible or easy to assess. **CONCLUSION**

The Guenoc Valley project anticipates housing thousands of residents and visitors on a Project site historically susceptible to fire and in a region where large-scale wildfire evacuations have recently been

necessary. The project offers only two primary means of egress to Butts Canyon Road, which only offers one direction for evacuees to escape (southwest) from the project site, and then only two directions to travel from there (northwest or southeast on Butts Canyon Road). The evacuation vehicle capacity offered by these roads is relatively low, and a rough estimate is that they could serve 1200 to 2400 vehicles departing per hour. On a given summer weekend day, it's not unlikely that it could take a few hours to evacuate this project site, and there are numerous plausible wildfire scenarios where this much time might not be available. Shelter-in-place is likely to be used in some scenarios where not everyone can evacuate in time, but it is not taken very seriously in the EIR or Wildfire Prevention Plan, which do not describe the access, capacity, and protection level that the various staging areas would offer. I strongly recommend that the County prepare a detailed and comprehensive evacuation plan for this project.

Thomas J. Cova, Ph.D.

CREDENTIALS

I received a Doctor of Philosophy (Ph.D.) degree from the University of California Santa Barbara in 1999 in the field of Geography; a Masters of Science (M.S.) degree from the same university in 1995; and a Bachelor's of Science (B.S.) degree in Computer and Information Science from the University of Oregon in 1986. I am currently a Professor of Geography and the University of Utah. My expertise is in environmental hazards, transportation, and geographic information systems with a particular focus on wildfire evacuation planning, analysis, and modeling. I proposed a set of standards for transportation egress (exit capability) in wildfire areas that was adopted by the National Fire Protection Agency in 2008 in their Standards for the Protection of Life and Property in Wildfires. I

received research grants from the National Science Foundation to study: 1) the 2003 Southern California Wildfires, 2) Protective Action Decision Making in regards to evacuation versus shelter-in-place, and 3) Protective Action Triggers (decision points regarding when to order an evacuation). In 2017 I published an article with my collaborators on warning triggers in environmental hazards that described the issues that arise in deciding when to order an evacuation or other protective action.[1] In 2013, along with my collaborators, I analyzed community egress in fire-prone areas of the western U.S. to identify those that might face difficulty evacuating due to traffic congestion.[2] In 2011, I developed a decision model with my collaborators to aid in deciding whether evacuation or shelter-in-place is the best decision in a wildfire.[3] My work has been cited in fire evacuation plans prepared in conjunction with Environmental Impact Reports in California.

REFERENCES

[1] Cova, T. J., Dennison, P. E., Li, D., Drews, F. A., Siebeneck, L. K., & Lindell, M. K. (2017). Warning triggers in environmental hazards: who should be warned to do what and when? *Risk Analysis*, 37(4), 601-611.

[2] Cova, T.J., Theobald, D.M., Normal, J.B., Siebeneck, L.K. (2013) Mapping evacuation vulnerability in the western US: the limits of infrastructure. *GeoJournal*, 78(2): 273-285.

[3] Cova, T.J., Dennison, P.E., Drews, F.A. (2011) Modeling evacuate versus shelter-in-place decisions in wildfires. *Sustainability*, 3(10): 1662-1687.

Concepts to help formulate wildfire-safe community egress codes

Thomas J. Cova, Ph.D.
Evacuation Consultant, Salt Lake City, UT
February 16, 2021

As communities continue to expand into wildfire-prone regions, safety regulations need to be enhanced to protect the public. One example is community egress codes designed to limit development patterns and densities based the available means of egress. Although this topic has not been at the fore in developing fire-prone wildlands, it is becoming increasingly important as communities in the western U.S. experience larger, faster-moving fires that offer less and less time for residents to evacuate. Many communities in the highest fire severity zones were never designed to safely support their current housing, commercial, and industrial density, let alone the proposed development that may be added. This raises the public safety question, "How much is too much?" when it comes to housing, commercial and industrial development in low-egress fire-prone communities. This paper presents geographic concepts that may help in formulating new regulations in fire-prone regions.

New Development with New Road infrastructure

Although evacuation planning has not historically been required in adding new development in fire-prone regions, recent large wildfires raise the question of whether we're reach a turning point. In short, wildfire evacuation risks associated with introducing people and vehicles to a community should be evaluated and disclosed prior to approving additional development. As a bare minimum, the local jurisdiction should prepare a project-specific evacuation plan that addresses the:

1. Possible range of evacuation times for residents, workers and visitors
2. Possible range of lead (available) times to act in an urgent wildfire
3. Pattern of evacuation road traffic on primary access roads from the site to major evacuation routes in the region-wide evacuation plan
4. Alternative plans for protecting residents, workers and visitors when roads become impassible or the time required to evacuate is greater than the time available.

Although lead agencies do not usually prepare an evacuation analysis stating the numerous variables affect potential evacuations, this type of planning is essential in assuring public safety. Project-specific evacuation analysis and modeling is not only possible, the data needed is readily available.

There are four principal dimensions that help promote public safety as it pertains to community design in fire-prone areas: 1) vehicle load, 2) number of exits, 3) exit capacity, and 4) exit arrangement. The next sections briefly address these dimensions.

Vehicle load

The **vehicle load** for a given area includes all vehicles that will be used by evacuees from residential, commercial and industrial structures or land uses. This can be represented as:

*vehicle_load = (households * vehicles_per_household) + vehicles_Commercial + vehicles_Industrial*

While vehicle density can be measured as the number of vehicles per unit area (e.g. vehicles per acre), a more useful density measure for evacuation purposes is the number of vehicles per unit of road length (e.g. vehicles per mile). To use this concept in the context of a regulation, it can be restated as the required minimum average length per vehicle (e.g. 10 feet per vehicle) or the maximum number of vehicles per mile. A minimum of 10 feet per vehicle in a high severity fire zone means that at most 528 vehicles could be present per mile of roadway (i.e. 5280 feet / 10 feet per vehicle = 528 vehicles per mile). While the length of the threshold can be debated, without a defined threshold it would be possible to have an unlimited number of vehicles, which would place residents at risk in a wildfire-prone region.

Using the equation above and a maximum of 528 vehicles per mile, a community with 3 miles of roads (in any configuration) and no commercial or industrial development, and assuming 2 vehicles per household, could have up to 792 households (based solely on vehicle load limitations):

*3 miles of roadway * 528 vehicles_per_mile = 1584 vehicles*
(1584 vehicles / 2 vehicles_per_household) + 0 + 0 = 792 households

Adding commercial and industrial vehicles to this community would reduce the number of households that could be constructed or added, if the vehicle density is to remain below 528 vehicles per mile. The maximum vehicle density threshold can also be varied depending on land use and fire severity. For example, a look-up table could be developed to set it higher in areas that are predominantly industrial or those with less wildfire risk.

Number of exits

The second consideration is the minimum **number of exits.** An *exit* in this context is a road segment that a resident in the community or evacuation zone must traverse to leave it. A community with one road connecting it to the rest of the network has one exit, and one with a choice between two roads to leave it has two exits. In the case of a defined evacuation zone, an exit is any road that allows people within the zone to travel to areas outside the zone (i.e. roads that cross the evacuation zone boundary). Each exiting road provides a *means of egress* for anyone inside the community or zone to leave it.

A required minimum number of exits can be represented with a table that links the estimated vehicle load in an area to the required minimum number of exit roads. Consider this example table:

Vehicles	Minimum exit roads
1 – 600	1
601 – 900	2
901 – 1200	3
1200 <	4

While the thresholds can be debated, the concept of requiring a minimum number of exit roads avoids the possibility of developing a "one-way-in-one-way-out" community with an unlimited number of vehicles (due to households, commercial, industrial activities) where residents have little to no chance of evacuating quickly in a dire wildfire scenario. Using the equation for vehicle load above, a community with 400 household vehicles (200 households assuming 2 vehicles per household), 150 from commercial activities, and 100 from industrial activities would require 2 exits (i.e. 400 + 150 + 100 = 650 => 2 exits).

Exit capacity

The third consideration is **exit capacity**. This regulation relies on the sum of the exit road capacities to determine the maximum vehicle load allowed in an area. Consider that all roads have a maximum number of vehicles that can be served in a given unit of time (e.g. 600 vehicles per hour or vph). To translate this into something useful for evacuation egress regulations, we can set a minimum capacity for the combined exits such that the minimum evacuation time does not exceed 1 hour (Note: an evacuation could take much longer). This is to avoid building a community where the least time it would take to evacuation would be 2, 3 or 4+ hours.

With a defined upper bound on the **minimum evacuation time**, we can calculate the maximum vehicle load in a given area based on the capacity of the exits. For example, if a community has one exit that can serve 600 vph (assume it ends with a stop sign at a major road), then 600 vehicles would be the maximum vehicle load (600 vehicles / 600 vph = 1 hour). A community with two exits that can each serve 600 vph could have a vehicle load of 1200. As in the prior cases, the thresholds can be adjusted, but without a regulation that connects the vehicles load in an area to the exit capacity, it becomes possible to develop communities in fire-prone areas with thousands of homes and commercial/industrial activities that could not safely be evacuated in a dire wildfire.

Exit arrangement

The last consideration is **exit arrangement.** This can be viewed as the minimum distance between any two exits in a community, assuming the community has more than one. Simply put, the exits should not be closer than one-half the furthest distance between any two households (or facilities) that rely on the exits. So, if the furthest distance between two households in a community is 1 mile and the community has two exits, the exits should not be closer than 0.5 miles (between any two points along either exit road). If the exits are too close, then they will not offer evacuees independent means of egress and more than one may quickly be blocked by the same wildfire.

New Development on Existing Road infrastructure

In addition to development along new road infrastructure, wildfire-safe regulations are also needed when adding development along existing road infrastructure. The configuration of rural communities with substandard roads presents an immediate concern due to the limited evacuation egress for residents, visitors and workers trying to reach collector roads or highways. Given this concern and the history of wildfires in fire-prone communities, it is critical that the local jurisdiction require a community-specific wildfire evacuation analysis that includes likely lead times and evacuation times. The evacuation analyses can be conducted on existing communities to evaluate existing wildfire evacuation conditions, and to determine if increases in the population associated with a new development should be approved. An evacuation analysis can identify significant bottlenecks and alternative evacuation routes that could become impassable under a variety of scenarios. Furthermore, infrastructure mitigation measures can be evaluated to determine if the most significant risks can be reduced to an acceptable level of impact.

There are two key variables that determine the success of an evacuation in getting residents to safety: the time available to protect people **(lead time)** and the time it takes to protect them **(evacuation time**). If lead time falls below evacuation time, a scenario get can become dire. Some variables (e.g. ignition location, winds, fuel moisture, terrain, fire behavior) are important inputs for estimating the lead time that might be available to protect residents. A fire that ignites near a community and spreads rapidly towards it (due to winds, behavior, terrain, direction) may offer little time for emergency managers to conduct an orderly evacuation. This can be exacerbated by the day-of-week and time-of-day variations in the vehicle load. For example, the number of vehicles (evacuating residents, workers and visitors) that might be in a community at any one time can vary dramatically depending on land use, which affects the evacuation time (e.g. industry, commercial activity, sporting events, concerts, weddings, holidays).

Wildfire safety hazards arise when the lead time falls below the evacuation time, and the difference between the two is a principal cause of fatalities in evacuations. For example, in the 2018 Camp Fire in Paradise, the city evacuation plan called for 2 to 3 hours to safely evacuate the town (evacuation time), but the fire only offered 1.5 hours from its ignition to its impact on structures on the northeast side of Paradise (lead time). This led to a community burnover where many residents were evacuating through the fire. If the estimated evacuation and lead times are known to be of unacceptable risk in a community subject to fast-moving wildfires, it is critical to evaluate them under a range of likely scenarios prior to adding development for more residents, workers, and tourists (vehicle load).

Gross estimates for evacuation time can be calculated using simple assumptions about **warning time, response time, vehicle loading, and road capacity.** Assuming that two-lane roads built to fire safe standards have one traffic lane for egress (and one lane for emergency vehicle ingress), and assuming that an egress lane to a collector road can

serve a range of 600 to 1200 vehicles per hour (vph) depending on many factors (e.g. merging, intersection control, car-following behavior, back-round traffic from surrounding communities). Likewise, if two similar roads are available to evacuate, the egress capacity could range from 1200 to 2400 vph. In supply-demand terms, this would be an estimate of the "supply" available to serve the evacuees as they leave a community. The egress "demand" is estimated by the vehicle load which depends on the time of day, day of week, or special events. Dividing the vehicle demand by the egress road supply provides an estimate of **the minimum evacuation time**. While this is a very blunt measure of the actual time to evacuate a community (which could be much longer), it has significant value in establishing egress regulations (i.e. the minimum should not be too great).

For example, assuming a community with 1000 households and 2 cars per household (or 2000 vehicles) exits along one road, the minimum evacuation time could range from an ideal high-capacity case of (2000 vehicles / 1200 vph = 1.7 hours), to a lower-capacity case (2000 vehicles / 600 vph = 3.3 hours). If there are two roads available for safe egress to the collector road, the minimum evacuation time is halved to (2000 vehicles / 2400 vph = 0.83 hours) for the high-capacity case or (2000 vehicles / 1200 vph = 1.6 hours) for the lower-capacity case. However, if workers or visitors increase the evacuee vehicle load, a much worse case of higher demand, such as 3000 vehicles and lower capacity exits could lead to a greater minimum evacuation time (3000 vehicles / 600 vph = 5 hours). This would not be an acceptable, as any wildfire that offered less than 5 hours of lead time could result in a community burnover with many evacuees in transit. This presents an extremely high safety threat, as visibility conditions may become so poor that the vehicles drive off the road or impact other vehicles and/or flames and heat overcome the occupants. On-road fatalities occurred, for example, during the 2003 Cedar Fire in San Diego County and the 2018 Camp Fire in Paradise.

Additionally, the evacuation time could be much longer if **warning time is prolonged** or key exits and intersections are not controlled by law enforcement. If traffic flow problems occur at intersections or along collector roads due to adverse events (e.g. wildfire blocking an exit, abandoned vehicles, or gridlock), this could also lead to fatalities. As the 2018 Camp Fire in Paradise and 2017 Tubbs Fire in Sonoma County recently demonstrated, vehicles overtaken by fire in an evacuation is an especially dangerous scenario.

Conclusion:
In summary, while there are many ways to develop standards that limit development in fire-prone areas to the number, capacity, and arrangement of the exits relied upon in a wildfire, it is important that development not proceed unchecked to the point that public safety is severely compromised and the residents have no realistic chance of safely evacuating in a dire wildfire scenario. The 2018 Camp Fire in Paradise, California offers the best example of a town with an evacuation plan of 2 to 3 hours that only had about 90 minutes before homes were burning.

CREDENTIALS

I received a Doctor of Philosophy (Ph.D.) degree from the University of California Santa Barbara in 1999 in the field of Geography; a Masters of Science (M.S.) degree from the same university in 1995; and a Bachelor's of Science (B.S.) degree in Computer and Information Science from the University of Oregon in 1986. I am currently a Professor of Geography at the University of Utah. My expertise is in environmental hazards, transportation, and geographic information systems with a particular focus on wildfire evacuation planning, analysis, and modeling. I proposed a set of standards for transportation egress (exit capability) in wildfire areas that was adopted by the National Fire Protection Agency in 2008 in their Standards for the Protection of Life and Property in Wildfires. I received research grants from the National Science Foundation to study: 1) the 2003 Southern California Wildfires, 2) Protective Action Decision Making in regards to evacuation versus shelter-in-place, and 3) Protective Action Triggers (decision points regarding when to order an evacuation). In 2005 I published an article questioning whether fire-prone communities would someday have a maximum occupancy and proposed possible standards.[1] In 2017 I published an article with my collaborators on warning triggers in environmental hazards that described the issues that arise in deciding when to order an evacuation or other protective action.[2] In 2013, along with my collaborators, I analyzed community egress in fire-prone areas of the western U.S. to identify those that might face difficulty evacuating due to traffic congestion.[3] In 2011, I developed a decision model with my collaborators to aid in deciding whether evacuation or shelter-in-place is the best decision in a wildfire.[4] My work has been cited in fire evacuation plans prepared in conjunction with Environmental Impact Reports in California.

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Public Safety in the Urban–Wildland Interface: Should Fire-Prone Communities Have a Maximum Occupancy?

Thomas J. Cova[1]

Abstract: Residential development in fire-prone wildlands is a growing problem for land-use and emergency planners. In many areas housing is increasing without commensurate improvement in the primary road network. This compromises public safety, as minimum evacuation times are climbing in tandem with vegetation and structural fuels. Current evacuation codes for fire-prone communities require a minimum number of exits regardless of the number of households. This is not as sophisticated as building egress codes which link the maximum occupancy in an enclosed space with the required number, capacity, and arrangement of exits. This paper applies concepts from building codes to fire-prone areas to highlight limitations in existing community egress systems. Preliminary recommendations for improved community evacuation codes are also presented.

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CE Database subject headings: Fire hazards; Evacuation; Access roads; Traffic capacity; Transportation safety; Codes; Public safety; Transportation engineering.

Introduction

Residential development in fire-prone wildlands is a growing problem for land-use and emergency planners. Easy access to recreation, panoramic scenery, and lower property costs are enticing people to build homes in areas that would otherwise be considered wildlands. This development steadily increased in the United States from the mid 1940s, although local growth rates varied according to economic, demographic, and amenity factors (Davis 1990). At the same time, decades of fire suppression has resulted in a record abundance of fuel in and around many developments (Pyne 1997). This led the Forest Service to recently identify thousands of communities near federal lands as "at risk" to large conflagrations (U.S. Forest Service 2001).

The area where residential structures and fire-prone wildlands intermix is called the urban–wildland interface or wildland–urban interface (Cortner et al. 1990; Ewert 1993; Fried et al. 1999). In much of this area, homes are being added as the primary road network remains nearly unchanged. This is not surprising, as interface communities are often nestled in a topographic context that prohibits the construction of more than a few exiting roads. It is generally too expensive to build a road into a canyon, or onto a hillside, from every direction. Also, residents prefer less access because it reduces nonresident traffic. A common road-network addition is a culdesac that branches off an existing road to add more homes.

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Incremental planning in fire-prone areas has a number of adverse impacts (e.g., wildfire effects, open space decline), but the focus in this paper is evacuation egress. "Egress" is defined as a means of exiting, and it can be viewed as accessibility out of an area in an evacuation. When a wildfire threatens a community, residents generally evacuate in a condensed time either voluntarily or by order. In past urban wildfires with short warning time, limited egress has proven to be a problem ("Charing cross bottleneck was a big killer" 1991; Office of Emergency Services 1992). Sheltering-in-place is a competitive protective action when there is not enough time to escape or a homeowner wishes to remain behind to protect property, but it is much less tested than evacuation in wildfires. However given increasing housing densities in fire-prone areas without commensurate improvements in the primary road network, the case for sheltering-in-place is gaining ground. This leads to an important question: "How many households is too many?" Or alternatively, "What is the maximum occupancy of a fire-prone community?"

Maximum occupancies are well defined and enforced in building safety, and it is common to see the maximum number of people allowed in an assembly hall posted clearly on the wall. This concept has not been applied to community development in fire-prone areas, although the broader terms of "access" and "egress" appear in contemporary codes (National Fire Protection Association 2002; International Fire Codes Institute 2003). Egress standards are currently defined in terms of minimum exit-road widths, or a minimum number of exits, without regard to how many people might rely on the exits. This is less sophisticated than building egress codes which link the maximum expected occupancy of an enclosed space with the required number, capacity, and arrangement of exits (Coté and Harrington 2003). Building egress codes have been hard earned over nearly a century of research, refinement, and loss of life (Richardson 2003).

The purpose of this paper is to apply egress concepts drawn from building fire safety to community egress in fire-prone areas. Although these concepts and codes were originally developed for

(Date: October 20, 1995)

Fig. 1. Looking west at narrow roads surrounding 1991 Oakland–Berkeley fire origin

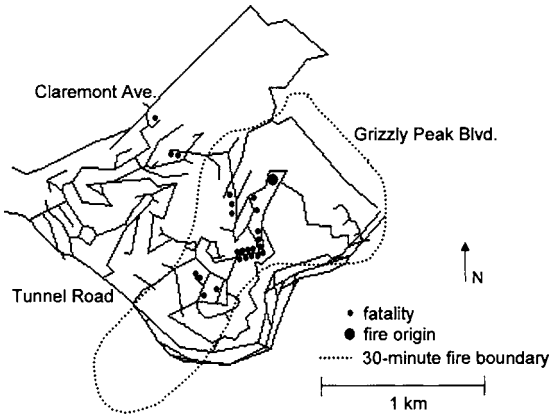


Fig. 2. Fatalities, fire origin, and approximate 30 min fire boundary in 1991 Oakland–Berkeley fire

small-scale, indoor spaces, they have potential utility in fire-prone communities. The first section reviews background on the growing urban–wildland egress problem. The next section reviews basic means-of-egress concepts defined in building codes. A method is presented to compare community egress systems based on concepts and standards from building safety that includes preliminary recommendations for new community egress codes. The paper concludes with a discussion of improvements that can be made to community egress systems.

Growing Urban–Wildland Egress Problem

Representative Communities

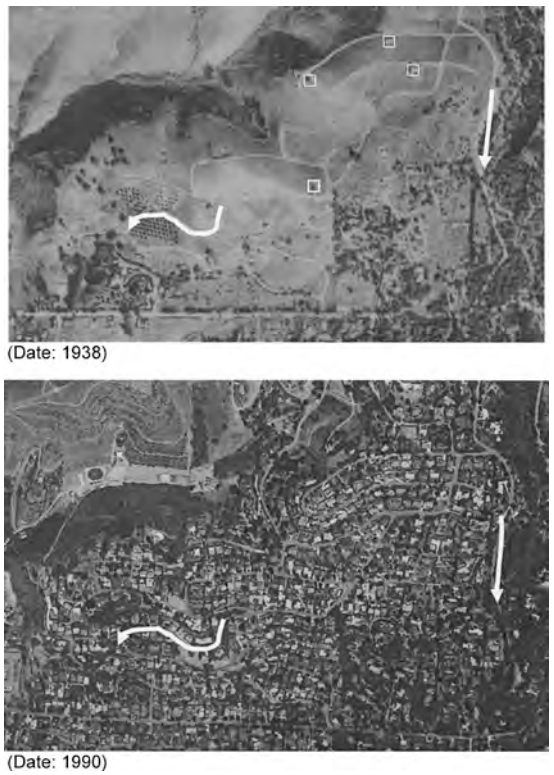
There are literally thousands of fire-prone communities in the West with a static road network and steadily increasing housing stock. This section briefly examines 2 representative examples. To date, the dominant focus of planners and residents in these communities has been structure protection with much less attention focused on egress issues. This may be due to the fact that property loss in wildfires is much more common than loss of life. Poor egress in interface communities is generally the result of narrow roads, irregular intersections, and few exits. In most of these areas the likelihood of an extreme fire is increasing in tandem with the vulnerability created by steadily climbing minimum evacuation times. Without fire to rejuvenate the ecological system, vegetation advances toward its fire recurrence interval as home construction adds additional fuel, residents, and vulnerability (Rodrigue 1993; Radke 1995; Cohen 2000; Cutter 2003).

Buckingham, Oakland, Calif.

Fig. 1 shows the neighborhood at the origin of the 1991 Oakland–Berkeley Fire 4 years after the fire. Without vegetation to obscure the view, it is clear that the road network is a maze of narrow streets. The photo was taken during the initial rebuilding process when hazard abatement procedures were being considered. At the time of the fire there were 337 homes in this neighborhood with four exits. The fire blocked the two primary exits in its first 1/2 h (Tunnel Road east and west), leaving the remaining residents two narrow, uphill exits. Most of these residents chose to leave on Charing Cross Road, a 13 ft wide afterthought that was not designed to handle this volume. Many of the fatalities (Fig. 2) were residents caught in or near their cars at the end of a traffic queue when the fire passed.

Mission Canyon, Santa Barbara, Calif.

Mission Canyon is a community just northwest of downtown Santa Barbara, Calif. that is adjacent to a chaparral ecosystem. The basic road network geometry was established in the 1930s and has changed little since (Fig. 3). In 1938 there were four households in the upper canyon using two exits (shown in white), but by 1990 there were more than 400 households relying on the same two exits. All households north the two exits (above) must use one of these two exits to leave, but households south of these exits (below) have more exiting options. The area was originally grasslands, but today it contains a significant amount of flammable, non-native vegetation (e.g., Eucalyptus) intermixed with wood structures. Prior evacuation studies have concluded that



(Date: 1938)

(Date: 1990)

Fig. 3. Mission Canyon in 1938 (4 homes, 2 exits in white) and 1990 (400+homes, same 2 exits in white)

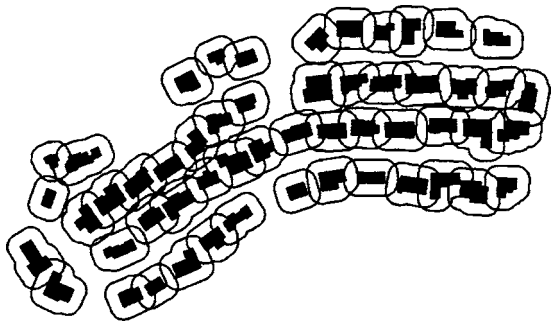


Fig. 4. Overlapping home ignition zones in fire-prone neighborhood (30 ft defensible-space buffer)

clearing upper Mission Canyon in the event of a wildfire would be relatively difficult (Cova and Church 1997; Law 1997; Church and Sexton 2002).

Protective Actions in Wildfires

Protective actions in a wildfire differ from a building fire in that sheltering-in-place in a structure, water body or safe zone (e.g., parking lot or golf course) is possible. This distinction is important because it means that evacuating a community may not be the best protective action in some cases (Krusel and Petris 1992). However, these cases can be difficult to assess during an event. Given more than enough time to evacuate, this is generally the best option for protecting life. If there is little to no time to evacuate, sheltering-in-place is likely the best option because evacuees risk being overcome by the fire in transit with much less protection than offered by a shelter. In the middle lies a gray area where evacuating may be the best option. As strongly as many experts feel about this issue (Wilson and Ferguson 1984; Decker 1995; Packman 1995; Oaks 2000), the uncertainty associated with a scenario can be too great to definitively state the best protective action. It depends on the quality of a shelter, road network geometry, fire intensity, wind speed and direction, visibility, travel demand, water availability and many other factors that are difficult to assess and synthesize under pressure.

A key hurdle in advising people to shelter-in-place in their homes is that not all structures are defensible. A defensible structure offers its occupants sufficient protection to withstand a passing wildfire. This is embodied in the concept of a "home ignition zone," or the area immediately surrounding a structure where ignition is feasible (Cohen 2000). Structures are not defensible if their ignition zones contain substantial fuel, adjacent ignition zones overlap, or both. If ignition zones overlap, then creating a defensible space would require homeowners to clear their neighbors' vegetation (Fig. 4). In other words, the wood structures in this figure are not defensible and an ignition chain reaction is possible. In cases where structures are sufficiently spaced, vegetation and other fuel within the home ignition zone can also render a structure indefensible. This is common because residents in these areas generally embrace trees and the amenities they provide. In dense, residential areas with wood structures, overlapping ignition zones and few viable shelters or safe zones, providing residents with sufficient egress is a critical issue.

Building Egress Codes

Early History

The concept of a maximum occupancy originated in an area of study called "means of egress." A means-of-egress is defined as, "… a continuous and unobstructed way of travel from any point in a building or structure to a public way consisting of three distinct parts: the exit access, exit, and exit discharge (Coté and Harrington 2003, p. 99)." Means-of-egress studies and associated codes incorporate all aspects of evacuating a building from stairway capacities and known crowd behavior under varying density to the proper illumination of exit signs. In setting standards for an enclosed space, an analyst can either examine the number, capacity, and arrangement of exits and calculate a maximum occupancy or, alternatively, examine the expected maximum occupancy and construct the required minimum egress. In either case, state-of-the-art egress standards and methods link occupancy to the number, capacity, and arrangement of exits.

Building egress standards can be traced to an occupancy–density study conducted by Rudolph Miller around 1910 in Manhattan (Nelson 2003). Miller's objective was to tabulate the density of workers per floor in 500 workshops and factories. This resulted in a wide range of densities from 19 to 500 ft^2 per person with the average for all floors at 107 ft^2 per person. In 1913 the National Fire Protection Association established the "Committee on Safety to Life" to study egress and formulate standards with a particular focus on advancing the principle of apportioning means-of-egress to the number of occupants in a building. One of the first egress standards was set by the New York Department of Labor in 1914 which limited the occupancy on each floor to 14 persons for every 22 in. of stair width. In 1935 the National Bureau of Standards published, "Design and construction of building exits," an important work in the history of building egress codes. One finding was that egress codes varied widely in regards to how many exits are needed, where they should be, and their required characteristics. Five different methods were discovered for determining required exits widths, and the report concluded with a new method that required stairwells have sufficient capacity to handle an evacuation of the most populated floor, the current method used in North American codes (Nelson 2003).

Modern Building Egress Codes

Contemporary methods for calculating a maximum occupancy for a building, floor, or meeting room are simple, but the number of possible building space uses and exit types is extensive (Coté and Harrington 2003). For example, the 2003 Life Safety Code© includes detailed exit-capacity adjustments (in persons) for stairways based on the presence, size and positioning of handrails, as well as ramp-capacity adjustments that incorporate ascending or descending slope (National Fire Protection Association 2003). In general, occupant load and building geometry determine the required number, location, and capacity of exits. An important aspect of a means-of-egress is that, "it is only as good as its most constricting component." Furthermore, a good design principle for an egress system is balance among exits because one or more might be lost in a fire.

A central concept in determining building egress is that of an occupant load factor. Occupant load factors are upper limits on density that vary with the use of the space. In other words, the nature of the use of a space determines its allowable density. For example, a "residential apartment building use" is allowed a gross

Table 1. Occupant Load Factors from Life Safety Code®[a]

Use	m^2 per person	ft^2 per person
Assembly use		
Concentrated, without fixed seating	0.65 net	7 net
Less concentrated, without fixed seating	1.4 net	15 net
Educational use		
Classrooms	1.9 net	20 net
Shops, laboratories, vocational rooms	4.6 net	50 net
Day Care use	3.3 net	35 net
Residential use		
Hotels and dorms	18.6 gross	200 gross
Apartment buildings	18.6 gross	200 gross
Industrial use		
General and high hazard	9.3 gross	100 gross

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density of 200 ft^2 per person while a "concentrated assembly (without fixed seating) use" allows a much higher net density of 7 ft^2 per person (Table 1). "Net" density refers to rooms, and "gross" density refers to floors or an entire building. Defining the maximum density for an indoor space based on its use is valuable because it bypasses the need to conduct an empirical occupancy study for every building. Occupant load factors derived from the table are then used in conjunction with the area of a meeting room or floor to design the means-of-egress system and also to trigger provisions like the need for a sprinkler system.

The required number, capacity, and arrangement of exits are determined using the occupancy load, the use of the space, and simple geometric rules. The required number of exits for each story is determined with a step function based on the use of the space and the occupancy load. Stories with less than 500 occupants require a minimum of two exits, those with between 500 and 1,000 require at least three exits, and more than 1,000 occupants requires at least four. A capacity-factor table specifies the minimum width for stairways and horizontal exits based on the use of the space. Most indoor activities require stairwells to have 0.3 in. of width for each person on the floor with the greatest number of occupants, but areas with hazardous contents require 0.7 in. per person, a much greater capacity (Table 2).

The linear relationship between the maximum number of occupants and exit widths was originally proposed by Pauls (1974) and widely adopted in North America. For example, a stairwell 44 in. wide has a capacity of (44 in./0.3 in. per person) = 147 persons for most floor uses (Table 2). If the occupancy of the floor is expected to exceed 147, then the stairwell capacity is insufficient and the maximum occupancy must be lowered or the stairwell egress capacity must be increased. The arrangement of the exits is determined using a simple geometric rule called the "one-half diagonal rule" that states that two exits shall not be located closer than one half the length of the maximum diagonal dimension of the area served (Fig. 5). This requires exits to be sufficiently remote so as to prevent a fire from blocking more than one. For example, if the maximum diagonal distance across a room with two exits is 60 ft., then the exits must be at least 30 ft. apart. Finally, an arbitrary distance cutoff is used to ensure that no building occupant is too far from an exit.

Table 2. Capacity Factors from Life Safety Code®[a]

	Stairwells (width per person)		Level components and ramps (width per person)	
Area	(mm)	(in.)	(mm)	(in.)
Board and care	10	0.4	5	0.2
Board and care, sprinklered	7.6	0.3	5	0.2
Health care, nonsprinklered	15	0.6	13	0.5
High hazard contents	18	0.7	10	0.4
All others	7.6	0.3	5	0.2

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Community Egress Codes

Despite the tremendous fire hazard in many interface communities, few studies have been done on residential densities in fire-prone areas (Theobald 2001; Schmidt et al. 2002; Cova et al. 2004). There is certainly nothing as complete as Nelson's (2003) longitudinal study of Washington D.C. federal building occupancy densities from 1927 to 1969. Second, there are no road-capacity studies for fire-prone communities on par with Pauls' (1974) extensive research on doorway and stairwell capacities. Roads in interface communities can be very narrow, intersect at odd angles, and vary in width. The capacity of this type of road network in dense smoke is difficult to quantify but would likely be very low. Third, existing egress codes for fire-prone communities are very general and do not provide the elegant methods for comparing and testing egress systems found in the building safety codes. The following codes serve as representative examples of contemporary community egress codes (National Fire Protection Association 2002):

1. 5.1.2 Roads shall be designed and constructed to allow evacuation simultaneously with emergency response vehicles.
2. 5.1.3 Roads shall be not less than 6.1 m (20 ft) of unobstructed width with a 4.1 m (13.5 ft) vertical clearance.

While the intent of the codes is clear, they do not link the occupant load with the required minimum number, capacity, and arrangement of exits. Current codes also tend to overlook the furthest distance a household is from its closest exit as well as vulnerability owed to dense fuel along the exits. In general, standards for interface community access focus more on maintaining fire-fighter ingress than resident egress (International Fire Code Institute 2003). Given that it is easy to find growing interface communities with miles of tangled narrow roads, many residents, and few exits, improved egress codes are a growing need.

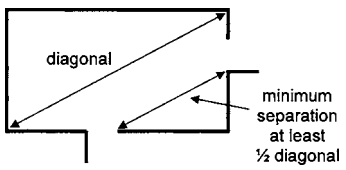

Fig. 5. One-half diagonal rule in building egress codes ensures that exits are sufficiently remote from one another

Differences in Community and Building Means-of-Egress Systems

Although there are many similarities between building and community egress systems, there are also significant differences. First, notification systems vary across communities (Sorensen 2000), whereas warning is generally issued with a siren, flashing lights, and a public address system in a building. For this reason, warning is nearly instantaneous and uniform in modern buildings, where it can take minutes to hours to warn all residents in a community, depending on the area, population density, and notification modes (e.g., reverse 911 or door to door). This has egress implications because the most constraining component in a community's egress system may simply be information, a vital yet scarce resource in most emergencies (Alexander 2002). However, slow notification can have benefits (if it is not too slow), as it can dampen household departure rates which reduces the likelihood of a traffic jam from a sudden burst of travel demand in a wildfire. Sudden bursts of travel demand are rare in evacuations but can lead to extreme stress when egress is constricted (Quarantelli et al. 1980; Chertkoff and Kushigian 1999), as in the case of the 1991 Oakland Fire.

Emergency manager behavior, population mobility, and human response are also important elements of an egress system. Emergency manager behavior is important because an incident commander generally decides who should evacuate and when they should leave (Lindell and Perry 1992). Mobility in a community context refers to the proportion of available drivers and vehicles in a population, whereas building evacuees are generally on foot or in a wheelchair. A glaring example of this constricting factor exists in many developing countries where mobility can be so low as to render regional evacuation infeasible (e.g., cyclones in Bangladesh). However, mobility can also cause problems if a highly mobile population leaves in a condensed amount of time and overloads an egress system.

Human response is also important, and evacuee behavior can be very different in wildfires than buildings. In building fires, occupants generally proceed directly out of the building or facility given sufficient egress, knowledge of the floor plan, and clear directions. In wildfires, there are family members, pets, horses, and livestock to evacuate, property to protect, and sheltering-in-place is always an option. These factors can dampen sudden spikes in egress demand but are more often a drawback in clearing an area quickly. In a building evacuation, the "walk, don't run" rule is used to dampen demand spikes and to reduce the likelihood of panic. Unfortunately, there are very few studies on wildfire evacuation behavior, but analogies can be drawn to evacuation behavior in other hazards that have been studied in greater depth (Perry 1985; Mileti and Sorensen 1990; Zelinsky and Kosinski 1991; Vogt and Sorensen 1992; Drabek 1996; Dow and Cutter 2002).

Perhaps the most obvious difference between building and community egress systems is the engineered components. Buildings have stairways, elevators, escalators, ramps, doors, handrails, and hallways, where communities have driveways, roads, intersections, stop signs, and traffic signals. Although these differences are significant, general concepts drawn from building codes may have value in a community context. One approach is to modify and extend building egress codes to achieve codes of comparable quality for communities.

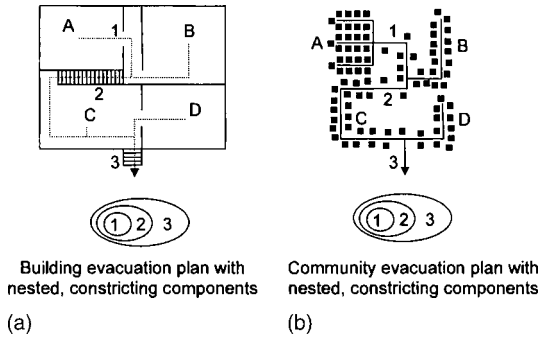

Fig. 6. Comparing nested, constricting components in building egress system with similar ones in community

What is a Community "Exit"?

An initial geographic problem in designing codes for communities might be deemed "the community exit problem." In a building context, exits have a component referred to as the discharge that leads people to a public way outside the building. In other words, safety is defined as "outside" the room or building. Inside and outside are ambiguous concepts in a community context and difficult to specify. If a predefined emergency planning zone (EPZ) is centered on a known hazard like a nuclear power plant or chemical stockpile site (Sorensen et al. 1992), then safety can be defined as outside the EPZ. In wildfires the zone to evacuate is defined on-the-fly at the time of the event and may expand in any direction as the fire progresses. For this reason, setting egress codes in advance that relate occupancy load to exit capacities requires searching the set of all potential evacuation zones.

An insight drawn from building studies can aid in addressing this problem. As noted, "A means of egress is only as good as its most constricting component." In a road-network context, this is referred to as a "bottleneck." A bottleneck can be used to define the inside and outside of a community, as traversing one is similar to clearing an exit discharge in a building (Cova and Church 1997). In other words, once a vehicle has successfully traversed a bottleneck, it is no longer a constraint on travel. This means that the community exit problem can be viewed as a search for potential roadway bottlenecks. In a sense, this is the approach adopted by interface codes that require at least two exits, as this precipitates a search for communities with only one exit, a potential bottleneck.

One problem with requiring that communities have more than one exit is that a bottleneck can still exist. In short, more than one exit does not ensure that an egress system is sufficient. It depends on the number of occupants, the arrangement and capacity of the exits, and the concentration of travel demand in space and time. Adding to this problem, bottlenecks can be nested in communities as they can in buildings. Fig. 6 compares nested constricting components in a building egress system with similar constricting components in a community context. Neighborhood A is nested within bottlenecks 1, 2, and 3. A building's outer wall is the point at which nested constraining components terminate, but in a community context, components nest from a street segment to a neighborhood, city, region, and so on. This can be addressed by terminating the search for egress bottlenecks when the area constrained is larger than that likely to be evacuated in a wildfire.

Table 3. Proposed Load Factors for Interface Communities

Use	Road length per household (m)	Road length per vehicle (m)
Residential[a]		
Low wildfire hazard	12.5	6.3
Moderate wildfire hazard	16.7	8.3
High+ wildfire hazard	20.0	10.0
Residential and tourism[b]		
Low wildfire hazard	12.5	4.2
Moderate wildfire hazard	16.7	5.6
High+ wildfire hazard	20.0	6.7

[a]2 vehicles per household.

[b]3 vehicles per household.

Table 5. Proposed Capacity Factors for Interface Communities

Use	Minimum total exit capacity (vph per household)	Minimum evacuation time (h)
Residential[a]		
Low wildfire hazard	1	2
Medium wildfire hazard	2	1
High+wildfire hazard	4	0.5
Residential and tourism[b]		
Low wildfire hazard	1.5	2
Medium wildfire hazard	3	1
High+wildfire hazard	6	0.5

[a]2 vehicles per household.

[b]3 vehicles per household.

Improving Community Egress Codes

Methods

The focus in a community context is therefore on identifying constricting components in a means-of-egress system. Furthermore, to achieve a comprehensive code and associated methods, the most constricting component should be defined in terms of the expected maximum occupancy as well as the number, capacity, and arrangement of exits. This is accomplished in a building context with look-up tables and simple geometric rules like the one-half-diagonal rule. In this section, preliminary analogues for interface communities are proposed. Agreed-upon community egress tables and codes will take significant cooperation among planners, and this represents a more formidable hurdle in terms of code development and compliance than the technical concepts discussed here (Burby et al. 1998).

Tables 3–5 represent community look-up tables for residential loading factors and the minimum number and capacity of exits. Table 3 depicts preliminary recommendations for community-based load factors expressed in road length per household, where communities with a greater fire hazard are required to have a lower density. In other words, as fire hazard increases the maximum allowable household density along roads should decline (Fig. 7). This is analogous to building codes which require a lower occupant density for buildings that contain hazardous materials (Table 1). To avoid delimiting a community's boundary, which is very subjective, "density" was defined as the average length of road (e.g., street centerline) per household in kilometers. This can be viewed as the average number of driveways per unit length of road. This calculation requires two easily acquired inputs that can be objectively measured: the number of households and total road length in the community.

Table 4 represents the minimum number of exits required for a community, which is a step function of the number of households. Allowing communities with only one exit to have up to 50 households avoids classifying all culdesacs as noncompliant with a two-exit minimum code. Table 5 represents the required minimum (total) exit capacity expressed in vehicles per hour (vph) per household. This is analogous to the linear relationship between persons and stairwell width in North American building egress codes (Table 2). The basis for the minimum required vph per household is a desired minimum evacuation time. For example, if a community has a high fire hazard (or greater), then the minimum evacuation time should be at most 30 min (0.5 h). Assuming two registered drivers per household, this requires that the exits have a minimum capacity of 4 vph per household. So a community with 100 households would need a total exit capacity of at least 400 vph to allow the estimated 200 vehicles to leave in 1/2 h (200 vehicles/0.5 h=400 vph). This coarse approach to estimating minimum evacuation time can be better tested for a given community with a traffic simulation model (Cova and Johnson 2002).

In most fire-prone communities, the "use" of the space is residential, but in larger communities there may be businesses, schools, churches, community centers, and tourist attractions (e.g., lakes, botanical gardens, hiking trails). Facilities and attractions above and beyond residences are important because community occupancy may vary significantly when tourists and tran-

Table 4. Proposed Minimum-Exits Table for Interface Communities

Number of households	Minimum number of exiting roads	Maximum households per exit
1–50	1	50
51–300	2	150
301–600	3	200
601+	4	

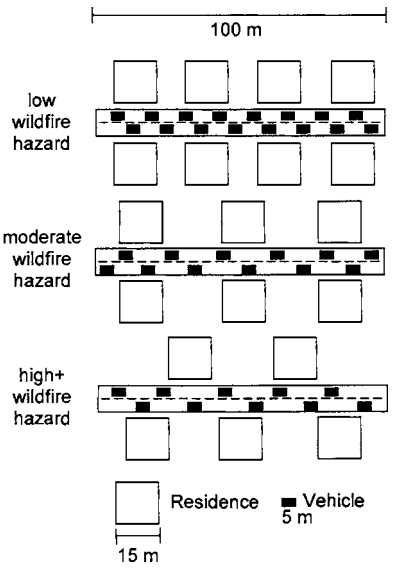

Fig. 7. Visual depiction of loading factor table for "residential use" assuming average of 2 registered drivers per home

sients are drawn (Drabek 1996). Furthermore, transient knowledge of the environment (e.g., evacuation routes) can be very poor. A community with a high degree of transients is analogous to an "assembly use" in building egress codes because occupants are generally unfamiliar with their environment. Table 5 requires a minimum capacity of 6 vph per household for high fire-hazard communities with tourism. So a community with 100 households and tourists would need a total exit capacity of at least 600 vph to allow the estimated 300 vehicles to leave in 1/2 h (300 vehicles/0.5 h=600 vph). The assumed mean number of vehicles per household can be adjusted, but standards should be set using the maximum probable occupancy in an area rather than the residents (and thus vehicles) recorded by the census.

Using Tables 3–5 in conjunction with a diagonal rule, a maximum-distance threshold and an exit-vulnerability rule, it is relatively straightforward to develop preliminary codes and compare community egress systems. For example:

1. Occupant load factor (density). The density of homes along the roads in any fire-prone community or portion thereof should not exceed that specified in Table 3.
2. Number of exits. The number of means-of-egress from any fire-prone community or portion thereof shall meet the minimum specified in Table 4.
3. Exit capacity. The total egress capacity from a fire-prone community or portion thereof shall meet the factors specified in Table 5.
4. Exit arrangement. The closest distance between any two points along any of the n exits from a fire-prone community must be at least $1/n$ the maximum diagonal distance across the community. The maximum diagonal of a community is defined as the greatest Euclidean distance between any two households that rely on the same exit set, and the minimum distance between exits is defined as the shortest Euclidean distance between any two points along two exiting roads.
5. Maximum exit distance. No household in a fire-prone community shall be further than 3 km by road from its closest exit. The maximum exit distance for a community is defined as the household with the greatest shortest-path distance on the road network to an exit discharge in the most constraining bottleneck set (i.e., the end of one of the exiting roads from the community).
6. Exit vulnerability (distance to fuel). Exits in a fire-prone community shall have a 30 ft buffer on each side that is clear of fuel.

An important aspect of this approach is that each recommended code is an independent test. This means that a community can meet or fail any subset of the codes. For example, a community might meet the density and minimum-number-of-exits codes but fall short of the exit-capacity code. The advantage of independent tests is that distinct limitations in a community's egress system can be highlighted separately. Fig. 8 depicts the proposed characteristics measured for Mission Canyon.

Table 5 provides the important link between expected maximum occupancy and required minimum exit capacity. An interesting aspect of this table is that it can be applied in reverse to calculate a community's maximum occupancy. For example, if a high-fire-hazard residential community (i.e., minimum evacuation time no greater than 30 min) has a total exit capacity of 1,000 vph in the most constraining bottleneck set, then from Table 5 the maximum occupancy would be (1,000 vph/4 vph *per household*)=250 households.

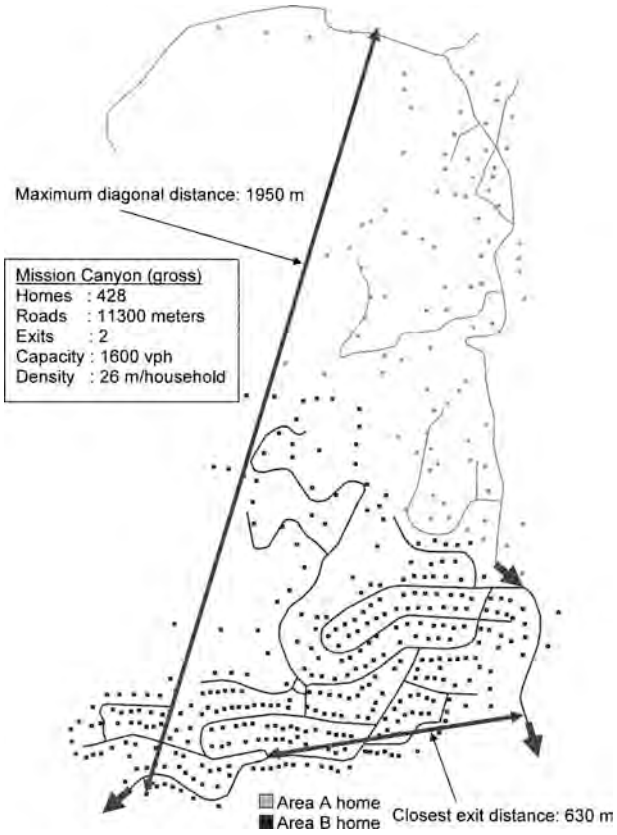

Fig. 8. Example (gross) egress calculations for Mission Canyon

Comparing Interface Communities

This section applies the proposed method to sample interface communities with high wildfire hazard, relatively low egress, and residential land use. A community with residential land use simplifies the estimation of occupant load by eliminating commercial, educational, and tourism activities. The inside (and outside) of each community is defined by the most constraining road-network bottleneck set. For example, if a community's most constraining bottleneck set is two exits, the calculations are for the households that would need to traverse one of these exits in an evacuation.

Perhaps the most involved calculation is for road capacity. This was crudely estimated using Eq. 8-3 in the *1997 highway capacity manual* (Transportation Research Board 1997):

$$\mathrm{SF}i = 2{,}800(v/c)_i f_d f_w f_g f_{\mathrm{HV}} \tag{1}$$

This equation states that a road's service flow rate (SF_i) in vehicles per hour (vph) is the product of the volume-to-capacity ratio for level-of-service i $(v/c)_i$ and a set of adjustment factors for directional traffic distribution f_d, lane and shoulder width f_w, grade f_g, and the presence of heavy vehicles f_{HV}. A narrow, mountainous road operating at level-of-service E (0.78) (maximum capacity) is assumed (for this analysis) with 100% of the traffic in one direction (0.71) on a 9 ft wide lane and 2 ft shoulder (0.70) heading downhill (1) with the possible 3% presence of large recreational vehicles (0.75) for an estimate of capacity per exit in clear visibility conditions with moderate demand rates of 814 vph (rounded to 800). In communities with uphill exits, wider roads or no recreational vehicles, this can be adjusted. Concentrated demand could greatly degrade this flow rate to level of service F where capacity can no longer be reliably estimated. Also, it should be noted that this number is very optimistic be-

Table 6. Data for Comparing Interface Community Egress Systems

Community	Homes	Exits	Road length (m)	Density (m per home)	Exit capacity (vph)	Max. diam. (m)	Exit separ. (m)	Max. dist. (m)	Exit fuel buffer
Buckingham[a]	337	4	5,293	16	3,200	1,040	85	430	No
Emigration Oaks	250	2	11,820	47	1,600	3,212	1,589	2,550	No
Summit Park	446	2	18,960	43	1,600	2,230	395	4,700	No
Mission Canyon	428	2	11,300	26	1,600	1,950	630	2,300	No
Area A (net)	60	1	4,576	76	800	1,520	NA[b]	1,750	No
Area B (net)	368	3	6,724	18	2,400	1,250	630	1,900	No

[a]1991 data.

[b]Not applicable.

cause it does not consider driveways along a road or other merge points that may create flow turbulence.

Table 6 shows the raw data for the communities in the comparison which all have "high+" wildfire hazard during the fire season. Community fire hazard was grossly assigned based on the predominant vegetation and residential construction type. A community of wood structures intermixed with a combination of highly flammable vegetation (e.g., Gambel Oak or Eucalyptus) was assigned a "high+" wildfire hazard. Table 7 is derived from Table 6 and the recommended codes presented in the prior section by determining which aspects of each community are "compliant" (C) or "noncompliant" (N).

An interesting result of this comparison is that the neighborhood at the origin of the 1991 Oakland–Berkeley fire is compliant for three of the six egress tests. The number and total capacity of the exits, as well as the furthest distance from any home to its nearest exit were reasonable. The problem appears to have been the relatively high residential density, the close proximity of exits 1 and 3 (Fig. 9), and the tremendous amount of fuel along the exits. The neighborhood had been built to urban density with only 16 m of road per household (i.e., street centerline length), the most densely developed neighborhood in the comparison (Table 6). This means that in 1991 the neighborhood had a driveway, on average, every 16 m. This is very dense development for an area with extremely high fire hazard. The arrangement of the exits was also not ideal, as exits 1 and 3 were closer than 1/4 the maximum diagonal distance between the furthest two households relying on the exits. In 1991, exits 1 and 2 were blocked by the fire in its first 1/2 h, and most of the remaining residents chose exit 3 (Charing Cross Road). However, from the point of view of a wildfire, exits 1 and 3 are too close to one another to be considered genuinely separate means-of-egress, so a fire that blocks exit 1 is almost certain to block exit 3 which is just uphill, and this is what happened in 1991. Finally, there was a substantial amount of fuel along the exits, and this is what led exits 1 and 2 to be blocked by the fire so early in the event. However, all told, if this neighborhood had less than four exits the number of fatalities would likely have been much higher.

In regards to the other neighborhoods in comparison, it is easy to identify canyon and hillside neighborhoods in the West with relatively poor egress systems to varying degrees. Emigration Oaks is a neighborhood just East of Salt Lake City, Utah that has a reasonably good egress system, but it is an elongated community and the two exits are less than 1/2 its maximum diagonal distance (Cova and Johnson 2002). This resulted in the community being noncompliant in regards to exit arrangement. The community also has a substantial amount of highly flammable Gambel Oak lining the exit-road shoulders. Summit Park is a community on the Wasatch Mountain ridgeline between Salt Lake City and Park City. This neighborhood did very poorly, as it currently has 446 homes relying on two proximal exits that are lined with conifers. Mission Canyon in Santa Barbara, Calf. also scored poorly for the same reasons. To provide one example of "net" egress calculations for a community, Mission Canyon is divided into areas A (upper canyon) and B (lower canyon). Area A is not compliant in regards to the number of exits because it has 60 homes and only one exit, where Area B is too dense and does not

Table 7. Comparing Interface Communities Against Egress Standards[a]

Community	Density	Number of exits	Exit capacity	Exit arrange	Maximum exit distance	Exit fuel buffer
Buckingham, Oakland, Calif.[b]	N	C	C	N	C	N
Emigration Oaks, Utah	C	C	C	N	C	N
Summit Park, Utah	C	C	N	N	N	N
Mission Canyon, Calif.	C	N	N	N	N	N
Area A (net)	C	N	N	N	N	N
Area B (net)	N	C	N	C	N	N

[a]C = compliant, N = noncompliant.

[b]1991 data.

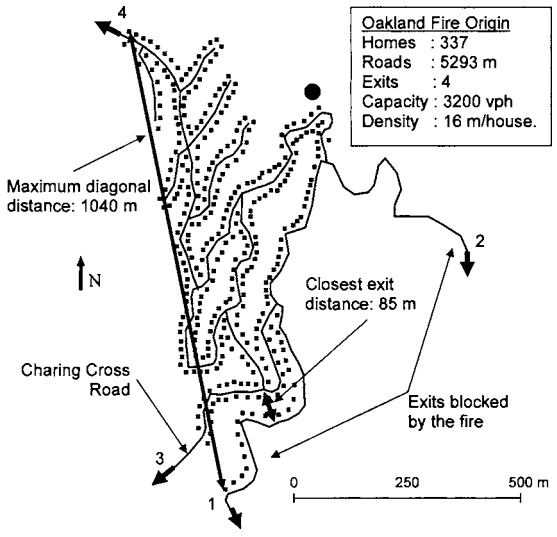

Fig. 9. Neighborhood at origin of Oakland–Berkeley fire in 1991

have sufficient exit capacity to serve its households. The main point with Tables 6 and 7 is simply that it is easy to identify neighborhoods with equal or greater fire hazard than the 1991 Oakland–Berkeley fire case and a more constrained egress system.

Urban and Emergency Planning Implications

The primary implication of developing a method comparable to building egress codes is that it is easy to identify fire-prone communities with relatively poor egress. The focus for urban and emergency planners should then turn to implementing new codes and improving egress systems. The proposed codes in the prior section can serve as a starting point and would need to be adjusted (or expanded) to work for a given locality. Also, despite the obvious limitations of the egress systems in the prior section, there are many actions that communities can take to improve their overall system (Plevel 1997). If a community has relatively poor egress, there are both demand-side and supply-side improvements (or adjustments) that can be implemented with varying cost (Burton et al. 1993). The focus in demand-side adjustments is reducing the concentration of vehicles in an evacuation in space and time to alleviate the need for egress capacity (e.g., supply). Example demand-side options include limiting the construction of new homes or businesses, limiting renters, constructing wildfire shelters, and identifying internal safe zones. Another demand-side adjustment is to require that structures be defensible so that residents can shelter-in-place. If a community can demonstrate that enough structures are defensible or there is sufficient public wildfire shelter or safe areas provided within the community, then the loading and capacity calculations could be adjusted to recognize that all not all residents will need to evacuate in a wildfire. This means that the following statement might be appended to each of the prior preliminary recommended codes:

"… unless a sufficient number and capacity of defensible structures, public shelters, or safe areas exist in the community for residents to shelter-in-place during a wildfire."

Supply-side adjustments to improve a community's egress system are also an option. This includes detailed evacuation route planning (i.e., Who will go where?) as well as reversing lanes and restricting turns at intersections to improve exit capacities (Wolshon 2001; Cova and Johnson 2003). Communities should also maintain their egress system. On-street parking restrictions can prevent low-capacity roads from becoming even lower, and clearing vegetation and other fuel along evacuation routes can minimize the loss of important exits during a wildfire. In cases where the egress system is severely substandard, widening roads or building new roads may be needed if more households are to be added.

Conclusion

Residential development in fire-prone areas is continuing without commensurate improvements to community-based transportation egress systems. This is only a small part of a much larger policy problem in fire-prone areas (Busenberg 2004), but it is an important one in protecting life. The codes presented in this paper would need to be integrated into a community's comprehensive hazard mitigation plan (Burby et al. 2000; Prater and Lindell 2000). However, the methods presented in this paper should help an analyst or planner in comparing community egress systems and possibly formulating codes. This may lead to improved community egress codes comparable to the higher-quality ones already in place for buildings. Limiting residential construction in low-egress, fire-prone areas with a "maximum occupancy" is not currently practiced but may be needed in some communities. If very few homes in a low-egress community are defensible and there is no safe zone or other public shelter, then limiting occupancy is one approach to maintaining public safety.

Economic pressure is strongly toward developing fire-prone communities to a density beyond which the egress system can safely handle in an urgent wildfire evacuation. The beneficiaries of new home development include new residents, developers, construction companies, and property tax collectors among many others. The parties that stand to lose include the residents who may perish in a wildfire, insurance companies, and the emergency managers challenged with the increasingly difficult task of protecting life and property in these rapidly growing areas. Thus, for political and economic reasons the methods presented in this paper may only find application in evacuation planning and comparing community egress systems. In the longer term, it is up to engineers and planners to ensure public safety in the urban–wildland interface by providing sufficient egress (or shelter) and educating residents on protective actions.

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From:	Gail Cafferata
To:	district5; district3; district4; Susan Gorin; David Rabbitt; Cannabis
Subject:	Marijuana harms innocent children
Date:	Tuesday, January 11, 2022 6:04:42 AM
Attachments:	JAMA article on marijuana.pdf

EXTERNAL

Dear Supervisors and staff,

I am deeply distressed by your refusal for months and years to deny any permits for any marijuana dispensaries (and any agricultural permits) despite community opposition based in scientific evidence of its harm to health, water supplies, air and other aspects of environmental health, community safety, and criminal activity.

I retain hope that you believe in science, which has proven the dangers of legalized marijuana sales and (and growing) for children. Here is an article from the Journal of the American Medical Association showing that making marijuana widely available increases children's hospitalizations for marijuana ingestion. Click https://www.medpagetoday.com/pediatrics/generalpediatrics/96567 for the full story: I also attach the complete JAMA article, FYI.

I strongly encourage you to read and digest this information. Without any change in your immoral actions, I will work to vote you all out of office.

Sincerely,
Gail Cafferata

JAMA Network Open

Research Letter | Substance Use and Addiction

Unintentional Pediatric Cannabis Exposures After Legalization of Recreational Cannabis in Canada

Daniel T. Myran, MD, MPH; Nathan Cantor, MSc; Yaron Finkelstein, MD; Michael Pugliese, MSc; Astrid Guttmann, MDCM, MSc; Rebecca Jesseman, MA; Peter Tanuseputro, MD, MHSc

Introduction

Previous studies have documented increases in cannabis exposures among young children after legalization of recreational cannabis.[1-3] Increasing evidence has implicated commercially produced edible cannabis products as a key factor associated with these increases.[3] Canada took a 2-phased approach to legalizing recreational cannabis. Initially, the sale of cannabis flower, seeds, and oils was permitted, and after 1 year, this expanded to a wider variety of products, including cannabis edibles.[4] We evaluated changes in pediatric emergency department (ED) visits and hospitalizations due to cannabis exposures associated with these changes.

Methods

This repeated cross-sectional study was authorized under section 45 of Ontario's Personal Health Information Protection Act and approved by the privacy and legal office of ICES (formerly the Institute for Clinical Evaluative Sciences). Section 45 allows ICES to collect personal health information without consent for the purpose of health system evaluation and improvement. We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline for cross-sectional studies.

We identified all ED visits and related hospitalizations due to cannabis exposures among 2.35 million children aged 0 to 9 years in Ontario, Canada, between January 1, 2016, and March 31, 2021. We compared trends and characteristics of ED visits over 3 periods: prelegalization (January 2016-September 2018); the period after legalization of flower products, or period 1 (October 2018-January 2020); and the period after commercial edibles became available, or period 2 (February 2020-March 2021). Poisson models were used to calculate incidence rate ratios (IRRs) for change in monthly rates of visits. Health administrative data sets were linked using encoded identifiers and analyzed at ICES (eMethods in the Supplement). All tests of significance were 2-sided, and *P* values < .05 were considered statistically significant. Data analysis was conducted from June through August 2021 using Stata statistical software version 17.0 (StataCorp).

Results

There were 522 ED visits due to cannabis exposures among children (mean [SD] age, 3.8 [2.6] years; 281 visits [53.8%] among boys) including 81 visits during prelegalization, 124 visits during period 1, and 317 visits during period 2. The proportion of cannabis-related ED visits with hospitalization increased significantly after the introduction of edibles (122 visits [38.5%] during period 2 vs 29 visits [23.4%] during period 1 and 20 visits [24.7%] during the prelegalization period; *P* = .002). There were 19 ED visits (3.6%) with intensive care unit admission; no deaths were recorded (**Table**).

Rates of ED visits associated with cannabis exposures increased from January 2016 to March 2021 (**Figure**). Period 1 (IRR, 3.13; 95% CI, 2.37-4.16; *P* < .001) and period 2 (IRR, 9.12; 95% CI, 7.15-11.65; *P* < .001) were associated with increases in visits compared with the prelegalization period,

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

with a larger IRR for period 2. After adjusting for an increasing time trend in ED visits due to cannabis exposures throughout the study period, period 2 continued to be associated with an increase in visits (IRR, 2.23; 95% CI, 1.17-4.27; P = .01) (Table). Period 2 overlapped with the COVID-19 pandemic.

Table. Cannabis Exposures Among Children by Time Period

	Prelegalization[a]	Period 1[b]	Period 2[c]	P value[d]
Cannabis exposure ED visits by characteristic				
Total visits, No. (monthly mean)	81 (2.5)	124 (7.8)	317 (22.6)	NA
Age, mean (SD)	3.6 (2.8)	3.5 (2.8)	4.0 (2.5)	.18
Sex, No. (%)				
Boys	44 (54.3)	78 (62.9)	159 (50.2)	.054
Girls	37 (45.7)	46 (37.1)	158 (49.8)	
Hospitalized, No. (%)	20 (24.7)	29 (23.4)	122 (38.5)	.002
Cannabis ED exposure visits per 100 000 population members				
Monthly rate, mean (95% CI)	0.16 (0.11-0.21)	0.51 (0.43-0.59)	1.48 (1.30-1.66)	NA
Annualized rate	1.96	6.14	17.75	NA
IRR (95% CI)				
Unadjusted	1 [Reference]	3.14 (2.37-4.16)	9.12 (7.15-11.65)	Period 1: < .001
				Period 2: < .001
Adjusted for monthly time trend[e]	1 [Reference]	1.33 (0.85-2.10)	2.23 (1.17-4.27)	Period 1: .21
				Period 2: .01
Cannabis ED exposure visits per 1000 all-cause poisoning ED visits[f]				
Monthly rate, mean (95% CI)	6.84 (4.80-8.88)	28.85 (22.07-35.63)	95.03 (80.54-109.52)	NA
IRR (95% CI)				
Unadjusted	1 [Reference]	3.81 (2.88-5.04)	13.05 (10.22-16.66)	Period 1: .001
				Period 2: .001
Adjusted for monthly time trend[g]	1 [Reference]	1.50 (0.95-2.38)	2.87 (1.49-5.52)	Period 1: .08
				Period 2: .002

Abbreviations: ED, emergency department; IRR, incident rate ratio; NA, not applicable.

[a] 33 months: January 2016-September 2018.

[b] Legalization of flower-based cannabis products, 16 months: October 2018-January 2020.

[c] Introduction of legal commercial edible cannabis products, 14 months: February 2020-March 2021.

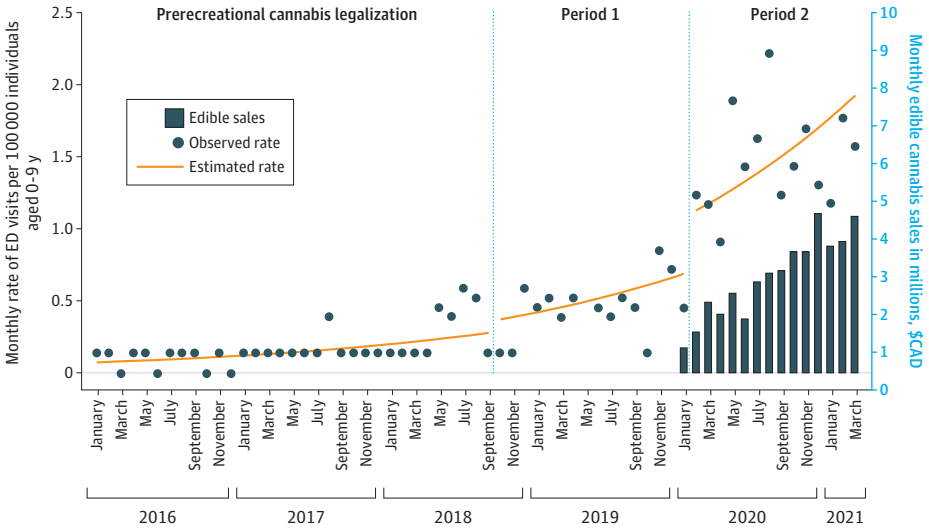
[d] Periods 1 and 2 are compared with the prelegalization period.

[e] IRR for monthly time trend: 1.04 (95% CI, 1.02-1.05; P < .001).

[f] ED visits related to all pharmaceutical and nonpharmaceutical poisonings.

[g] IRR for monthly time trend: 1.04 (95% CI, 1.02-1.06; P < .001).

Figure. Monthly Emergency Department (ED) Visits Due to Cannabis Exposures Among Children



Blue dots indicate observed rate; orange line, time-adjusted estimated rate; blue bars, monthly value of sales of legal commercial cannabis edible products (in millions $CAD); period 1, legalization of flower-based cannabis products; period 2, introduction of legal commercial edible cannabis products. To comply with privacy requirements at ICES (formerly the Institute for Clinical Evaluative Sciences), the rate of visits in months with 1 to 5 ED visits has been adjusted to represent the mean rate (0.14 monthly visits per 100 000 individuals) of all months during the study with 1 to 5 ED visits. The estimated trend line and analysis are based on unadjusted observed data.

During this time, pediatric ED visits due to cannabis exposures increased despite a decrease in total poisoning-related pediatric ED visits; the mean (SD) monthly count of visits was 312.3 (102.3) visits in the year prior to the pandemic vs 263.5 (100.4) visits during the first year of the pandemic.

Discussion

This repeated cross-sectional study found significant increases in the frequency and severity of ED visits due to cannabis exposures among children after the legalization of recreational cannabis. These findings suggest that the introduction of legal commercial edible cannabis products was a key factor associated with changes in ED visit frequency and severity. Rates of pediatric cannabis ED exposures found in this study were 7-fold higher than rates reported in Colorado after recreational cannabis legalization.[1] These population-level findings suggest that prior work from single centers may have underestimated the burden associated with pediatric cannabis exposures. Increases in ED visit frequency and severity occurred despite strict regulations that largely exceed US regulations (eg, a maximum of 10 mg of tetrahydrocannabinol per entire edible package, child-resistant packaging, and marketing restrictions) and consumer education campaigns.[5]

Our study was limited by lack of data on the source and type of cannabis ingested, and it is possible that cannabis from illicit sources and nonedible products contributed to the increase in visits. The legal cannabis retail market in Ontario has expanded rapidly since the start of period 2, and the number of legal cannabis stores is expected to increase 3-fold in the coming years.[6] Further regulatory measures, such as limiting formulations and appearance of commercial edibles, combined with education for parents and caregivers, may be required to decrease pediatric cannabis exposures.

ARTICLE INFORMATION

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Author Contributions: Dr Myran had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: Myran, Cantor, Tanuseputro.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Myran, Cantor.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Myran, Cantor, Pugliese.

Obtained funding: Myran, Cantor, Tanuseputro.

Administrative, technical, or material support: Cantor.

Supervision: Finkelstein, Guttmann, Jesseman, Tanuseputro.

Conflict of Interest Disclosures: None reported.

Funding/ Support: This study was supported by ICES (formerly the Institute for Clinical Evaluative Sciences), which is funded by an annual grant from the Ontario Ministry of Health and Ministry of Long-Term Care. This study

was also supported by project grant 452360 from the Canadian Institute for Health Research (CIHR). Dr Myran was supported by a fellowship from CIHR and the University of Ottawa Department of Family Medicine. Dr Tanuseputro was supported by a PSI Knowledge Translation Fellowship.

Role of the Funder/Sponsor: The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Disclaimer: Parts of this material are based on data and information compiled and provided by the Canadian Institute for Health Information and the Ontario Ministry of Health. The analyses, conclusions, opinions, and statements expressed herein are solely those of the authors and do not reflect those of the funding or data sources; no endorsement is intended or should be inferred.

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3. Dilley JA, Graves JM, Brooks-Russell A, Whitehill JM, Liebelt EL. Trends and characteristics of manufactured cannabis product and cannabis plant product exposures reported to US poison control centers, 2017-2019. *JAMA Netw Open*. 2021;4(5):e2110925-e2110925. doi:10.1001/jamanetworkopen.2021.10925

4. The Cannabis Act, Bill C-45, 42nd Parliament of Canada (2018). Accessed November 23, 2021. https://www.parl.ca/LegisInfo/en/bill/42-1/C-45

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SUPPLEMENT.

eMethods.
eReferences.

From:	Gail Cafferata
To:	district5; district3; district4; Susan Gorin; David Rabbitt; Cannabis
Subject:	Marijuana increases risk of strokes, especially among younger people
Date:	Wednesday, January 12, 2022 7:56:28 PM

DearSonoma County Supervisors and County Cannabis Advocates,

I am deeply distressed by your refusal for months and years to deny any permits for any marijuana dispensaries (and any agricultural permits) despite community opposition based in scientific evidence of its harm to health, water supplies, air and other aspects of environmental health, community safety, and criminal activity.

I retain hope that you believe in science, which has recently proven the increased dangers of marijuana on the cerebral health of younger people. Here is a summary of a recent article in the medical journal STROKE, published by the American Heart Association.

Cannabis Use and Delayed Cerebral Ischemia After Aneurysmal Subarachnoid

"Growing evidence links cannabis use to cerebrovascular disease, including aneurysmal subarachnoid hemorrhage (aSAH)1 and acute ischemic stroke.2 In a population-based study, the aSAH incidence was twice as high in cannabis users as in nonusers in a younger age group. Given the popularization of cannabis use in the United States, it is essential to continue evaluating the associated risks and benefits. This study investigates the effects of cannabis on delayed cerebral ischemia (DCI) and other outcomes of patients with aSAH. This study is the largest to identify a significant relationship between cannabis use and development of DCI, which contributes to morbidity and mortality after aSAH. In propensity score–adjusted multivariable analysis, DCI was 2.6× more likely in cannabis users. Patients with DCI were significantly more likely to experience poor functional outcomes (modified Rankin Scale score >2) and death."

Authors: Michael T. Lawton, MD et al. (c/o Neuroscience Publications, Barrow Neurological Institute, St. Joseph's Hospital and Medical Center, 350 W. Thomas Rd, Phoenix, AZ 85013. Email neuropub@barrowneuro.org)

Published in journal STROKE www.ahajournals.org/journal/str Stroke. 2022;53:00–00.

DOI: 10.1161/STROKEAHA.121.035650 February 2022

I believe in the golden rule. Do until others as you would have others do unto you, or "What is hateful to you, do not do to others," I strongly encourage you to read , mark and inwardly digest this information. Without any change in your immoral actions, I will work to vote you all out of office.

Sincerely,
Gail Cafferata

———————————————

The Rev. Gail Cafferata, Ph.D.
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From:	Nancy Graalman
To:	Tennis Wick; Scott Orr; Crystal Acker; Cannabis
Cc:	district4; Susan Gorin; David Rabbitt; Chris Coursey; Lynda Hopkins
Subject:	Sonoma Co. Programmatic EIR: Include "Wildlife Protection"
Date:	Friday, January 28, 2022 5:45:17 PM
Attachments:	Wildlife Protection_Sonoma County Programmatic EIR.pdf

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Please see the embedded document below and the attachment that detail our request that Wildlife Protection be an essential part of Sonoma County's study of the impact of cannabis cultivation on the County's environment and ecosystems.

Please call me with any questions or concerns.
Regards,
~~Nancy Graalman
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==========

Sonoma County Programmatic EIR

Scoping Document: Wildlife Protection

In support of Sonoma County's draft cannabis ordinance framework, we request that **study elements be included in the environmental impact report that explicitly serve to monitor and protect Sonoma County's richly diverse wildlife populations**.

> "You cannot begin to preserve any species of animal unless you preserve the habitat in which it dwells. Disturb or destroy that habitat and you will exterminate the species as surely as if you had shot it. So conservation means that you have to preserve forest and grassland, river and lake, even the sea itself. This is not only vital for the preservation of animal life generally, but for the future existence of man himself -- a point that seems to escape many people."
>
> ***- Gerald Durrell, naturalist and author (7 Jan 1925-1995)***

Habitat Loss and Importance of Connectivity

Over the last decade, natural areas in the West—including forests, wetlands, deserts, and grasslands—have been lost to development at the rate of one football field every two and a half minutes (Disappearing West, Center for American Progress, 2016). At the same time, more than 300 California animal species are at or near the brink of extinction, and many western wildlife species are in severe decline. Over the past decades, habitat loss in Sonoma County accrued 22% faster than in other counties in the state and 81% faster than elsewhere

in the US. Without habitat protections, the continued collapse of wildlife populations will have profound human and economic consequences in Sonoma and elsewhere.

Sonoma County is fortunate to be home to 860 protected areas (California Protected Area Database 2019, GreenInfo Network) that provide wildlife habitat, recreational opportunity, and ecosystem services. However, Sonoma County is also the most highly parcellated county in California. (Greenbelt Alliance, 2006). As County population density has increased, the availability of adequate habitat has decreased in tandem with the proliferation of roads, fencing and other development that degrades habitat and impedes movement of wildlife.

In addition to maintaining and expanding protected areas, Sonoma County needs to protect Wildlife Corridors, the continuous areas of natural and working lands connecting protected areas. Corridors allow for daily, seasonal, and generational movement of plants and animals. Keeping landscapes connected via habitat linkages or Corridors is the most frequently recommended strategy for maintaining ecosystem resilience in the face of climate change. (Heller and Zavaleta, 2009). In addition to supporting healthy movements of plants, animals, and other resources, Corridors contribute to clean and abundant water. Through an inclusive stakeholder process, areas of Sonoma County have already been identified as priority Terrestrial and Riparian Corridors (Gray *et al*, 2020a). These priority areas provide critical linkages for wildlife between coastal areas to the Berryessa Blue Ridge National Monument, as well as providing access to cooler areas (Gray *et al*, 2020b).

Protection of native fish and wildlife is consistent with Sonoma County's highest values of livability. Sonoma County's Fish and Wildlife Commission is charged with:

- Public education relating to the scientific principles of fish and wildlife conservation
- Improvement of fish and wildlife habitat
- Scientific fish and wildlife research conducted by institutions of higher learning, qualified researchers, or governmental agencies

The expansion of cannabis, similar to other types of development, is likely to come with ecological costs. These costs may include lower freshwater availability and quality due to withdrawal, road construction, pesticide, degraded wildlife habitat (e.g., vegetation clearing and fencing), and direct mortality (e.g., toxicants and poaching), and disturbance (e.g. lights, equipment noise, human presence) (Parker-Shames, 2021).

Recommendations

In developing Sonoma County cannabis Environmental Impact Report, we request:

1. Sonoma County does not issue "crop protection" licenses to trap, poison or shoot wildlife to cultivators of cannabis, and that illegal killings of wildlife be prosecuted to the fullest extent of the law.

2. Sonoma County's Cannabis programmatic EIR include a county-wide inventory of our various wildlife populations, including identification and specification of their habitat and movement requirements to sustain healthy populations. Data should include information about resident and migratory species.
3. Sonoma County supports existing or initiates new projects that track wildlife population trends and biodiversity metrics. This data should be made available to the public and should include strategies to address detriment to wildlife from cannabis cultivation.
4. Address the impacts of additional water use on groundwater and aquifers that ultimately and profoundly impact wildlife survival.

References

Parker-Shames, P., Choi, C., Butsic, V., Green, D., Barry, B., Moriarty, K., Levi, T., & Brashares, J. S. 2021. *The spatial overlap of small-scale cannabis farms with aquatic and terrestrial biodiversity.* Conservation Science and Practice, e602. https://doi.org/10.1111/csp2.602

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Gray, M., Micheli, L., Comendant, T., and Merenlender, A. 2020a. *Climate-Wise Habitat Connectivity Takes Sustained Stakeholder Engagement*. Land. 9. 413. 10.3390/land9110413.

Gray, M., Micheli, L., Comendant, T., and Merenlender, A. 2020b. *Quantifying Climate-Wise Connectivity across a Topographically Diverse Landscape.* Land. 9. 355. 10.3390/land9100355

Sonoma County Programmatic EIR
Scoping Document: Wildlife Protection

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--more--

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- Improvement of fish and wildlife habitat
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Recommendations

In developing Sonoma County cannabis Environmental Impact Report, we request:

1. Sonoma County does not issue "crop protection" licenses to trap, poison or shoot wildlife to cultivators of cannabis, and that illegal killings of wildlife be prosecuted to the fullest extent of the law.
2. Sonoma County's Cannabis programmatic EIR include a county-wide inventory of our various wildlife populations, including identification and specification of their habitat and movement requirements to sustain healthy populations. Data should include information about resident and migratory species.
3. Sonoma County supports existing or initiates new projects that track wildlife population trends and biodiversity metrics. This data should be made available to the public and should include strategies to address detriment to wildlife from cannabis cultivation.
4. Address the impacts of additional water use on groundwater and aquifers that ultimately and profoundly impact wildlife survival.

References

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