Idaho-Maryland Mine Project Supplement to the Final Environmental Impact Report

SCH# 2020070378

December 19, 2022
(Revised April 2023)

A Final Environmental Impact Report (EIR) was prepared for the Idaho-Maryland Mine Project (proposed project) by Nevada County, as Lead Agency, in accordance with the California Environmental Quality Act (CEQA) and the CEQA Guidelines, Section 15132. The Final EIR contains agency and public comments received during the public review period of the proposed project Draft EIR (DEIR). This Supplement to the Final EIR document has been prepared to address an inadvertent omission of attachments to a public comment letter received by Stevee Duber on the DEIR. Specifically, the attachments to Individual Letter 748, beginning on page 2-7704 of Chapter 2, Responses to Comments, of the Final EIR were inadvertently omitted from inclusion in the Final EIR. The attachments provide general information in support of the commenter's comments and do not directly address the DEIR. Although these attachments were inadvertently omitted from the Final EIR, the County did review the attachments prior to preparing its responses to the commenter's comments. Thus, the County adequately considered the referenced comments and revisions to the DEIR or Final EIR are not needed.

This Supplement also provides a replacement copy of Group Letter 7 from Community Environmental Advocates (CEA) that contains the full list of signatories to the letter. The comment content of the two letters is otherwise the same. It is noted, however, that this replacement letter does not include the letter attachments. Please refer to the Final EIR for the County's written responses to the full version of Group Letter 7, including its attachments.

Geophysical Research Letters

RESEARCH LETTER
10.1029/2020GL088679

Future Warming and Intensification of Precipitation Extremes: A "Double Whammy" Leading to Increasing Flood Risk in California

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Abstract This study focuses on quantifying future anthropogenic changes in surface runoff associated with extreme precipitation in California's Sierra Nevada. The method involves driving a land surface model with output from a high resolution regional atmospheric simulation of the most extreme atmospheric rivers (ARs). AR events were selected from an ensemble of global climate model simulations of historical and late 21st century climate under the "high-emission" RCP8.5 scenario. Average precipitation during the future ARs increases by ~25% but a much lower proportion falls as snow. The resulting future runoff increase is dramatic—nearly 50%, reflecting both the precipitation increase and simultaneous conversion of snow to rain. The "double whammy" impact on runoff is largest in the 2,000–2,500 m elevation band, where the snowfall loss and precipitation increase are both especially large. This huge increase in runoff during the most extreme AR events could present major flood control challenges for the region.

Key Points:
- Atmospheric river storm events will become more extreme and result in intensified surface runoff along with reduced snowfall
- The "double whammy" impact on runoff is dramatic in the future—nearly 50% on average, easily double and higher in certain locations
- The disproportionately enlarged runoff during extremes could raise significant challenges for water resource management and flood control

Supporting Information:
- Supporting Information S1

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1. Introduction

Recent studies have shown that precipitation events will become more extreme under projected 21st century climate change, due in large part to thermodynamically driven increases in global mean atmospheric moisture (Fischer & Knutti, 2016; Held & Soden, 2006; Norris et al., 2019; O'Gorman & Schneider, 2009; Pendergrass & Hartmann, 2014). Although projected globally averaged increases in precipitation extremes are quite robust, regional variations are typically substantial. Landfalling precipitation varies strongly due to both topographic influences and mesoscale atmospheric dynamical processes (Huang, Swain, Walton, et al., 2020; Leung et al., 2013; Pontoppidan et al., 2017; Rotunno & Houze, 2007).

In California, extreme precipitation is associated mainly with atmospheric rivers (ARs), narrow and filamentary corridors of enhanced water vapor flux. AR events also contribute to the majority of annual precipitation in the region (Gershunov et al., 2017; Guan et al., 2010; Ralph et al., 2004; Rutz et al., 2014; Zhu & Newell, 1998). Recent work has emphasized the significance of ARs for both water resources and flooding damage (Eldardiry et al., 2019; Konrad & Dettinger, 2017; Pavelsky et al., 2011). ARs are associated with very high precipitation over California's highest mountainous range, the Sierra Nevada (SN), where they are often associated with flood risk (Dettinger, 2011; Guan et al., 2016; Huang et al., 2018; Ralph et al., 2019) and provide critical water resources (roughly 60% of California's developed water) (quoted from Sierra Nevada Conservancy key issues, 2020; Reich et al., 2018).

A recent effort attempted to quantify future precipitation changes associated with the most extreme ARs impacting the SN (Huang, Swain, & Hall, 2020), involved dynamical downscaling of the Community Earth System Model Large Ensemble (CESM-LENS; Kay et al., 2015). Huang, Swain, and Hall (2020) found that projected precipitation during the most extreme AR events increases significantly, roughly 25% on average, mainly due to the thermodynamically driven increase in atmospheric moisture. Previous studies, such as Gershunov et al. (2019), also showed the dominant role of increased AR-related precipitation in climate change-related precipitation in California. Such intensification of future precipitation events over the western United States has been shown to lead to an increase in flood risk (Dettinger, 2011; Warner et al., 2015). In addition, previous studies (e.g., Das et al., 2011, 2013; Fyfe et al., 2017; Hamlet & Lettenmaier, 2007; Huang et al., 2018; Pierce et al., 2008) have shown that future warming will likely bring a very large loss of snowpack through enhanced snowmelt and more precipitation falling as rain rather than snow.

These two effects, increased precipitation and a decrease in the proportion of snowfall, would likely combine to produce a disproportionately large increase in flood risk during extreme AR events. To date, this "double whammy" effect on runoff has not been quantified. In this study, we impose output from the previously conducted extreme AR downscaling experiments of Huang, Swain, and Hall (2020) on a land surface model, initialized with plausible historical and future snowpack. Our goal is to examine how heavy runoff increases disproportionately compared to the increase in extreme precipitation when more of that precipitation falls as rain rather than snow, and it falls on a shrunken snowpack.

2. Methods

We use the Noah-MP land surface model (LSM) (Niu et al., 2011) (see the supporting information for further discussion), which is also the default LSM option coupled to Weather Research and Forecasting (WRF) model, to simulate changes to snowpack and runoff in response to very extreme AR events impacting the SN region. As introduced previously, the AR events we studied here were previously selected for WRF downscaling at 3 km from the 40 CESM-LENS ensemble members (hereafter, we refer to this data set as LENS-WRF) (Huang, Swain, & Hall, 2020). The 40 most extreme AR events impacting the SN were chosen in both the historical (1996–2005) and future (2071–2080) periods. (See the supporting information for more details about the LENS-WRF simulations and the Noah-MP runs.)

Given the size of the CESM ensemble (40 members), the number of events selected, and the number of years in each period, this procedure results in an average return period for the selected events of approximately 10 years. Each event simulation lasts about 10 days (i.e., 240 hr) long on average including the spin-up time before the event precipitation occurs. To better retrieve the runoff when AR events are imposed in the offline LSM runs, it is necessary to initialize the Noah-MP runs with a plausible preexisting snowpack from long-term mean climatology. The snowpack can then evolve along with runoff in the AR-forced Noah-MP runs, possibly affecting the surface runoff through rain-on-snow processes and the underlying snowmelt during the AR events (Li et al., 2019; Musselman et al., 2018). This preexisting snowpack will generally be much smaller in the warmer future climate, potentially affecting runoff with reduced rain on snow. Here we assume that the initial condition of the soil moisture remains unchanged, since the goal is to isolate the role of snowpack changes.

We derive the historical preexisting snowpack from a continuous 10-year WRF simulation (1996–2005) and future initial snowpack values from end-of-century regional climate simulations with the "pseudo global warming" (PGW) method (from Sun et al. (2016) and Walton et al. (2017)). The historical snowpack used as the initial condition in our simulations here was evaluated against observations in Sun et al. (2016) and Walton et al. (2017), who demonstrated reasonable accuracy for temporal and spatial variations of snowfall water equivalent during the baseline period. Mean snowpack (in terms of snow water equivalent) values are averaged over the major months when ARs occur (here November to March) to produce the preexisting snowpack values for the Noah-MP runs. We emphasize that the PGW method is only used to retrieve the future initial mean snowpack condition. (See the supporting information for more details.)

3. Results

3.1. Intensified AR-Associated Precipitation Extremes From Selected Events

Here we review the properties of the 40 most extreme AR events simulated in LENS-WRF in the historical and future time. Although here we focus on the most extreme ones, the frequency of future ARs and/or precipitation extremes in the LENS are also projected to increase significantly, as shown in Hagos et al. (2016), Swain et al. (2018), and Huang, Swain, and Hall (2020). Overall, the average total precipitation per event over the SN watersheds is around ~350 and ~430 mm/event during the historical and future cases, respectively. Future changes show a heterogeneous but consistent intensification pattern for about 120 to 300 mm/event, with generally larger increases over the central and southern SN (Figure 1c).

A direct grid-cell-by-grid-cell comparison (Figure 1e) between historical and future extreme precipitation values shows a clear future shift to higher values, especially visible in the upper tails of the distribution. The increase is about ~25% on average. The peak hourly precipitation rate (Figure 1f), a relevant metric for flash flooding impacts, exhibits an even larger shift to higher values (~40% average increase). The

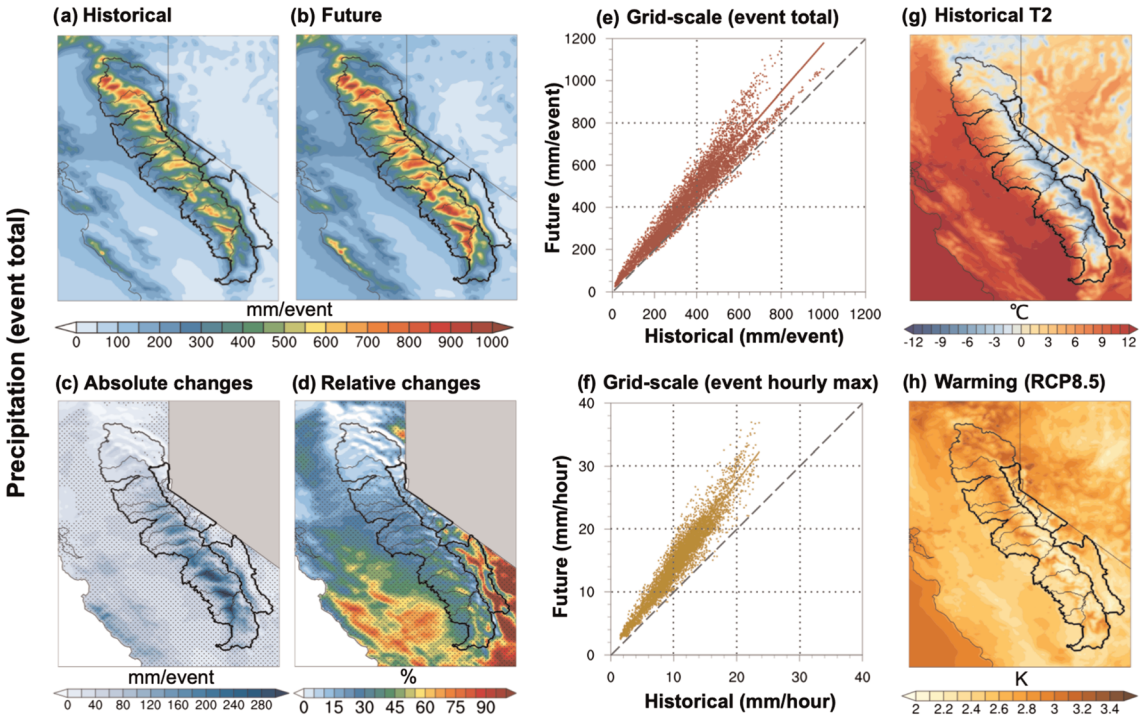

Figure 1. Precipitation extremes from the 40 simulated AR events impacting the SN under future warming scenarios, from 3 km LENS-WRF simulations. (a and b) Historical (1996–2005) and future (2071–2080) event total precipitation averaged over the 40 ARs impacting the SN; (c and d) absolute and relative changes of the precipitation extremes from historical to future (i.e., differences between b and a); (e and f) grid-cell-by-grid-cell scatterplot of historical versus future precipitation for average event total (e) and hourly maximum (f) over the grid cells lying within SN watersheds. (x axis: AR average over 40 historical events; y axis: AR average over 40 future events, for particular grid points.) The best-fit linear regression line is added in solid red (e) or yellow (f) and the $y = x$ line is shown as the dashed line; (g) near-surface temperature (at 2 m) averaged over the historical AR events; (h) difference of event-averaged temperature between future and historical cases. SN watershed boundaries are overlaid in panels (a)–(d), (g), and (h), denoted by black outlines.

mean simulated warming during future ARs is about 2–3.2 K, as measured by the change in 2 m air temperature (T2) (Figure 1h). As a result, the freezing level (i.e., T2 $\leq$ 0°C) moves toward notably higher elevations, leading directly to a large reduction in the fraction of precipitation falling as snow affecting both snowpack and runoff.

3.2. Snow Loss Under Warming

We first examine the climate change-induced snowfall loss in the LENS-WRF AR simulations. Over historical extreme ARs, snowfall mainly occurs over the middle and high elevations, with snow water equivalent values reaching more than ~650 mm/event at certain locations (Figure 2a). The SN domain average for water equivalent from the falling snow is ~147 mm/event. In the future, snowfall exhibits a notable reduction over almost the entire study region, except the highest-elevation areas of the southern SN where increased precipitation results in a snowfall gain above the freezing line. The heaviest snowfall loss occurs in midelevations, reaching more than 250 mm/event in terms of water content (Figure 2b), mainly due to the shrinking of the freezing zone to high elevations. The domain-averaged loss is roughly 30%.

Figures 2d–2f show the resulting historical and future snowpack changes when output from the LENS-WRF AR simulations is imposed on the Noah-MP model initialized with preexisting snowpack. In the historical period, a total snowpack depth (including initialized values) up to 1,200 mm is seen in terms of water equivalent value for the ARs event mean, with an SN domain average of ~248 mm (Figure 2d). Future snowpack changes during the AR events, including the background initialized snowpack difference and the AR-associated snow differences, are dominated by large losses, though they range from a gain of 190 mm to a loss of 900 mm in water content. The domain average loss is ~103 mm. Looking at relative changes (Figure 2f), most of the SN region shows a snowpack loss of over ~50%; in some locations, the losses reach up to 100%. The SN regional mean loss is 65% (Figures 2e and 2f). Despite the extra snowfall over the

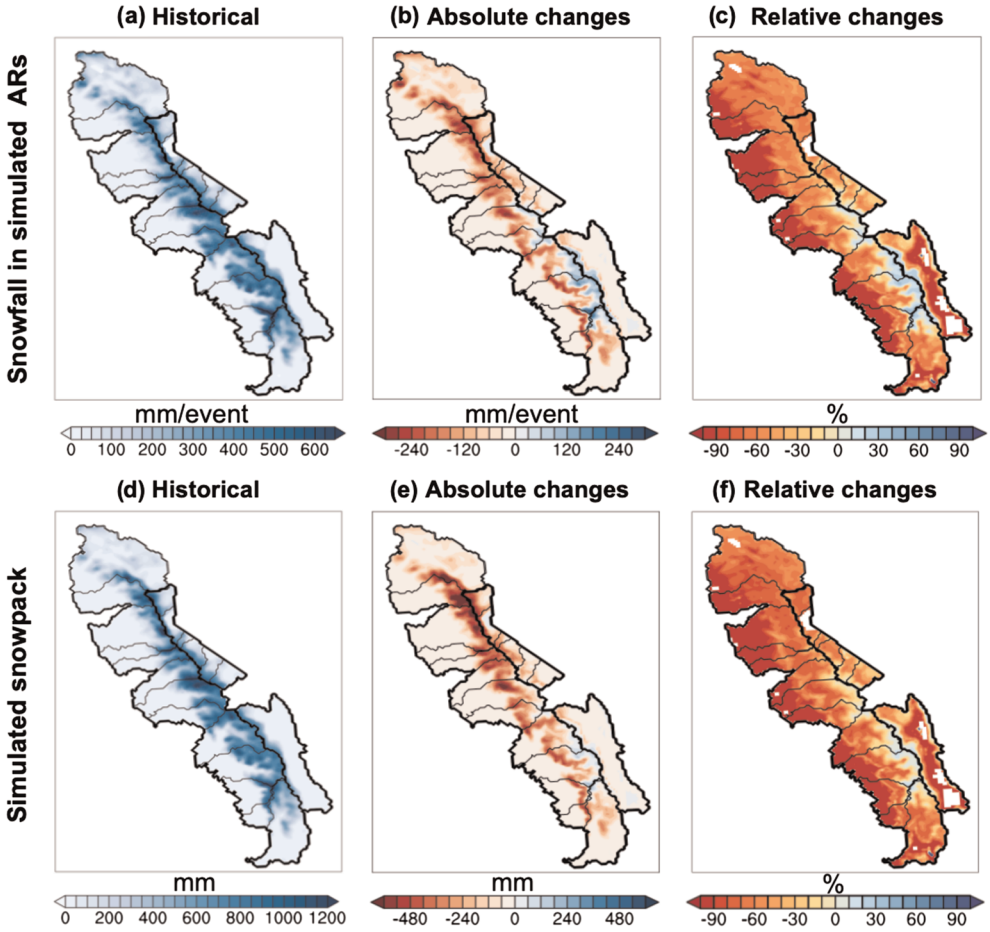

Figure 2. Snowfall and snowpack during the AR events, present versus future from LENS-WRF (for snowfall) and Noah-MP runs (for snowpack). (a–c) For historical event total snow accumulation and its future changes (absolute and relative) from all 40 AR events in each time period; (d–f) as in as (a)–(c) but for snowpack when the output from each AR simulation is imposed on Noah-MP independently with an initialized preexisting snowpack. In all panels, SN watershed boundaries are overlaid with black outlines.

highest elevations, the future loss of snowpack overwhelmingly dominates. When we compute total gain and loss by independently summing grid point totals with positive and negative changes again, the loss is 50 times the gain.

3.3. Double-Whammy Effect on Surface Runoff

Next, we turn to the main implications of changes in precipitation, temperature, and snowfall, for surface runoff. In the historical runs, larger runoff occurs in the northern SN watersheds (>400 mm/event) (Figure 3a), consistent with heavier precipitation there (Figure 1a). The future intensification of precipitation extremes is accompanied by a slight shift of precipitation to the southern SN, as indicated by the greater the increase in the south SN relative to the north (Figures 1a and 1b). This is associated with a comparable shift in the runoff to the southern SN and higher elevations (Figure 3b). Consistent with results from the previous study (Huang et al., 2018), the reduced snow-to-precipitation ratio in the low middle elevations leads to the largest surface runoff increase (see Figure S2).

In the low middle elevations, future changes are comparable to or larger than the historical values, implying at least a doubling of runoff. Meanwhile, high-elevation increases are somewhat lower, though the increase is still very large. When averaged over the whole SN region, the change between historical and future ARs is ~54 mm/event; yet, the historical values themselves average ~58 mm/event. In other words, future average runoff is almost double the historical value. An examination of individual locations (Figure 3c) also reveals a

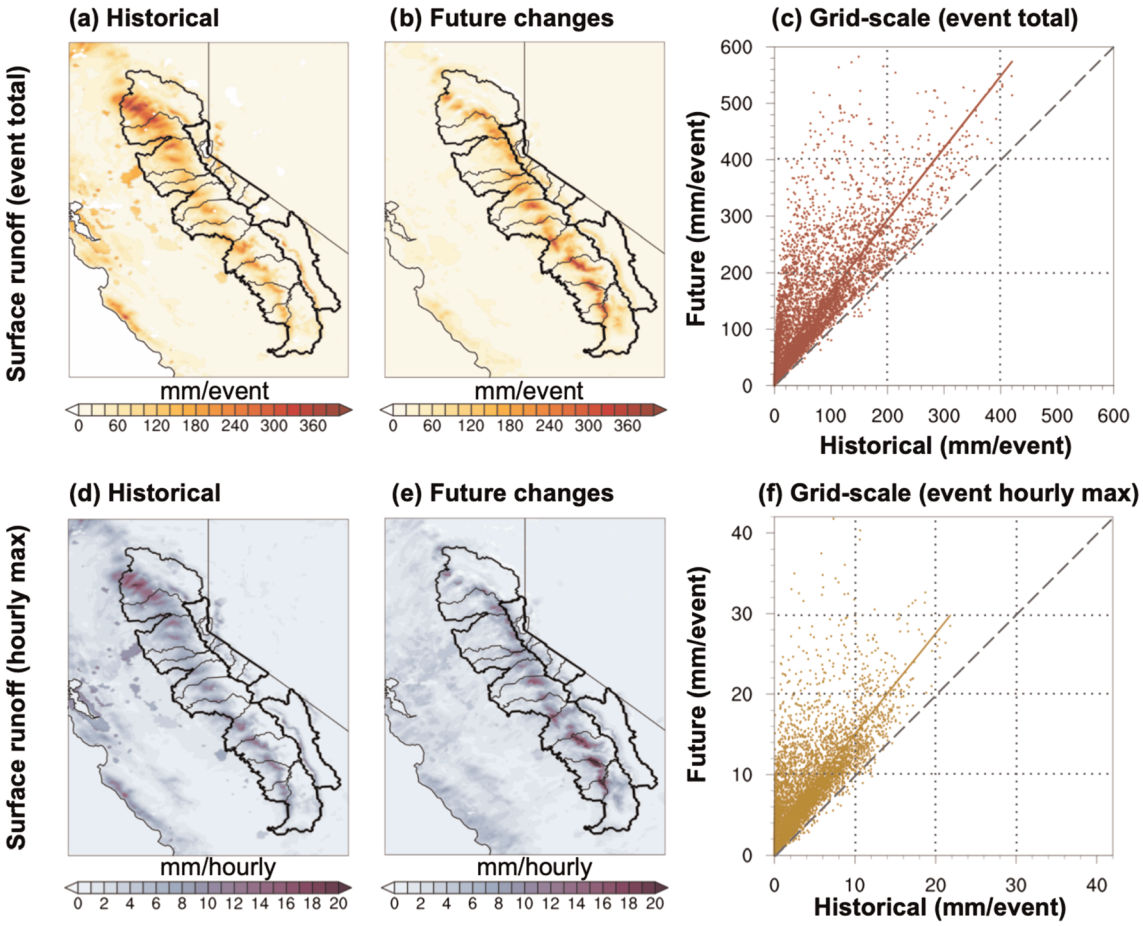

Figure 3. Surface runoff for the AR events, present versus future, from Noah-MP runs. (a and b) For historical event total surface runoff and its future changes averaged from all 40 AR events in each time period; (c) grid-cell-by-grid-cell scatterplot of historical versus future surface runoff based on the event total average; linear regression line is added in solid line and the $y = x$ line is added in dashed line; (d–f) as in (a)–(c) but for peak hourly runoff averaged over the ARs.

notable shift in the future runoff distribution toward more extreme values. At some locations, future values are more than quadruple the historical ones, reaching nearly 600 mm/event. The increase in extreme runoff values is much more substantial than the increase in precipitation extremes (comparing Figures 1e and 3c), revealing the importance of the conversion of snow to rain for the changes in runoff characteristics. We also investigated hourly maximum runoff as a relevant metric for flash flooding risk (Figures 3d–3f). Overall, a similar spatial pattern is found compared to the features of event total runoff, although an even larger amplification (approximately a quintupling) is seen at some locations (Figure 3f).

We further refined analysis to the watershed scale, to assess the increase in runoff on a watershed-by-watershed basis. Consistent with Figure 1, AR-induced precipitation extremes increase significantly in each watershed (Figure 4a). The future increases are generally proportionately larger going from north to south and going from the leeside to the windward side. Along with changes in the mean, the tails of the event total distributions also shift in the future, with the interquartile range increasing across the majority of watersheds, indicating stronger variability. This implies that extremes become more extreme, both in terms of the event total and instantaneous values of precipitation.

As expected from Figure 3, runoff changes are even larger than the associated precipitation changes in every watershed (Figure 4b). Due to intensified precipitation extremes and the decreased snow-to-precipitation ratio (Figure S2), the event total runoff increases from 38% to 190%, depending on the watershed. For certain watersheds (such as the windward Feather, Stanislaus, and Tuolumne watersheds), the increase in runoff is disproportionately large compared to the precipitation increase. These watersheds contain a larger fraction

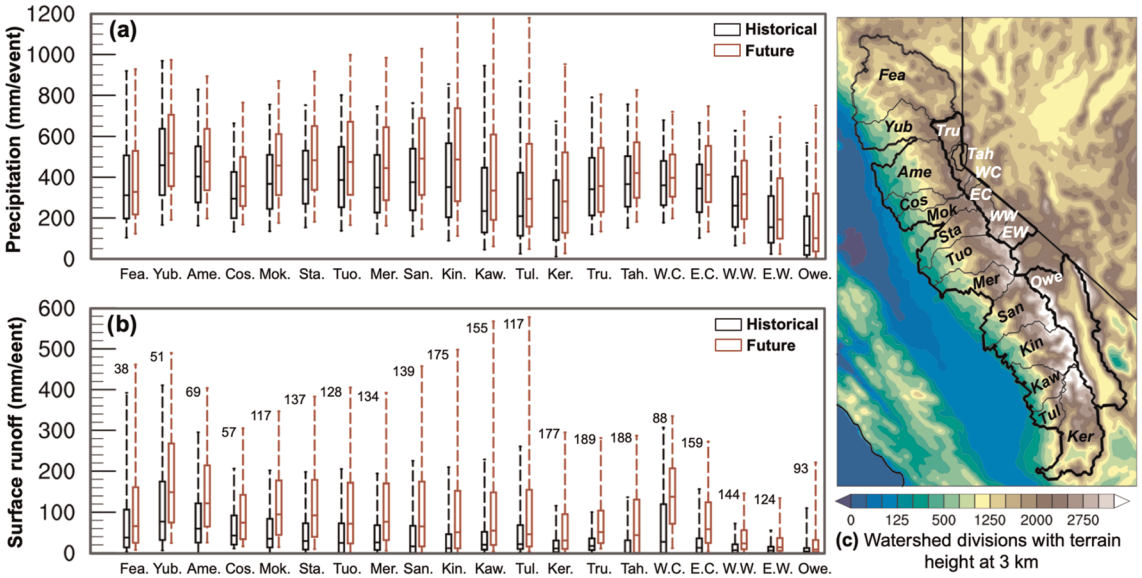

Figure 4. Distribution of precipitation and surface runoff within each of the 20 SN watersheds over the SN, for all historical and future ARs events. **(**a) Boxplot for grid-scale event total precipitation over each watershed at each time period, ordering from north to south, starting with the windward side, and then moving to the leeside (from left to right); (b) as in (a) but for event total surface runoff. Numbers on top of each watershed's boxplot refer to the relative increase (%) in the mean runoff; (c) watershed divisions with topographical details overlaid; the black labels refer to the windward side watersheds and white ones refer to leeside watersheds. In panels (a) and (b), the width of the box is the interquartile range, the tails are the 5th–95th percentile range, and the line in the middle is the median of the distributions. Black boxplots illustrate historical results and red ones future values. The full names of the watersheds can be found in the supporting information.

of those midelevation ranges where the conversion of snow to rain under warming and the snowpack loss is especially large (Figure S2). Similar to precipitation, the runoff increases are generally much larger for the upper tails of the distribution, suggesting a dramatic increase in localized flooding within watersheds. Certain watersheds, such as the Feather, Tuolumne, San Joaquin, Kaweah, and King, exhibit spectacular increases in local flooding, roughly a doubling of values that were already extreme in the historical climate. The watersheds that exhibit overall higher changes of the mean also show larger variability increases and shifts in the upper tail for both precipitation and runoff.

3.4. Elevation Effects

As implied in the results above, elevation is a key variable controlling the future increase in runoff during extreme AR events. Here we present the elevation-dependent changes in precipitation, snowpack, and surface runoff specifically (Figure 5). For event total precipitation, with mean changes by about 20–30% in the future, the increases are somewhat larger at high elevations (also see Figure 1). As for the snowpack, the reduction is greatest over middle elevations, with minor increases at the highest elevations (also see Figure 2e). Compared to lower elevation regions (<2,000 m), the variability (i.e., the ranges between the 5th percentile and 95th percentiles) of precipitation intensity over higher elevations shows a larger increase, of about 23–34%.

For runoff (Figure 5c), the increase is especially large for elevations above 1,500 m. For example, going in 500 m increments from 1,000 to 2,500 m, middle elevations see future runoff increases of 34%, 82%, and 265%, respectively, along with more variability (i.e., more extreme values). This is attributable to both the increase in precipitation and the warming effects of snowfall loss, that is, the "double whammy." The double whammy has its largest effect in the 2,000–2,500 m elevation band, where the snowfall loss and precipitation increase are both especially large. Overall runoff values are small at high elevations for both historical and future periods, as precipitation is mostly falling in frozen form in both periods. However, some high elevations also show significantly higher runoff, indicating some localized impact of warming and snowfall loss.

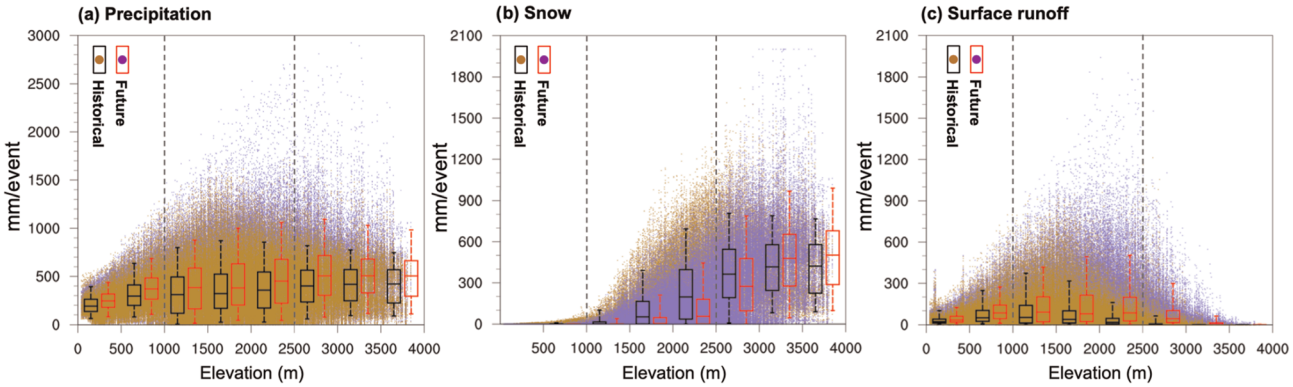

Figure 5. Grid-cell-by-grid-cell distribution of precipitation, snowpack, and surface runoff as a function of elevation for all historical and future ARs events. (a) Precipitation (mm/event); (b) Snow (mm/event) from AR-induced snowfall; (c) surface runoff (mm/event). In all panels, the brown dots refer to values from historical ARs and purple dots refer to the ones from future ARs. The dots correspond to all the grid cells and all the events over each elevation level in the SN. The boxplots describe the 5th, 25th, medium, 75th, and 95th percentiles. For the boxplots, the data are binned by 500-m intervals (i.e., 0–500, 500–1,000, and 1,000–1,500 m). The vertical dashed lines divide low, middle, and high elevation zones.

4. Summary and Implications

In this study, we impose output from the previously conducted extreme AR downscaling experiments of Huang, Swain, and Hall (2020) on a land surface model, initialized with plausible historical and future snowpack. Combined effects of increased precipitation extremes and conversion of snow to rain are shown to produce dramatic surface runoff changes during the AR events, a so-called "double whammy" effect with expansion of direct runoff (nonsnow accumulation) portion of watershed. The fact that precipitation also falls on a shrunken snowpack may also contribute to the runoff increase.

In the future extreme ARs, precipitation increases significantly (~25%), but the associated snowfall exhibits a notable reduction of about 30% averaged over the study domain. Thus, future rainfall increases much more than overall precipitation. The future runoff increase during the AR events reflects this precipitation increase and simultaneous conversion of snow to rain, showing an overall increase of nearly 50% averaged over the study domain. The double whammy impact on runoff has its largest effect in the 2,000–2,500 m elevation band, where the snowfall loss and precipitation increase are both especially large. Those watersheds preferentially draining this elevation band show particularly large extreme runoff increases. Some localized areas within watersheds show spectacular runoff increases, close to a quintupling of runoff.

The disproportionately large increases in runoff during the most extreme ARs could raise significant challenges for water resource management and flood control. Nearly all rivers draining SN watersheds are impounded by reservoirs. During future extreme AR events, the managed or even total storage capacity of those reservoirs could be exceeded by river water volumes that would be unprecedented. The present study highlights this risk, but further research must be done to quantify it. For example, incorporating a hydrologic model with a river-routing scheme would allow for the calculation of streamflow into reservoirs, rather than local runoff within Noah-MP, as we have quantified here. The initial condition of the soil moisture remained unchanged in our simulations, which could introduce some uncertainty, and is an aspect that could be improved in future work. Our results also flow from a single GCM's output. The degree to which the Sierra Nevada experiences a "double whammy" would likely be quantitatively different if another GCM were used, although it seems likely the results would be qualitatively similar.

Conflict of Interest

The authors have no competing interests to declare.

Data Availability Statement

All postprocessed data used in this study can be accessed at the online public portal (the link: https://portal.nersc.gov/project/m2637/hydro/) or by contacting the corresponding author (at xingyhuang@gmail.com) with additional data requests.

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Increasing precipitation volatility in twenty-first-century California

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Mediterranean climate regimes are particularly susceptible to rapid shifts between drought and flood—of which, California's rapid transition from record multi-year dryness between 2012 and 2016 to extreme wetness during the 2016–2017 winter provides a dramatic example. Projected future changes in such dry-to-wet events, however, remain inadequately quantified, which we investigate here using the Community Earth System Model Large Ensemble of climate model simulations. Anthropogenic forcing is found to yield large twenty-first-century increases in the frequency of wet extremes, including a more than threefold increase in sub-seasonal events comparable to California's 'Great Flood of 1862'. Smaller but statistically robust increases in dry extremes are also apparent. As a consequence, a 25% to 100% increase in extreme dry-to-wet precipitation events is projected, despite only modest changes in mean precipitation. Such hydrological cycle intensification would seriously challenge California's existing water storage, conveyance and flood control infrastructure.

Mediterranean climate regimes are renowned for their distinctively dry summers and relatively wet winters—a globally unusual combination[1]. Such climates generally occur near the poleward fringe of descending air in the subtropics, where semi-permanent high-pressure systems bring stable conditions during most of the calendar year[2]. Here, the majority of precipitation occurs during the passage of transient storm events during a short rainy season[3]—a distinct seasonality brought about by an equatorward shift in the mid-latitude storm track during winter[4]. The same factors that imbue such regions with their temperate mean climate state, however, are also conducive to dramatic swings between drought and flood[4–6]. Subtle year-to-year jetstream shifts can generate disproportionately large precipitation variability[7]—yielding highly non-uniform precipitation distributions[8] and increasing the intrinsic likelihood of hydroclimatic extremes[4,9]. These effects are often amplified in California, where a combination of complex topography and over 1,000 km of latitudinal extent yield a great diversity of microclimates within the broader 'dry summer' regime[1].

California's rapid shift from severe drought to abundant precipitation (and widespread flooding) during the 2016–2017 winter[10] offers a compelling example of one such transition in a highly populated, economically critical and biodiverse region[11,12]. Immediately following one of the most intense multi-year droughts on record between 2012 and 2016 (refs [13–15]), the state experienced several months of heavy precipitation associated with an extraordinarily high number of atmospheric river storms during November–March 2016–2017 (ref. [10]). While the heaviest precipitation was concentrated in northern Sierra Nevada watersheds, hundreds of roads throughout California were damaged by floodwaters and mudslides (including a major bridge collapse)[16]. In February 2017, heavy runoff in the Feather River watershed contributed to the failure of the Oroville Dam's primary spillway—culminating in a crisis that forced the emergency evacuation of nearly a quarter of a million people[17].

Previous studies focusing on future changes in California precipitation have generally reported modest[18–20] (and/or uncertain) changes in regional mean precipitation[7,20]. More recent work, however, has suggested an increased likelihood of wet years[20–23] and subsequent flood risk[9,24] in California—which is consistent with broader theoretical and model-based findings regarding the tendency towards increasing precipitation intensity[25] in a warmer (and therefore moister) atmosphere[26,27]. Meanwhile, while evidence shows that anthropogenic warming has contributed to an increased risk of California drought via increasing temperatures[28,29] and increased frequency of seasonally persistent high-pressure ridges[8,14,30,31], attribution studies focusing directly on precipitation have yielded mixed results[18,32]. Contributing additional uncertainty are climate model simulations suggesting that the boundary between mean subtropical drying and mid-latitude wetting will probably occur over California[33], potentially yielding strong latitudinal gradients in the precipitation response. Thus, while there is already substantial evidence that climate change will induce regional hydroclimatic shifts, a cohesive picture has yet to emerge—presenting serious challenges to decision-makers responsible for ensuring the resilience of California's water infrastructure[11].

Importance of large ensemble approach

We use specific flood and drought events from California's history as baselines for exploring the changing character of precipitation extremes. Our use of a large ensemble of climate model simulations[34]—the Community Earth System Model Large Ensemble (CESM-LENS)—allows us to directly quantify changes in large-magnitude extremes. This approach offers a substantial advantage over traditional climate model experiments, which yield too small a sample size of statistically rare extreme events to draw robust inferences without making assumptions regarding the underlying precipitation distribution[35]. By selecting a wide range of wet, dry and dry-to-wet transition (that is, 'whiplash') events informed by historical analogues, we aim to provide a comprehensive perspective on the changing risks of regional hydroclimate extremes in a manner directly relevant to climate adaptation and infrastructure planning efforts.

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We assess simulated changes in the frequency of California precipitation extremes caused by increasing atmospheric greenhouse gas concentrations. Our overall approach is to (1) determine approximate frequency of occurrence for each event of interest based on direct observations or historical accounts, (2) calculate the magnitude of events within a preindustrial control climate model simulation that occur with comparable frequency to those observed and (3) quantify subsequent frequency changes in similar events under a scenario of continued growth in greenhouse gas concentrations.

We focus on changes in frequency of precipitation events exceeding particular thresholds for two key reasons. First, historical civil engineering and risk management practices have been predicated on a largely stationary climate[36], and the majority of existing water storage and conveyance structures have been constructed under such assumptions. Second, a frequency-based approach also offers the considerable advantage of implicit climate model bias correction. While all global climate models exhibit some degree of mean precipitation bias in topographically complex California[9], the use of a long preindustrial control simulation to define return interval thresholds allows us to make internally consistent comparisons between simulated precipitation distributions at different levels of radiative forcing. We can therefore select CESM-LENS precipitation thresholds corresponding to approximate return intervals of real-world historical events, which serve as analogues for impacts.

Large increase in extreme wet-event frequency

We find large, statistically robust increases in the simulated frequency of extremely heavy precipitation events on multiple timescales. All of California experiences a 100–200% increase in the occurrence of very high cumulative seasonal precipitation (of a magnitude comparable to the 2016–2017 season on a statewide basis) by the end of the twenty-first century (Fig. 1). This simulated increase in seasonal wet extremes across California is part of a broader regional increase extending across the Pacific coast. Seasonal precipitation of this magnitude (equivalent to that associated with the 25 year preindustrial control (PIC) return interval) has only occurred a handful of times over the lifespan of California's modern water infrastructure. It represents a rarely exceeded but not unprecedented threshold, for which there are analogues in the recent historical record.

We note, however, that California's most severe floods do not necessarily coincide with its wettest winters. Instead, regional flood events are more directly linked to persistent storm sequences on sub-seasonal timescales, which are capable of bringing a significant fraction of annual average precipitation over a brief period[3,6,37]. Thus, to better characterize changes in the frequency of such 'high consequence, low probability' precipitation events, we use a sub-seasonal threshold motivated by the extraordinary sequence of 'atmospheric river' storms that brought extremely severe flooding to much of California during the winter of 1861–1862 (refs [38,39]). We define 40 day precipitation accumulations exceeding the 200 year preindustrial return interval as a measure of occurrences comparable to this benchmark event (see Methods).

Given the severe impacts even one such occurrence would have on California's existing infrastructure and population centres[40], we assess cumulative twenty-first-century risk beginning in the present winter season (2017–2018). Figure 2 shows that at least two-thirds (66.66%) of LENS ensemble members simulate two or more 1862-magnitude events over this interval across virtually all of California—which represents a dramatic increase in likelihood relative to preindustrial simulations (where, by definition, the cumulative 83 year likelihood of a single occurrence is less than 50%). Strikingly, these findings suggest that California's major urban centres (including San Francisco and Los Angeles) are more likely than not to experience at least one such extremely severe storm sequence between 2018 and 2060 (Fig. 2b,c) on a business-as-usual emissions trajectory. On a statewide basis, the overall frequency of 1862-magnitude events increases on the order of 300–400% by the end of the twenty-first century (Supplementary Fig. 2).

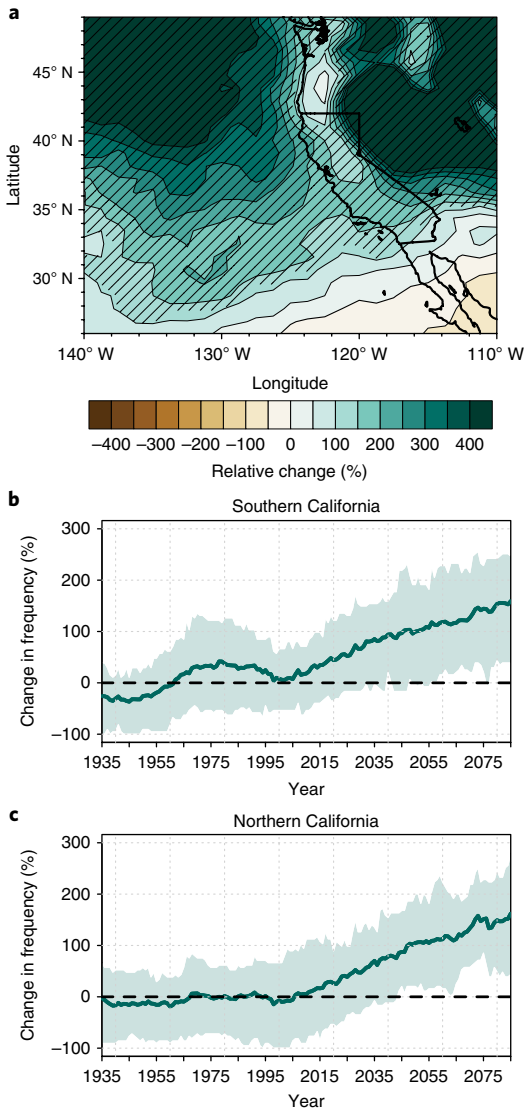

Fig. 1 | Change in frequency of extremely wet seasons. a, Relative (%) change in frequency of extremely wet seasons (meeting or exceeding the 25 year PIC return interval for November–March precipitation) at end of the twenty-first century (2070–2100, RCP8.5 forcing) relative to the preindustrial era (1850 forcing). Cross-hatching signifies 90% statistical confidence ($P < 0.10$) in robustness of frequency shifts across the full 40-member CESM-LENS ensemble. **b**,**c**, Time series showing relative (%) change in frequency of extremely wet seasons in each year from 1935 to 2085 (solid green curve) for a cluster of grid boxes in Southern California (**b**) and Northern California (**c**). Data are smoothed over 30 year intervals, and the green shaded range encompasses two-thirds (66.66%) of the CESM-LENS ensemble spread (that is, the 16.66th and 83.33th percentile bounds). Dashed black horizontal lines in **b** and **c** denote zero change in frequency.

These increases in extreme wet-event frequency across the large ensemble emerge in an essentially monotonic fashion throughout most of California beginning between around 2010–2020 for both seasonal (25 year) wet events (Supplementary Fig. 3a) and sub-seasonal (200 year) wet events (Supplementary Fig. 3b). In addition to the robust ensemble-mean signal by mid-to-late century for both

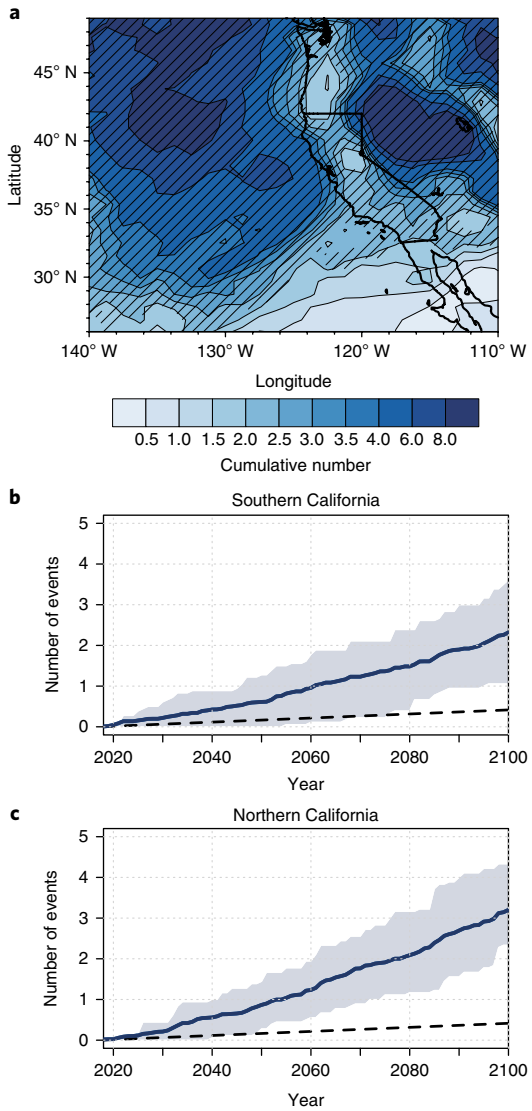

Fig. 2 | Cumulative occurrence of extremely wet sub-seasonal storm sequences. a, Cumulative number of extremely wet sub-seasonal storm sequences (meeting or exceeding the 200 year PIC return interval for cumulative 40 day precipitation) occurring in CESM-LENS between 2018 and 2100 under RCP8.5 forcing. Cross-hatching signifies regions where at least two-thirds (66.66%) of CESM-LENS ensemble members simulate two or more such occurrences. **b**,**c**, Time series showing cumulative number of extremely wet sub-seasonal storm sequences during 2018–2100 (solid blue curve) for a cluster of grid boxes in Southern California (**b**) and Northern California (**c**). Blue shaded range encompasses two-thirds (66.66%) of the CESM-LENS ensemble spread (that is, the 16.66th and 83.33th percentile bounds). Dashed black curve depicts baseline cumulative occurrence over an equivalent time interval assuming constant preindustrial climate forcings.

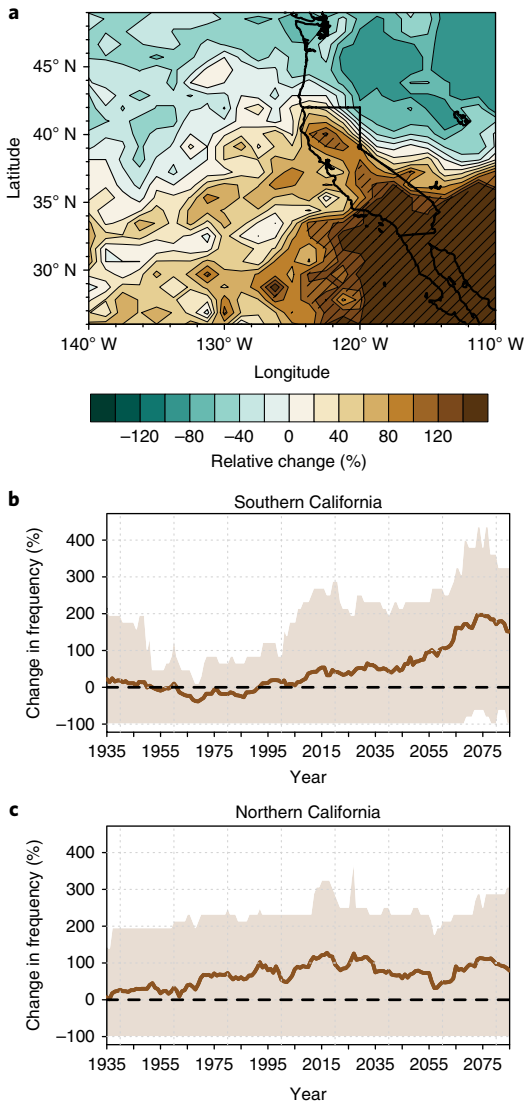

Fig. 3 | Change in frequency of extremely dry seasons. a, Relative (%) change in frequency of extremely dry seasons (meeting or falling below the 100 year PIC return interval for low November–March precipitation) at end of the twenty-first century (2070–2100, RCP8.5 forcing) relative to the preindustrial era (1850 forcing). Cross-hatching signifies 90% statistical confidence ($P < 0.10$) in robustness of frequency shifts across the full 40-member CESM-LENS ensemble. **b**,**c**, Time series showing relative (%) change in frequency of extremely dry seasons in each year 1935–2085 (solid brown curve) for a cluster of grid boxes in Southern California (**b**) and Northern California (**c**). Data are smoothed over 30 year intervals, and the brown shaded range encompasses two-thirds (66.66%) of the CESM-LENS ensemble spread (that is, the 16.66th and 83.33th percentile bounds). Dashed black horizontal lines in **b** and **c** denote zero change in frequency.

extreme wet events, these results also imply that an increased likelihood of large precipitation accumulations relative to a preindustrial climate may already exist. However, we note that a handful of outlying ensemble members suggest a chance that internal variability could delay emergence of an attributable signal by several decades (Fig. 1b,c and Fig. 2b,c).

Shifts in extreme dry-event frequency

The simulated frequency of extremely dry years also increases across nearly all of California (Fig. 3). An increased likelihood of these extremely dry rainy seasons (that is, exceeding the 100 year return interval, analogous to the 1976–1977 drought and slightly drier than 2013–2014) first emerges weakly across portions of the state as early as the 1980s, before emerging in a statistically robust manner across Northern California around 2010–2020 and Southern California later in the century (around 2060; Supplementary Fig. 4a). Notable are especially large increases (>140%) in frequency that occur across Southern California after 2050 (Fig. 3b and Supplementary Fig. 4a), though we emphasize that substantial increases on the order of +80% extend across most of Northern California. Except

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for southernmost California, much of this increased risk emerges during the twentieth and early twenty-first centuries (Fig. 3b,c and Supplementary Fig. 4a)—suggesting that the likelihood of individual dry seasons may already be increased relative to the preindustrial period.

In contrast, changes in the occurrence of extremely dry consecutive years analogous to the record-low 3 year cumulative statewide precipitation observed during 2013–2015 (100 year return interval on a 3 year basis) exhibit a more complex temporal and spatial structure (Supplementary Fig. 4b). By the end of the twenty-first century, only far southern California experiences a robust increase in the frequency of consecutively dry seasons (Supplementary Fig. 2), while the rest of California does not experience statistically significant changes. Further analysis shows that this divergence between single and consecutive dry-season frequency shifts arises from the increased pace of future wet-year increases relative to dry-year increases, which is especially pronounced across Northern California (Supplementary Fig. 5c). These findings suggest that future multi-year droughts in California may exhibit an increased propensity to be interrupted by very wet interludes.

Emergence of 'precipitation whiplash' signal

Given the large simulated increase in the frequency of both dry and wet extremes, we test whether the frequency of rapid transitions between dry and wet conditions—similar to the precipitation whiplash that occurred between the recent 2012–2016 drought and 2016–2017 floods—also increases. For the purposes of this study, we define precipitation whiplash as the occurrence of two consecutive years during which rainy season (November–March) precipitation falls under the PIC 20th percentile (in the first year) and subsequently exceeds the PIC 80th percentile (in the following year). Figure 4 confirms such an increase during the twenty-first century throughout California. We report a strong latitudinal gradient in the year-to-year (interannual) whiplash response to anthropogenic forcing, ranging from an ~100% increase across Southern California to an ~25% increase in Northern California (Fig. 4a). These whiplash increases first emerge in the south relatively early in the twenty-first century (2010–2020) before spreading progressively northward in a statistically robust manner in the following decades (especially after 2050; Supplementary Fig. 5). We also investigate changes in month-to-month (sub-seasonal) precipitation variability during the canonical wet season. We report modest but widespread increases of 20–30% across a broad swath of the northeastern Pacific region, again extending across all of California (Supplementary Fig. 2c).

Together, these shifts represent a marked increase in both the interannual and intraseasonal variability of precipitation, especially in Southern California—which is noteworthy for two distinct reasons. First, natural precipitation variability in this region is already large[6], and projected future whiplash increases would amplify existing swings between dry and wet years (and between dry and wet months within the rainy season). Second, the robust emergence of a precipitation whiplash signal across a wide range of timescales (Fig. 4 and Supplementary Fig. 2c) is remarkable, as large-scale atmospheric variability over the North Pacific relevant to California precipitation is dominated by different physical processes and associated remote teleconnections on sub-seasonal (for example, the Madden–Julian Oscillation[41]) and interannual (for example, El Nino–Southern Oscillation (ENSO)[42]) timescales.

Increasingly sharp seasonality of California wet season

We find a distinct sharpening of California's future mean seasonal cycle (Fig. 5). While winter mean precipitation increases across most of California, mean precipitation during autumn (September–November) and especially spring (March–May) decreases nearly everywhere, which is consistent with previous findings from the Coupled Model Intercomparison Project Phase 5 (CMIP5) ensemble[43]. This striking contrast between the drying marginal and wetting core rainy season months results in a large ensemble-mean increase (35% to 85% from north to south) in the ratio of overall wet season precipitation falling between November and March relative to cumulative precipitation during the four months of September, October, April and May (Fig. 5). This increase in sharpness of precipitation seasonality suggests that the already distinct contrast between California's long, dry summers and relatively brief, wet winters will probably become even more

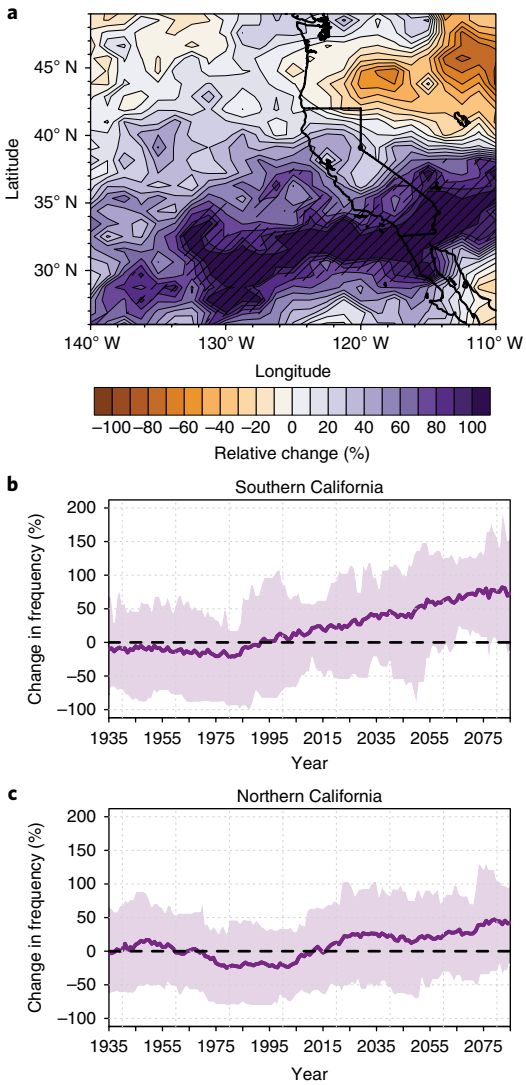

Fig. 4 | Change in frequency of precipitation whiplash events. a, Relative (%) change in frequency of dry-to-wet precipitation whiplash events (years with November–March precipitation at or above the 80th preindustrial percentile immediately followed by a year with precipitation below the 20th preindustrial percentile) at end of the twenty-first century (2070–2100, RCP8.5 forcing) relative to the preindustrial era (1850 forcing). Cross-hatching signifies 90% statistical confidence ($P < 0.10$) in robustness of frequency shifts across the full 40-member CESM-LENS ensemble. **b**,**c**, Time series showing relative (%) change in frequency of whiplash events in each year 1935–2085 (solid purple curve) for a cluster of grid boxes in Southern California (**b**) and Northern California (**c**). Data are smoothed over 30 year intervals, and the purple shaded range encompasses two-thirds (66.66%) of the CESM-LENS ensemble spread (that is, the 16.66th and 83.33th percentile bounds). Dashed black horizontal lines in **b** and **c** denote zero change in frequency.

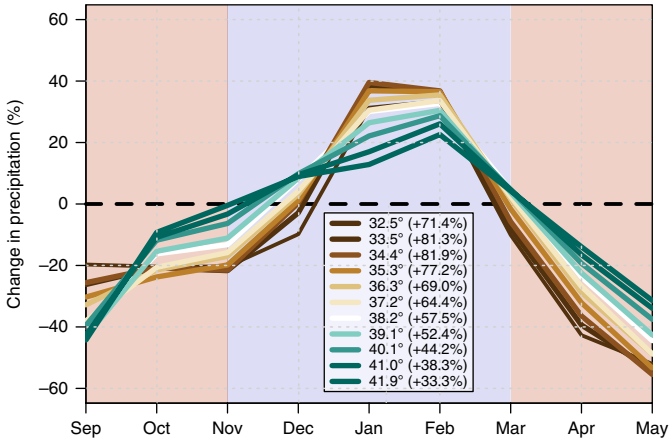

Fig. 5 | Shifts in precipitation seasonality. Relative changes in CESM-LENS monthly mean precipitation at the end of the twenty-first century (2070–2100) as a percent of the PIC climatology for each calendar month for a range of latitudes spanning the California coast. Percentages in the legend denote relative changes in mean 'seasonal sharpness' at each latitude, defined as the ratio between precipitation falling during the core rainy season (November–March; blue background shading) to that cumulatively falling during the marginal rainy season (September–October, April–May; red background shading). Curves are colour coded by latitude (and therefore by mean seasonal precipitation, which increases monotonically with latitude). Dashed black horizontal line denotes zero change in magnitude.

pronounced during the twenty-first century. While a comprehensive assessment is beyond the scope of this study, we note that autumn and spring drying trends have recently begun to emerge in observations across California (Supplementary Fig. 7)—suggesting that the projected concentration of precipitation into an even narrower season may already be underway.

Increase in extremes despite modest mean change

The substantial increases in California precipitation extremes over a wide range of timescales and intensities occur despite only modest changes in rainy season mean precipitation. By the end of the twenty-first century, the CESM-LENS ensemble mean depicts modest cool-season wetting over the northern portion of the state (<20–30%; Fig. 5), with little change in the south (~0%; Supplementary Fig. 6)—similar to the CMIP5 multi-model ensemble-mean response (Supplementary Fig. 6). Yet over the same interval, the frequencies of both extreme dry seasons and whiplash events increase by over 50% over much of the state (Figs. 3 and 4), and the frequency of extreme wet events increases by well over 100% nearly everywhere (Fig. 1 and Supplementary Fig. 2). This remarkable divergence between simulated future mean and extreme climate is especially pronounced across Southern California. For example: simulated mean precipitation in Southern California exhibits little trend by the end of the twenty-first century (Supplementary Fig. 5), despite an ~200% increase in extremely dry seasons (Fig. 3), an ~150% increase in extremely wet seasons (Fig. 1), a >500% increase in extreme sub-seasonal precipitation events (Fig. 2 and Supplementary Fig. 2) and an ~75% increase in year-to-year whiplash (Fig. 4). Importantly, these findings suggest that lingering uncertainty regarding the magnitude (and even sign) of regional mean precipitation change does not preclude statistically robust conclusions regarding changes in precipitation extremes.

Changes in processes responsible for extremes

We confirm that simulated large-scale atmospheric circulation patterns associated with California wet and dry extremes are substantially similar to those observed historically (Supplementary Fig. 12). Wet years are linked to strong low-pressure anomalies over the northeastern Pacific Ocean (Fig. 6a), with downstream enhancement of the storm track just west of California[7,14]. Dry years coincide with seasonally persistent high pressure extending across the northeastern Pacific (Fig. 6d), which reinforces the climatological mean ridge along the West Coast[14] and prevents storms from reaching California[44].

We find that future (representative concentration pathway 8.5 (RCP8.5)) wet and dry years are linked to broadly similar atmospheric circulation anomalies as those in the past (PIC; Fig. 6b,e)—suggesting that the spatial character of large-scale features driving California precipitation extremes may remain relatively stationary. However, given that subtle storm track perturbations can yield disproportionately large shifts in California precipitation[7,14,20], we note two potentially important differences between the RCP8.5 and PIC composites. In future wet years, low pressure over the North Pacific is deeper to the west of California (Fig. 6b), which previous work using models in the CMIP5 experiment has suggested is linked to a localized eastward extension of the jetstream[7,20]. In RCP8.5 dry years, atmospheric pressure anomalies in the immediate vicinity of California are similar to PIC dry years (Fig. 6e), but are higher in adjacent regions—suggesting a broader, more longitudinally oriented atmospheric ridge pattern and subsequent poleward storm track shift.

We also report large increases in atmospheric water vapour during both future wet and dry years. While this moistening is not in itself surprising—given the well-understood thermodynamic consequences of the Clausius–Clapeyron relation[45]—we point out that RCP8.5 dry years occur in an atmosphere moister than that during even the wettest years of the PIC simulation (Fig. 6c,f). The fact that California dry years occur more frequently (Fig. 3) suggests that simulated (thermodynamic) moistening must be counteracted (at least periodically) by changes in the frequency and/or intensity of atmospheric circulation patterns that prevent precipitation-bearing storms from reaching California, such as persistent high-pressure systems[14] or transient poleward shifts in the East Pacific storm track[7]. Conversely, the (thermodynamic) increase in water vapour would probably reinforce the (dynamic) effect of deeper North Pacific low pressure during wet years—which may underlie the relatively larger simulated increase in extreme wet-event frequency (versus dry-event frequency). Nonetheless, we emphasize that further work is necessary to better understand underlying changes in both remote (tropical[31,44] and Arctic teleconnections[46–48]) and regional-scale (that is, atmospheric rivers[9] and orographic precipitation) influences.

Societal implications of hydrological intensification

Collectively, our findings suggest that anthropogenic warming will bring about large increases in the frequency of California hydroclimatic extremes similar or greater in magnitude to those that have historically caused widespread disruption. These changes in the character of California precipitation emerge in a large single-model ensemble despite only modest trends in mean precipitation—strongly suggesting that the region's already variable year-to-year climate is likely to become even more volatile. Historically observed impacts of droughts and floods may in many cases offer reasonable analogues for the human and environmental impacts of future events of a similar magnitude, but increasingly wide swings between dry and wet conditions will threaten to upset the already precarious balance between competing flood control and water storage imperatives in California.

Moreover, we report a substantial increase in the projected risk of extreme precipitation events exceeding any that have occurred over the past century—meaning that such events would be unprecedented in California's modern era of extensive water infrastructure. Few of the dams, levees and canals that currently protect millions living in California's flood plains and facilitate the movement of

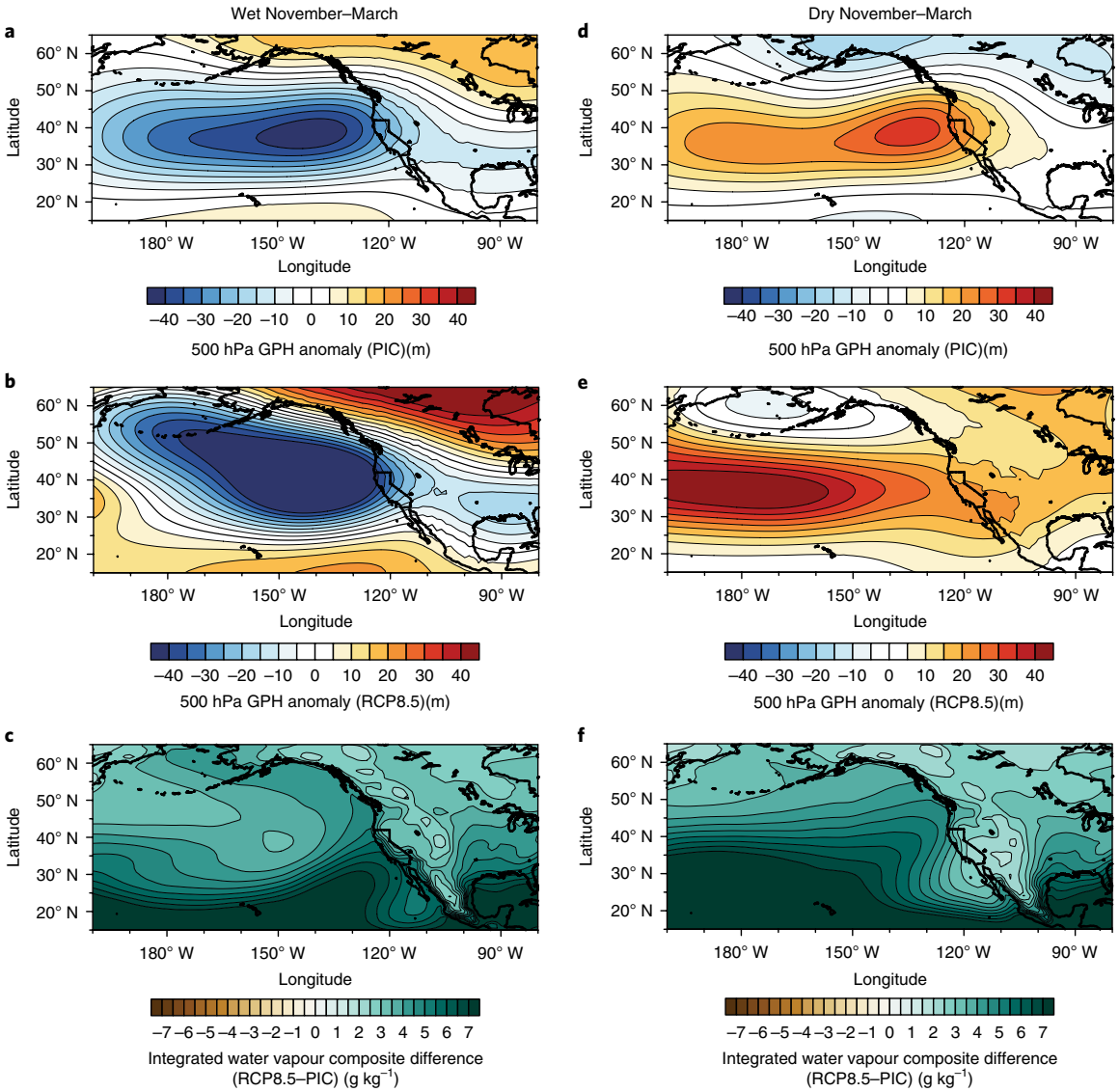

Fig. 6 | Large-scale atmospheric conditions linked to California precipitation extremes. a,**d**, Composite maps depicting anomalies in November–March 500 hPa GPH during wet (80th percentile, left column) and dry (20th percentile, right column) March–November seasons in the CESM-LENS simulation. **b**,**e**, RCP8.5 (2081–2100) composite anomaly patterns for GPH (see Methods). **c**,**f**, Difference between RCP8.5 (2081–2100) and PIC composite anomaly patterns for column-integrated water vapour.

water from Sierra Nevada watersheds to coastal cities have been tested by a deluge as severe as the extraordinary 1861–1862 storm sequence—a repeat of which would probably lead to considerable loss of life and economic damages approaching a trillion dollars[39,40]. Our results suggest that such an event is more likely than not to occur at least once between 2018 and 2060, and that multiple occurrences are plausible by 2100 on a business-as-usual emissions trajectory. Therefore, recognizing that risks associated with hydroclimatic extremes may rise more rapidly than the gradual projected shift in regional mean precipitation might otherwise suggest will be a critical step in ensuring resilience amid a warming climate.

Methods

Methods, including statements of data availability and any associated accession codes and references, are available at https://doi.org/10.1038/s41558-018-0140-y.

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Author contributions

D.L.S., B.L., J.D.N, and A.H. conceived of the study and designed the analyses. D.L.S. and B.L. provided analysis tools and conducted the analyses. D.L.S. wrote the manuscript and B.L., J.D.N. and A.H. provided comments and feedback.

Competing interests

The authors declare no competing interests.

Additional information

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Attachment 4

Methods

Datasets used in this study. The CESM-LENS is a large ensemble of fully coupled model simulations designed to explore multiple realizations of internal climate system variability on long timescales. We used precipitation output from an 1,800 year PIC run and 40 separate simulations of the twentieth century (20C; 1920–2005) and RCP8.5 (2005–2100) climate change scenario[49]. Each of the 40 20C + RCP8.5 realizations is generated using the same climate model but with slightly perturbed initial conditions, which yield different time sequences of daily- to decadal-scale internal variability[50]. Thus, CESM-LENS offers an opportunity to examine robust changes in extreme events across a wide range of simulated internal variability—a considerable advantage relative to other investigations that have historically been limited by the shortness of the observational record and the relative infrequency of extreme hydroclimatic events in smaller ensembles.

We also used precipitation output from climate model simulations generated as part of the CMIP5 project[49] for comparison with CESM-LENS simulations. We constructed a multi-model ensemble consisting of 78 realizations from 35 distinct climate models, where each distinct model receives equal weight in the ensemble mean and fields are interpolated to a common 2.5° grid.

We used the National Climatic Data Center's nClimDiv observational divisional dataset to determine the relative rank of historical precipitation events to estimate approximate return intervals (Supplementary Fig. 2). Existing biases between simulated and observed precipitation were implicitly accounted for using the methodology described below. Finally, we used gridded observational precipitation data to validate CESM-LENS precipitation (see section on Suitability of CESM-LENS for simulating California precipitation).

Quantifying changes in frequency of extreme hydroclimatic events. We seek to quantify changes in the frequency of extreme wet, dry and whiplash events in a manner that implicitly accounts for model biases and sidesteps parametric assumptions regarding the underlying shape of the precipitation distribution. In doing so, we focus on relative changes in the frequency of occurrence of events exceeding fixed thresholds defined using the PIC simulation. PIC atmospheric greenhouse gas concentrations are maintained at constant levels similar to those before the start of the Industrial Revolution (that is, year 1850 levels)—representing a counterfactual climate without human influence. We subsequently compare the relative change in frequency of specific events in the 20C + RCP8.5 simulations. The 20C forcing includes rising greenhouse gas and aerosol concentrations close to those observed in the historical record, and RCP8.5 forcing includes projected greenhouse gas increases between 2005 and 2100 based on a business-as-usual emissions trajectory[49]. We examine the RCP8.5 simulations as they most closely resemble the observed emissions trajectory to date[51], and they provide a larger signal-to-noise ratio for statistically rare extreme events[52].

We restrict our analysis of extremes to the months of November to March, representing the peak of the California rainy season[14]. While the seasonal peak of monthly precipitation occurs earlier in Northern California than in Southern California, extreme winter-like precipitation events associated with mid-latitude cyclonic activity can occur during any of these calendar months throughout the state. Thus, data for November–March are pooled to create a single, spatially explicit rainy season distribution of precipitation accumulations in each grid box.

Using direct observational (and indirect historical) records, we first estimate the approximate return interval for each event of interest. Our definition of return interval (R) is consistent with that widely used in the climate and civil engineering literature[36]: the likelihood of occurrence in any given year of an event with an n year return interval is $1/n$. Using this fixed return interval, we then calculate the precipitation value (p) in the CESM-LENS PIC simulation that occurs with frequency $1/n$ at each climate model grid box. In the 40-member ensemble, we then count exceedances of the specific return values and normalize the PIC and 20C + RCP8.5 runs on an events-per-year basis.

Once these counts are tabulated across all ensemble members and each season, we calculate percent changes in the frequency F of a given event at time t relative to the PIC period:

$$\Delta F_t = \frac{F_t - F_{\mathrm{PIC}}}{F_{\mathrm{PIC}}} \quad (1)$$

This approach is modelled after ref. [35] and references therein. We note that our use of a fixed return interval, rather than percentile values, allows us to directly compare precipitation extremes spanning timescales from monthly to multi-annual. For example: the 98th percentile of daily precipitation might be expected to occur several days per year, but the 98th percentile of annual precipitation might be expected to occur only twice per century.

Definition of precipitation whiplash. Given the potential for adverse human impacts of rapid transitions between dry and wet conditions in California (as occurred during 2016–2017), we formalize two precipitation whiplash metrics across a range of timescales. We define year-to-year (interannual) whiplash years to be those during which seasonal (November–March) precipitation accumulation meets or exceeds the PIC 80th percentile and which were immediately preceded by a year with seasonal precipitation at or below the PIC 20th percentile. We define within-season (intraseasonal) whiplash as the standard deviation of monthly precipitation within individual rainy seasons across the ensemble.

Selection of extreme events and climate model analogues. *2016–2017 (wet) analogue with 25 year return interval.* This threshold is based on the extremely wet 2016–2017 winter, during which record wet seasonal precipitation (return interval >100 years) occurred across portions of Northern California and relatively smaller positive anomalies occurred over Southern California (return interval ~10 years), yielding a mean statewide return interval of approximately 15–25 yr for November–March. Given the strong latitudinal gradient in relative abnormality of seasonal precipitation during this period—and the consequent variation in adverse societal impacts across the state—we use a 25 yr return interval as a compromise threshold.

1861–1862 (wet) analogue with 200 year return interval. This threshold is based on the extraordinary sequence of atmospheric river storm events that brought extremely severe and widespread flooding to much of California during the 1861–1862 winter. Much of what is known about the 'Great Flood of 1862' has been pieced together from informal historical accounts and newspaper records from the then-nascent State of California[38,52]. Such records suggest that the most intense period of nearly continuous precipitation occurred between late December 1861 and late January 1862 over an approximately 40 day period, yielding rainfall accumulations over 1 m in some locations[38]. While this event occurred before the advent of reliable meteorological observations in California, palaeoclimate evidence from sediment records in coastal river systems suggests that events comparable to the 1861–1862 flood are associated with an approximately 200 year return interval[53]. Given the substantial uncertainties regarding the exact duration, magnitude and recurrence interval of the 1861–1862 event, we define our analogue as the 40 day cumulative precipitation during all November–March periods with a return interval of 200 years in the PIC simulation. The magnitude of this event is larger than that envisioned in the 'ARkStorm' natural hazard contingency planning scenario jointly developed by the United States Geological Survey and the State of California[39] but smaller in magnitude compared with several other probable events in the past millennium[53].

Recent research has suggested that a modern recurrence of the 1861–1862 flood would probably have a catastrophic human and socioeconomic toll[39,40]. Thus, despite the fact that such an event remains unlikely in any given year even under strong greenhouse forcing, a multi-fold relative increase in physical event likelihood combined with a high degree of socioeconomic vulnerability collectively yield a substantial increase in the overall risk associated with such an event over a period of decades[54].

1976–1977 (dry) analogue with 100 year return interval. This threshold is based on the extremely dry conditions that occurred during winter 1976–1977, which was the driest such period in California's 122 year observational record. This short-lived but intense drought led to acute water shortages in regions dependent on surface runoff from smaller hydrological basins and without direct access to State Water Project or Central Valley Project reservoirs. We conservatively assume a 100 year return period for this single-year event analogue threshold.

2012–2016 (dry) analogue with 100 year return interval. This threshold is based on the multi-year drought that occurred in California between late 2012 and early 2016. A substantial fraction of overall drought magnitude and associated impacts can be attributed to extremely warm temperatures that coincided with the lack of precipitation during successive winters[28,29], and while 2013 was the driest calendar year on record in California[8], no individual November–March period was the drier than 1976–1977. Nevertheless, the driest consecutive 3 year period (and consecutive November–March seasons) on record in California did indeed occur between 2013 and 2016 (ref. [14]), and we use this 3-year threshold as a benchmark for a high-impact, multi-year drought. We emphasize that the widespread environmental impacts of this event were substantially exacerbated by record warm temperatures—which are expected to be a signature of future droughts in this region as the climate warms[28,55]. Consistent with the single-year dry event, we conservatively assume a 100 year return interval.

Quantification of statistical significance. All figures showing spatial changes (latitude–longitude and time–latitude maps) represent 30 year running means in the 20C + RCP8.5 simulations. In all significance assessments below, these 30 year mean changes in event frequency are compared with resampled (bootstrapped) time series from the PIC simulation. Confidence intervals represent climate change signals that fall outside the sampled range of PIC variability with 90% confidence, representing a high statistical bar given the very wide range of simulated internal variability that exists within CESM-LENS[50].

Change-in-frequency maps. To provide a robust measure of statistical significance for change-in-frequency maps (Figs. 1–4 and Supplementary Fig. 2), we used a bootstrap resampling approach. For seasonal extreme events (25 year wet events and 100 year dry events), we generated 10,000 random time series by selecting wet season precipitation totals from the full 1,800 year PIC run (with replacement).

The length of each time series corresponds to the return interval of the event itself: in this instance, either 25 or 100 years. Next, in each resampled time series, the number of exceedances of 25 or 100 year events was calculated and translated into a ratio relative to the full PIC count, producing a distribution of 10,000 bootstrapped ratio values at each grid point. Finally, these distributions were used to determine the rarity of the simulated ratios relative to internal variability in the PIC run. In all map plots, cross-hatching for wet (dry) events represent a value at or above (at or below) the 90th (10th) PIC percentile—signifying 90% confidence ($P<0.1$) that ratios fall outside of the PIC internal variability. In time series plots shown in Figs. 1–4, error bars represent two-thirds of the spread (±33.3%) of 40 ensemble members, and the average is calculated on a 30 year running mean basis to distinguish long-term trends from interannual variability.

We used a modified version of the bootstrap resampling approach described above for the 200 year event change-in-frequency map (Fig. 2 and Supplementary Fig. 2). Given the computational constraint of large-N resampling using this dataset, 100 resampled time series were constructed for this particularly extreme event (we confirm that $N=100$ is a sufficiently large sample size for estimates of precipitation values to stabilize). For each time series, 200 years were chosen at random (each of which contains a distribution of 40 day running sums of November–March precipitation). We note that temporal autocorrelation can become problematic when counting occurrences using 40 day running sums for high-magnitude events. To ensure that our frequency counts do not unintentionally count these extremes twice, our algorithm skips ahead by 40 days each time a 200-year-magnitude event is encountered. As for other extreme events, we calculated the ratio of event frequencies between the full PIC run and the bootstrapped time series at each grid point.

For change-in-frequency maps of seasonal whiplash events (Fig. 4a), 10,000 block bootstrapped time series were generated using randomly chosen segments of 100 consecutive years. This consecutive-year (block) approach is necessary because our whiplash definition depends on sequential dry-to-wet transitions; thus, to appropriately sample the internal variability, the underlying temporal sequence in the PIC simulation must be preserved.

For change-in-frequency maps of month-to-month precipitation variability (Supplementary Fig. 2c), P values are calculated using 10,000 bootstrapped 40 year time series of November–March PIC precipitation. In each bootstrap iteration, 40 years were selected at random and with replacement, and the standard deviation across 200 (40 × 5) November–March model months was calculated for comparison with the CESM-LENS 40-member ensemble. Distributions of these month-to-month variability measures were generated at each grid point and normalized by the full PIC run to represent ratios.

For time series plots referring to either Southern California or Northern California, we use a spatially smoothed mean value (defined as the average value within a 3×3 grid box cluster centred on the original CESM-LENS grid box closest to the actual latitude/longitude of Los Angeles and San Francisco, respectively).

Time–latitude plots. The bootstrapped time series discussed above are also used to calculate statistical significance for time–latitude plots. After these bootstrapped time series were generated, further calculations were completed using the average of three contiguous west-to-east-oriented grid boxes along the California coast at each relevant latitude. As before, P values <0.1 resulting from the significance test imply rejection of the null hypothesis that the ratios in the time–latitude plots are within the range of simulated internal variability in the PIC simulation. In the present case, rejection of the null hypothesis is interpreted to mean that the 20C + RCP8.5 distribution is statistically distinguishable from the 'climate without humans' control.

Analysis of large-scale atmospheric conditions linked to extremes. We created anomaly composite maps for 500 hPa geopotential heights (GPH; Fig. 6a,d) and column-integrated water vapour (Fig. 6c,f) for wet years (exceeding the 80th preindustrial percentile) and dry years (falling below the 20th percentile) in the LENS simulations during both the full 1,800 year PIC simulation and across the 40 ensemble members of the RCP8.5 simulation between 2081 and 2100 (yielding a sample size of 760 model years). To simplify visual comparison of the anomaly patterns (where spatial gradients determine the geostrophic wind field) a spatially constant component of the thermal dilation[5,14] of the atmosphere (Supplementary Fig. 8a) was removed by subtracting the field mean difference in GPH (RCP8.5 minus PIC for a broad region near California (20° N–60° N, 180° E–250° E) from all grid points before generating RCP8.5 anomaly fields (Fig. 6a,d). We also compare the difference in anomalies between the RCP8.5 and PIC for wet and dry years (Fig. 6b,c,e,f) to emphasize the relative similarity of the underlying atmospheric circulation features between these periods.

Suitability of CESM-LENS for simulating California precipitation. The majority of findings in this study were derived using a global climate model operating at relatively coarse spatial resolutions (nominally 1°, or ~100 km, for the CESM configuration in LENS[34]). Given the importance of fine-scale topography in influencing California precipitation extremes[6], the relative spatial coarseness of model data used in this study precludes quantitative estimates of future runoff volume and flood flows at the watershed scale. Indeed, we note that that a local minimum in the relative increase in wet extremes exists along the axis of maximum topographic slope in the CESM-LENS boundary conditions (Supplementary Fig. 9b), suggesting a possible nonlinearity in orographic precipitation scaling with warming (a possibility supported by recent high-resolution modelling experiments, for example, ref. [56]). In the present study, however, our focus on relative (rather than absolute) changes in the frequency of various precipitation extremes across broad regions implicitly accounts for possible simulated precipitation biases arising from coarse model resolution and other sources.

We reiterate that CESM-LENS, while state-of-the-art, is a single-model ensemble. Substantial intermodel differences do exist in the simulated atmospheric response to anthropogenic forcing[7], but we have chosen to focus on results using exclusively CESM-LENS data for two reasons. First, CESM-LENS includes 40 ensemble members over a 180 year simulation (1920–2100)—yielding a very large (7,200-model year) sample size, allowing us to directly examine very rare extreme events (such as the '200 year flood') without making assumptions about the character of the underlying statistical distribution. Combining this with the 1,800 year PIC simulation allows for evaluation of very rare events that would otherwise not be possible in the observational record or CMIP5 experiments. Recent evidence suggests that (1) CESM reproduces both the mean and variability of observed California precipitation with reasonable fidelity[9] (Supplementary Fig. 10), (2) the CESM-LENS single-model ensemble mean lies close to the median of the CMIP5 multi-model ensemble mean in the vicinity of California (Supplementary Fig. 6) and (3) CESM reproduces remote teleconnections (that is, those associated with ENSO) critical to California precipitation[57] (Supplementary Fig. 11).

To independently confirm that CESM-LENS is an appropriate tool for investigating changes in California precipitation, we compare simulated versus observed precipitation distributions for the 20C historical period for Northern and Southern California. We perform this validation using a gridded observational dataset (the Global Precipitation Climatology Project (GPCP) version 2.3[58]). To generate distributions for Northern and Southern California regions (depicted as white boxes in Supplementary Fig. 9), we sum November–March precipitation over land-only grid boxes with centroids that fall within a 200 km radius of San Francisco and Los Angeles, respectively, during the 1980–2016 period of mutual overlap between the CESM-LENS 20C simulations and the GPCP dataset.

We find that despite slight positive bias in median seasonal precipitation (<5% for Southern California and +9% for Northern California), the overall shape of the CESM-LENS distribution for both regions is statistically indistinguishable from observations at the 5% level using a Kolgoromov–Smirnoff test (Supplementary Fig. 10). We note that the CESM-LENS distribution tends to have slightly longer tails than observations, but this is unsurprising given that the effective sample size of the historical simulation (1,440 model years) is much larger than for the observational dataset (40 years) and the range of distribution among the 40 realizations encompasses the GPCP data (see horizontal bars in Supplementary Fig. 10). As our overall methodology implicitly accounts for mean biases in precipitation, and our focus is on extreme events in the upper and lower the tails of the distribution, the outcome of this validation exercise strongly suggests CESM-LENS is capable of capturing both the median and underlying interannual variability of California hydroclimate.

Having confirmed these measures of fidelity of simulated California precipitation in CESM-LENS relative to observations, we assess whether the ensemble also captures the large-scale physical processes and teleconnections responsible for precipitation variability in this region. To test whether CESM-LENS plausibly reproduces the observed ENSO teleconnection, we perform linear regression of 500 hPa GPH on sea surface temperatures in the 'Nino3.4' region of the tropical eastern Pacific Ocean using data from both CESM-LENS and National Centers for Environmental Prediction/National Center for Atmospheric Research (NCEP/NCAR) R1[59]. The spatial pattern of the GPH teleconnection is substantially similar between CESM-LENS simulations and the R1 reanalysis (corroborating results previously shown in ref. [57]), and is characterized by a deepening of North Pacific low pressure and a more modest decrease in mid-tropospheric heights eastward over California and the southern tier of the United States (Supplementary Fig. 11a,b) during El Niño events. We further confirm that the mean position and magnitude of the cool-season (November–March) jetstream is close to that in observations (Supplementary Fig. 11b,c), though we also point out that even subtle biases could potentially lead to latitudinal shifts in the location of precipitation extreme changes discussed here (an issue that has been raised in previous work[60]). Finally, the large-scale atmospheric circulation patterns during California wet and dry years, respectively, exhibit similar spatial patterns and magnitudes to those observed during historical wet and dry years (Supplementary Fig. 12), especially in key regions near the US West Coast. Collectively, these results suggest that CESM-LENS is an appropriate tool for use in characterizing changes in regional precipitation extremes in the vicinity of California.

Code availability. The code used in the analyses described in this study is available from the corresponding author upon reasonable request.

Data availability. Precipitation data from the CESM-LENS simulations are available from the University Corporation for Atmospheric Research (http://www.

cesm.ucar.edu/projects/community-projects/LENS/data-sets.html). Precipitation data for California are available from the National Oceanic and Atmospheric Administration National Climatic Data Center (nClimDiv, www.ncdc.noaa.gov/monitoring-references/maps/us-climate-divisions.php) and National Oceanic and Atmospheric Administration Earth System Research Laboratory (NOAA ESRL) (GPCP, https://www.esrl.noaa.gov/psd/data/gridded/data.gpcp.html). CMIP5 ensemble data were obtained from Lawrence Livermore National Laboratory's Earth System Grid portal (https://esgf.llnl.gov) via the Royal Netherlands Meteorological Institute Climate Explorer (https://climexp.knmi.nl). Geopotential height and wind data from NCEP/NCAR R1 are available from NOAA ESRL (https://www.esrl.noaa.gov/psd/data/gridded/data.ncep.reanalysis.html) and additional composite data were created using the NOAA ESRL plotting tool (https://www.esrl.noaa.gov/psd/cgi-bin/data/composites/printpage.pl).

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Attachment 4

CALIFORNIA NATURAL RESOURCES AGENCY

FINAL STATEMENT OF REASONS FOR REGULATORY ACTION

AMENDMENTS TO THE STATE CEQA GUIDELINES

OAL NOTICE FILE NO. Z-2018-0116-12

NOVEMBER 2018

Final Statement of Reasons

Update to the Initial Statement of Reasons

The California Natural Resources Agency (the "Natural Resources Agency" or "Agency") proposes to amend the Guidelines Implementing the California Environmental Quality Act (Pub. Resources Code section 21000, et seq.) ("CEQA Guidelines"). The proposed amendments address legislative changes to the California Environmental Quality Act (CEQA), clarify certain portions of the existing CEQA Guidelines, and update the CEQA Guidelines to be consistent with recent court decisions.

CEQA generally requires public agencies to review the environmental impacts of proposed projects, and, if those impacts may be significant, to consider feasible alternatives and mitigation measures that would substantially reduce significant adverse environmental effects. Section 21083 of the Public Resources Code requires the adoption of guidelines to provide public agencies and members of the public with guidance about the procedures and criteria for implementing CEQA. The guidelines required by section 21083 of the Public Resources Code are promulgated in the California Code of Regulations, title 14, sections 15000-15387, plus appendices. Public agencies, project proponents, and third parties, who wish to enforce the requirements of CEQA, rely on the CEQA Guidelines to provide a comprehensive guide on compliance with CEQA. Subdivision (f) of section 21083 requires the Agency, in consultation with the Office of Planning and Research ("OPR"), to certify, adopt, and amend the CEQA Guidelines at least once every two years.

The Natural Resources Agency has made the following changes to the CEQA Guidelines:

Add sections: 15064.3 and 15234.

Amend sections: 15004, 15051, 15061, 15062, 15063, 15064, 15064.4, 15064.7, 15072, 15075, 15082, 15086, 15087, 15088, 15094, 15107, 15124, 15125, 15126.2, 15126.4, 15152, 15155, 15168, 15182, 15222, 15269, 15301, 15357, 15370, and Appendix G, Appendix M and Appendix N.

The CEQA Guidelines are unique among administrative regulations. They provide a carefully organized, step-by-step guide to the environmental review process. As a result, rather than turning to the statute and case law, many agency staff and planners look to the CEQA Guidelines as a comprehensive source of information regarding CEQA's requirements.

Background

The last comprehensive update to the CEQA Guidelines occurred in the late 1990s. Since 2011, the Governor's Office of Planning and Research ("OPR") and the Natural Resources Agency have informally collected ideas on possible improvements to the CEQA Guidelines. In 2013, OPR and the Agency distributed a formal Solicitation for Input on possible improvements. Specifically, the solicitation asked for suggestions on efficiency improvements, substantive improvements, and technical improvements. Stakeholders offered many ideas. After considering this input, OPR developed a possible list of topics to

address in the update, and again sought and received substantial public input. Based on that input, as well as input received during informal stakeholder meetings, conferences, and other venues, OPR, in consultation with the Agency, developed a Preliminary Discussion Draft of proposed changes to the CEQA Guidelines. As that process proceeded, OPR, again in consultation with the Agency, developed proposed updates related to transportation impacts, as well as a proposed update related to the evaluation of hazards in response to the California Supreme Court's holding in *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal. 4th 369.

In November 2017, OPR finalized the package of updates and transmitted them to the Natural Resources Agency. The Agency then prepared the rulemaking documents required by the Administrative Procedures Act, including a Standardized Regulatory Impact Assessment to evaluate the potential economic impacts of the package.

Anticipated Benefits of the Proposed Regulations

Approximately thirty (30) sections have been identified for adoption or amendment during this rulemaking process. Several of those changes are intended to, both directly and indirectly, reduce greenhouse gas emissions and better enable communities to respond to the effects of climate change. Additionally, several changes should help agencies accommodate more homes and jobs within California's existing urban areas. Doing so should help people find homes and get to where they need to go more quickly and affordably while also preserving California's natural resources. Finally, many of the changes are intended to make the CEQA process easier to navigate by, among other things, improving exemptions, making existing environmental documents easier to rely on for later projects, and clarifying rules governing the CEQA process.

Regarding the change related to transportation impacts, the Agency's Statement of Regulatory Impact Assessment identified numerous potential direct and indirect benefits of reducing vehicle miles traveled. Realization of those benefits will depend on the degree to which, pursuant to this CEQA Guidelines update, lead agencies use the streamlined approaches for analysis of low-VMT projects, mitigate high-VMT projects, or choose lower VMT project alternatives.[1] Some of the benefits, among many others, that may result from reducing vehicle miles traveled are described qualitatively below:

- *Better health and avoided health care costs.* Higher vehicle miles traveled is associated with more auto collisions, more air pollution, more greenhouse gas emissions, less active transportation, and less transit use. If California achieves its goals of doubling walking and tripling biking (Caltrans Strategic Management Plan), 2,095 annual deaths will be avoided. Increasing active transit modes would help reduce air pollution and greenhouse gas emissions. Estimates of the annual monetized value of prevented deaths and disabilities in California resulting from achieving those targets ranges from $1 billion to $15.5 billion.[2]

[1] Lead agencies determine whether any particular mitigation measure is feasible in the context of the project under review. (See, e.g., CEQA Guidelines § 15091.) Further, CEQA allows a lead agency to approve a project that has significant environmental impacts so long as it finds that the benefits of the project outweigh those impacts. (*Id*. at § 15093.)

[2] Maizlish N. *Increasing Walking, Cycling, and Transit: Improving Californians' Health, Saving Costs, and Reducing Greenhouse Gases. Final Report. California Department of Public Health (CDPH)*, 2016.

- *Reduction in transportation, building energy, and water costs.* Less vehicle travel reduces vehicle fuel (or electricity), maintenance, parking, and in some cases vehicle ownership costs. Transportation costs are typically the second greatest category of household expenditure after housing itself (Bureau of Labor Statistics, Consumer Expenditures). Compact development, which is associated with lower vehicle miles traveled, tends to consume less building energy and irrigation water, leading to savings to residents and businesses. Busch et al., 2015 estimated that if 85 percent of new housing and jobs added in the state until 2030 were located within existing urban boundaries, it would reduce per capita vehicle miles traveled by about 12 percent below 2014 levels.[3] That combination of reduced vehicle miles traveled and more compact development would, in turn, result in an estimated $250 billion in household cost savings cumulative to 2030 (with an average annual savings per household in 2030 of $2,000). Household costs analyzed in the Busch, et al. study included auto fuel, ownership and maintenance costs, as well as residential energy and water costs.

- *Reduction in travel times to destinations.* Reducing vehicle miles traveled reduces congestion regionally, decreasing travel times, and may also encourage more investment in multi-modal infrastructure. Even if there is localized congestion, due to increased density of development, travel times decrease because of better proximity (Mondschein, 2015).[4]

- *Cleaner water.* Motor vehicle travel can cause deposition of pollutants onto roadways, which can then be carried by stormwater runoff into waterways. Fuel, oil, and other liquids used in motor vehicles can leak from vehicles onto the ground (Delucchi, 2000). Brake dust and tire wear can further cause particles to be deposited onto the ground (Thorpe and Harrison, 2008). Brake pads and tire compounds are made out of compounds that include metal. Further, motor vehicles require roadways for travel. Paved roadways are impervious surfaces which prevent infiltration of storm water in the ground. Impervious surfaces can increase the rate, volume, and speed, and temperature of stormwater runoff (US Environmental Protection Agency, 2003). Wearing down of roadways can further cause particles to be deposited onto the ground (Thorpe and Harrison, 2008). The Victoria Transportation Policy Institute (2015) estimates that in total that motor vehicle contributions to water pollution cost approximately 42 billion dollars per year or 1.4 cents per mile.

The Agency also expects more sustainable development decisions to result from the clarified sections addressing water supply, energy, wildfire, greenhouse gas emissions, as well as the clarified exemptions for transit oriented developments and upgrades to existing facilities. Other benefits of the remainder of the CEQA Guidelines update are expected to include greater certainty for both public agencies and private applicants, as well as time and cost savings due to clearer rules.

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https://www.cdph.ca.gov/programs/Documents/IncreasingWalkingCyclingTransitFinalReport2016rev2017-01-28.pdf

[3] Busch C., et al., *Moving California Forward, How Smart Growth Can Help California Reach Its 2030 Climate Target While Creating Economic and Environmental Co-Benefits*, Nov. 2015, at p. 26.

[4] Mondschein A. *Congested Development: A Study of Traffic Delays, Access, and Economic Activity in Metropolitan Los Angeles*, Institute of Transportation Studies, UCLA Luskin School of Public Affairs, Sept. 2105.

What is in this Package?

This rulemaking package contains changes or additions involving nearly thirty different sections of the Guidelines addressing nearly every step of the environmental review process. It is a balanced package that is intended to make the process easier and quicker to implement, and better protect natural and fiscal resources consistent with California's environmental policies.

Efficiency Improvements

The package includes several changes intended to result in a smoother, more predictable process for agencies, project applicants and the public.

First, the package promotes use of existing regulatory standards in the CEQA process. Using standards as "thresholds of significance" creates a predictable starting point for environmental analysis, and allows agencies to rely on the expertise of the regulatory body, without foreclosing consideration of possible project-specific effects.

Second, the package updates the environmental checklist that most agencies use to conduct their environmental review. Redundant questions in the existing checklist are proposed to be eliminated and some questions would be updated to address contemporary topics. The checklist has also been updated with new questions related to transportation and wildfire, pursuant to Senate Bill 743 (Steinberg, 2013), and Senate Bill 1241 (Kehoe, 2012), respectively.

Third, the package includes several changes to make existing programmatic environmental review easier to use for later projects. Specifically, it clarifies the rules on tiering, and provides additional guidance on when a later project may be considered within the scope of a program EIR.

Fourth, the package enhances several exemptions. For example, consistent with Senate Bill 743 (Steinberg, 2013), it updates an existing exemption for projects implementing a specific plan to include not just residential, but also commercial and mixed-use projects near transit. It also clarifies the rules on the exemption for changes to existing facilities so that vacant buildings can more easily be redeveloped. Changes to that same exemption will also promote pedestrian, bicycle and streetscape improvements within an existing right of way.

Finally, the package includes a new section to assist agencies in complying with CEQA following resolution of a court challenge, and help the public and project proponents understand the effect of the remand on project implementation.

Substantive Improvements

The package also contains substantive improvements related to environmental protection.

First, the package provides guidance regarding energy impacts analysis. Specifically, it requires an EIR to include an analysis of a project's energy impacts that addresses not just building design, but also transportation, equipment use, location, and other relevant factors.

Second, the package includes guidance on the analysis of water supply impacts. The guidance is built on the holding in the California Supreme Court decision in *Vineyard Area Citizens for Responsible Growth v.*

City of Rancho Cordova (2007) 40 Cal. 4th 412. It requires analysis of a proposed project's possible sources of water supply over the life of the project and the environmental impacts of supplying that water to the project. The analysis must consider any uncertainties in supply, as well as potential alternatives.

Third, as directed in Senate Bill 743, the package includes a new section addressing the evaluation of transportation impacts. The current emphasis on traffic congestion in transportation analyses tends to promote increased vehicle use. This new guidance instead focuses on a project's effect on vehicle miles traveled, which should promote project designs that reduce reliance on automobile travel.

Fourth, the package updates the guideline addressing greenhouse gas emissions to reflect recent case law. Among other changes, the Agency clarifies that a project's incremental contribution to the impacts of climate change should not be compared to state, national or global emissions to determine whether the project's emissions are cumulatively considerable. The changes also clarify that, if relying on consistency with state goals and policies to determine significance, the lead agency should explain how the project's emissions are consistent with those goals.

Technical Improvements

The package also includes many technical changes to conform to recent cases and statutory changes. For example, one of the changes clarifies when agencies must consider the effects of locating projects in hazardous locations, in response to the California Supreme Court's ruling in *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal. 4th 369. Others clarify when it may be appropriate to use projected future conditions as the environmental baseline. Another change addresses when agencies may defer specific details of mitigation measures until after project approval. The package also includes a set of changes related to the duty of lead agencies to provide detailed responses to comments on a project. The changes clarify that a general response may be appropriate when a comment submits voluminous data and information without explaining its relevance to the project. Other changes address a range of topics such as selecting the lead agency, posting notices with county clerks, clarifying the definition of "discretionary," and others. Detailed Description of Proposed Changes

The specific changes proposed in this package are described in detail below in the order in which they would appear in the CEQA Guidelines.

15004. TIME OF PREPARATION

Specific Purposes of the Amendment

CEQA Guidelines section 15004 states the requirement that environmental impact reports (EIRs) and Negative Declarations be prepared before an agency makes a decision on the project and early enough to help influence the project's plans or design.

In *Save Tara v. City of West Hollywood* ("*Save Tara*") (2008) 45 Cal.4th 116, the California Supreme Court addressed the issue of when CEQA applies to certain activities that precede project approval. The court declined to set forth a bright-line rule. Instead, the court concluded

that several factors are relevant to the determination of when CEQA review must be completed. The purpose of the addition of subdivision (b)(4) is to assist lead agencies in applying the principles identified by the California Supreme Court in the *Save Tara* decision. The first sentence of subdivision (b)(4) acknowledges that pre-approval agreements may fall on a spectrum between mere interest in a project and a commitment to a definite course of action. That sentence also reflects the Supreme Court's holding that circumstances surrounding the activity are relevant to the determination of whether an agency has, as a practical matter, committed to a project. The second sentence provides an example of what could likely not precede CEQA review, such as an agreement that vests development rights. The third sentence, on the other hand, provides examples of characteristics of agreements that may be executed prior to CEQA review. These include agreements that do not foreclose any mitigation measures or project alternative and that are conditioned on completion of CEQA review.

Necessity

The proposed addition of (b)(4) of CEQA Guidelines section 15004 is reasonably necessary to reflect the California Supreme Court's decision in *Save Tara*. The additional language will ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Natural Resources Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with case law that has interpreted CEQA, and the proposed action adds no new substantive requirements. The Natural Resources Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses, as any impacts are due to the California Supreme Court's determination in *Save Tara*.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing case law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15051. CRITERIA FOR IDENTIFYING THE LEAD AGENCY

Specific Purposes of the Amendment

This CEQA Guidelines section provides criteria for identifying the Lead Agency when a project may require approval by more than one public agency under CEQA. Public Resources Code section 21067 defines "lead agency" as "the public agency which has the principal responsibility for carrying out or approving a project which may have a significant effect upon the environment." Similarly, the CEQA Guidelines define the lead agency as "the public agency which has the principal responsibility for carrying out or approving a project…. Criteria for determining which agency will be the lead agency for a project is contained in section 15051." (CEQA Guidelines, § 15367.) CEQA Guidelines section 15051, subdivisions (a) and (b), explain which entity will act as lead agency under usual circumstances, and subdivisions (c) and (d) address circumstances when more than one agency could potentially be lead.

CEQA Guidelines, section 15051, subdivision (c), states that, "[w]here more than one public agency equally meet the criteria in subdivision (b), the agency which will act first on the project in question shall be the lead agency." However, subdivision (d) states that "[w]here the provisions of subdivisions (a), (b), and (c) leave two or more public agencies with a substantial claim to be the lead agency, the public agencies may by agreement designate an agency as the lead agency…." As these sections are currently written, where two public agencies equally meet the criteria for lead agency, the agency which will act first must be the lead under subdivision (c), which effectually renders subdivision (d) inapplicable other than with respect to subdivision (a). The existing language, if read literally, would prevent two potential lead agencies which meet the criteria in subdivision (b), each with a substantial claim to be the lead, from agreeing to designate one as the lead unless both happen to act at the exact same moment on the project.

The purpose of the amendment is to increase the flexibility in the determination of a lead agency by changing the word "shall" to "will normally" to clarify that where more than one public agency meets the criteria in subdivision (b), the agencies may agree pursuant to subdivision (d) to designate one entity as the lead.

Necessity

The proposed changes are reasonably necessary to provide clarity and to ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose

for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Natural Resources Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be internally consistent, and the proposed action adds no new substantive requirements. The Natural Resources Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law and makes this CEQA Guideline internally consistent. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15061. REVIEW OF EXEMPTION

Specific Purposes of the Amendment

CEQA Guidelines section 15061 describes when a project or activity is exempt from CEQA. The Natural Resources Agency proposes to amend subdivision (b)(3) of Section 15061. Currently, subdivision (b)(3) states that an activity is covered by the "general rule" that an activity is exempt from CEQA if there is no possibility that activity may have a significant effect on the environment. The Natural Resources Agency proposes to replace the phrase "general rule" with the phrase "common sense exemption" in order to match the language used by the California Supreme Court when evaluating the application of this CEQA exemption. (See, *Muzzy Ranch Co. v. Solano County Airport Land Use Com.* (2007) 41 Cal. 4th 372, 389 (using the phrase "common sense exemption" to apply Section 15061).)

Necessity

This clarification is needed to match practitioners' customary use of the term "common sense exemption" and to prevent possible confusion for others who see or hear references to the term but cannot find it in the text of the CEQA Guidelines. Additionally, the proposed change is reasonably necessary to provide clarity and to ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected

private persons than, the proposed action. This conclusion is based on the Natural Resources Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with case law that has interpreted CEQA, and the proposed action adds no new substantive requirements. The Natural Resources Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing case law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15062. NOTICE OF EXEMPTION

Specific Purposes of the Amendment

This section prescribes the use and content of the Notice of Exemption. Agencies are authorized but, in most cases, not required to file this notice. The regulation spells out minimum contents so that people can recognize whether a particular notice applies to the project with which they are concerned. The section notes that the effect of filing the notice is to start a short statute of limitations period. If the notice is not filed, a longer period would apply. Failure to comply with all of the requirements for filing notices of exemption results in the longer, 180-day, statute of limitations.

Pursuant to Assembly Bill 320 (Hill, 2011), the Natural Resources Agency added a new subdivision (a)(6) to Section 15062 of the CEQA Guidelines. AB 320 amended Public Resource Code, sections 21108 and 21152 requiring certain information to be included in the Notice of Exemption consistent with CEQA Guidelines section 21065, subdivisions (b) and (c). Specifically, AB 320 requires the Notice of Exemption to include the identity of the person undertaking an activity, in whole or in part, through contracts, grants, subsidies, loans, or other forms of assistance from one or more public agencies or the identity of the person receiving a lease, permit, license, certificate, or other entitlement for use. Thus, the Natural Resources Agency added subdivision (a)(6) to section 15062 of the CEQA Guidelines to provide consistency with Public Resources Code, section 21108 and 21152.

Necessity

This addition is necessary to implement the requirements of AB 320 (Hill, 2011) and to be consistent with Public Resources code, sections 21108 and 21152.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Natural Resources Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with Sections 21108 and 21152 of the Public Resources Code, and the proposed action adds no new substantive requirements per se. Rather, additional information regarding the project applicant must be included in the forms filed by public agencies. The Natural Resources Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15063. INITIAL STUDY

Specific Purposes of the Amendment

The purpose of this section is to describe the process, contents, and use of the Initial Study. The Natural Resources Agency proposes to add a new subsection (4) to Section 15063, subdivision (a), to specify the arrangements a lead agency may use to prepare an initial study. The Public Resources Code states that a public agency may prepare a draft environmental impact report or negative declaration directly or under contract to that public agency. (Pub. Resources Code, § 21082.1.) Section 15084 of the CEQA Guidelines implements the Public Resources Code by allowing lead agencies to prepare a draft environmental impact report directly or under contract. (See CEQA Guidelines, § 15084 subd. (d).) The CEQA Guidelines do not currently, however, contain a parallel provision for negative declarations or mitigated declarations.

A draft or mitigated negative declaration must include a copy of an initial study. (See CEQA Guidelines, § 15071, subd. (d) (stating that a negative declaration circulated for public review must include a copy of the initial study).) Therefore, the Natural Resources Agency proposes to add the new subsection to Section 15063, subdivision (a) to match the methods and arrangement used to prepare a draft environmental impact report and increase consistency in report preparation.

Necessity

This addition is necessary to provide consistent guidance for lead agencies preparing environmental documents.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Natural Resources Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be internally consistent, and the proposed action adds no new substantive requirements. The Natural Resources Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing case law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15064. DETERMINING THE SIGNIFICANCE OF THE ENVIRONMENTAL EFFECTS CAUSED BY A PROJECT

Specific Purposes of the Amendment

A key step in the environmental review process is to determine whether a project may cause a significant effect on the environment. Section 15064 of the CEQA Guidelines provides general criteria to guide agencies in determining the significance of environmental effects of their projects as required by section 21083 of the Public Resources Code. The Natural Resources Agency updated CEQA Guidelines Section 15064 to expressly clarify that agencies may rely on standards adopted for environmental protection as thresholds of significance. Specifically, the Natural Resources Agency added subdivision (b)(2) to Section 15064.

The first sentence of subdivision (b)(2) states the rule, set forth in cases interpreting CEQA, that thresholds of significance may be used in the determination of significance. (See *Communities for a Better Environment v. California Resources Agency* (2002) 103 Cal.App.4th 98 111; see also *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal. App. 4th 1099, 1111.) Importantly, this new sentence also provides a cross-reference to CEQA Guidelines, Section 15064.7, which defines a threshold of significance.

The second sentence of this new subdivision provides that an agency that relies on a threshold of significance should explain how application of the threshold indicates a less than significant effect. This sentence recognizes the court's caution in *Protect the Historic Amador Waterways* that "thresholds cannot be used to determine automatically whether a given effect will or will not be significant." (*Protect the Historic Amador Waterways, supra*, 116 Cal. App. 4th at pp. 1108-1109.) This sentence is also consistent with several other provisions in the Guidelines. (See, e.g., CEQA Guidelines § 15064(h)(3) ("When relying on a plan, regulation or program [to evaluate cumulative impacts], the lead agency should explain how implementing the particular requirements in the plan, regulation or program ensure that the project's incremental contribution to the cumulative effect is not cumulatively considerable"); § 15063, subd. (d)(3) (initial study must include sufficient information to support its conclusions).) Notably, the explanation need not be lengthy. CEQA Guidelines Section 15128 provides the explanation that an impact is determined to be less than significant, and therefore was not analyzed in an EIR, need only be brief.

Finally, the third sentence of this new subdivision cautions that a lead agency must evaluate any substantial evidence supporting a fair argument that, despite compliance with thresholds, the project's impacts are nevertheless significant. (*Protect the Historic Amador Waterways, supra*, 116 Cal. App. 4th at pp. 1108-1109 ("thresholds cannot be used to determine automatically whether a given effect will or will not be significant[;]" rather, "thresholds of significance can be used only as a measure of whether a certain environmental effect 'will normally be determined to be significant' or 'normally will be determined to be less than significant' by the agency"); see also *CBE, supra*, 103 Cal.App.4th at 112-113.)

This sentence does not alter the standard of review. Thus, in the context of an environmental impact report, a lead agency may weigh the evidence before it to reach a conclusion regarding the significance of a project's effects. This added sentence clarifies, however, that a project's compliance with a threshold does not excuse an agency of its obligation to consider the information presented to it regarding a project's impacts. (*Rominger v. County of Colusa* (2014) 229 Cal. App. 4th 690, 717.) In other words, thresholds shall not be applied in a rote manner; analysis and evaluation of the evidence is still required. In this regard, this sentence is similar to a lead agency's requirement to review and consider comments submitted on its environmental documents. (CEQA Guidelines, §§ 15074, subd. (b), 15088.)

Necessity

The change is necessary to clarify a lead agency's obligation to determine the significance of a proposed project and what evidence it must consider in reaching that conclusion. The Natural Resources Agency's revision will clarify that compliance with relevant standards may be a basis for determining that the project's impacts are less than significant.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Natural Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Natural Resources Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be internally consistent, and the proposed action adds no new substantive requirements. The Natural Resources Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. The proposed action also does not alter the applicable standard of review. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15064.3. DETERMINING THE SIGNIFICANCE OF TRANSPORTATION IMPACTS

Californians drive approximately 332 billion vehicle miles each year. Traffic studies used in CEQA documents have typically focused on one thing: the impact of projects on traffic flows. Senate Bill 743 (2013) required OPR and the Natural Resources Agency to develop alternative methods of measuring transportation impacts under CEQA. At a minimum, the new methods must apply within areas that are served by transit; however, the Guidelines may extend the new methods statewide. Once the Agency adopts the new transportation guideline, automobile delay (often called Level of Service) will no longer be considered to be an environmental impact under CEQA.

Explanation of Proposed New Section 15064.3

New section 15064.3 contains several subdivisions, which are described below. In brief, these Guidelines provide that transportation impacts of projects are, in general, best measured by evaluating the project's vehicle miles traveled. Methodologies for evaluating such impacts are already in use for most land use projects, as well as many transit and active transportation projects. Methods for evaluating vehicle miles traveled for highway capacity projects continue to evolve, however, and so these Guidelines recognize a lead agency's discretion to analyze such projects, provided such analysis is consistent with CEQA and applicable planning requirements.

Subdivision (a): Purpose

Subdivision (a) sets forth the purpose of the entire new section 15064.3. First, the subdivision clarifies that the primary consideration, in an environmental analysis, regarding transportation is the amount

and distance that a project might cause people to drive. This captures two measures of transportation impacts: auto trips generated and vehicle miles traveled. These factors were identified by the legislature in SB 743. The last sentence clarifies that automobile delay is not a significant effect on the environment.

Subdivision (b): Criteria for Analyzing Transportation Impacts

While subdivision (a) sets forth general principles related to transportation analysis, subdivision (b) focuses on specific criteria for determining the significance of transportation impacts. It is further divided into four subdivisions: (1) land use projects, (2) transportation projects, (3) qualitative analysis, and (4) methodology.

Subdivision (b)(1): Land Use Projects

SB 743 did not authorize the Agency to set thresholds, but it did direct OPR and the Agency to develop Guidelines "for determining the significance of transportation impacts of projects[.]" (Pub. Resources Code § 21099(b)(2).) Therefore, to provide guidance on determining the significance of impacts, subdivision (b)(1) describes factors that might indicate whether the amount of a project's vehicle miles traveled may be significant, or not.

Subdivision (b)(2): Transportation Projects

While subdivision (b)(1) addresses vehicle miles traveled associated with land use projects, subdivision (b)(2) focuses on impacts that result from certain transportation projects. Subdivision (b)(2) clarifies that lead agencies should presume that projects that reduce vehicle miles traveled, such as pedestrian, bicycle and transit projects, will have a less than significant impact. This subdivision further provides that lead agencies have discretion in which measure to use to evaluate highway capacity projects, provided that any such analysis is consistent with the requirements of CEQA and any other applicable requirements (e.g., local planning rules). Importantly, this provision does not prohibit capacity expansion. It also does not relieve agencies of the requirement to analyze any other potential impacts of such projects, including, but not limited to, greenhouse gas emissions and other air pollutants. Finally, recognizing that highway capacity projects may be analyzed at a programmatic level, subdivision (b)(2) states that lead agencies may be able to tier from a programmatic analysis that adequately addresses the effects of such capacity projects.

Subdivision (b)(4): Methodology

Lead agencies have the discretion to choose the most appropriate methodology to analyze a project's vehicle miles traveled. Depending on the project, vehicle miles traveled may be best measured on a per person, per household or other similar unit of measurement. Subdivision (b)(4) also recognizes the role for both models and professional judgment in estimating vehicle miles traveled.

Subdivision (c): Applicability

The new procedures may be used immediately upon the effective date of these Guidelines by lead agencies that are ready to begin evaluating vehicle miles traveled, but jurisdictions will have until 2020 to start analyzing vehicle miles traveled if they need that time to update their procedures. In that case, those agencies would continue to evaluate transportation impacts by measuring congestion.

Necessity

The proposed addition of CEQA Guidelines section 15064.3 is reasonably necessary to implement the direction in Public Resources Code 21099 that the CEQA Guidelines provide for a new methodology for analyzing transportation impacts of projects. The language of this section of the CEQA Guidelines follows the direction of the Legislature and ensures that that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Natural Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered and rejected two alternatives to the proposed action. Under Alternative 1, the change from level of service to vehicle miles traveled would apply only to proposed projects within "transit priority areas." This is the minimum scope of what Senate Bill 743 requires. Proposed projects outside of transit priority areas would continue to prepare traffic analyses using level of service, or other measures of congestion.

The Agency rejected Alternative 1 for several reasons. First, this alternative would forgo substantial cost and time savings that are expected to result from studying vehicle miles traveled instead of congestion. Second, this alternative would be more likely to cause confusion and increase litigation risk. Greater uncertainty would result because this alternative would require two different types of analyses to be conducted, depending on location. Third, research indicates that a transportation analysis focused on vehicle miles traveled may result in numerous indirect benefits to individuals including improved heath; savings on outlay for fuel, energy, and water; reduction of time spent in transport to destinations. Finally, this alternative would be less likely to achieve the purposes of SB 743. That legislation requires the updated CEQA Guidelines "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." As explained in the Office of Planning and Research's Preliminary Evaluation of Alternative Methods of Transportation Analysis, as a metric, vehicle miles traveled promotes those statutory purposes better than level of service.

Under Alternative 2, the analysis of vehicle miles traveled would apply to land use projects only and not to transportation projects. In other words, under this alternative, congestion analysis would continue to apply to roadway, transit, bicycle and pedestrian projects reviewed under CEQA.

The Agency rejected Alternative 2 because it would forgo the cost and time benefits described above for transit, bicycle and pedestrian projects. Those types of projects in particular are more likely to provide healthier, lower cost, more equitable transportation options. They are also a key strategy to reducing

greenhouse gas emissions. As a result, this alternative would be less likely to achieve the purposes of Senate Bill 743, requiring the CEQA Guidelines update to "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses."

The Action Will Not Have a Significant Adverse Economic Impact on Business

The Agency has determined that the proposed action will not have a significant adverse economic impact on businesses, and instead, would lead to an overall economic benefit. Project proponents, including businesses, would experience time and cost savings related to document preparation largely because, with the changes required by SB 743, traffic studies would be less complicated and CEQA analysis may be streamlined, depending on the project's proximity to transit. Private consulting businesses that prepare environmental documents may generate less revenue for preparing less expensive studies, but their receipts would vary based on project-specific factors, including project complexity and location.

15064.4 DETERMINING THE SIGNIFICANCE OF IMPACTS FROM GREENHOUSE GAS EMISSIONS

Specific Purposes of Amendment

The Agency has amended several portions of existing section 15064.4, as described below. The Agency added section 15064.4 to the CEQA Guidelines in 2010 as part of a package of amendments addressing greenhouse gas emissions, as directed by Senate Bill 97 (Dutton, 2007). The purpose of section 15064.4 is to assist lead agencies in determining the significance of a project's greenhouse gas emissions on the environment.

Subdivision (a)

The first change is in subdivision (a) of section 15064.4. Subdivision (a) currently states that lead agencies "should" make a good faith effort to estimate or describe a project's greenhouse gas emissions. The Agency replaced the world "should" with the word "shall" to clarify that evaluation of a project's greenhouse gas emissions is a requirement of CEQA. (See Pub. Resources Code, § 21083.05; *Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70, 90-91 ["climate-change impacts are significant environmental impacts requiring analysis under CEQA"]; *Cleveland National Forest Foundation v. San Diego Assn. of Governments* (2017) 3 Cal.5th 497 (*SANDAG*); *see also* CEQA Guidelines, § 15005 [defining the terms "should" and "shall"].) This clarification is necessary because some agencies continue to provide information regarding climate change in their projects' environmental documents without actually determining whether the project's greenhouse gas emissions are significant. A similar clarifying change has been made in subdivision (b), replacing the word "assessing" with the word "determining." CEQA requires a lead agency to determine the significance of all environmental impacts. (Pub. Resources Code, § 21082.2; CEQA Guidelines, § 15064.)

Subdivision (b)

The Agency updated subdivision (b) of section 15064.4 by adding four sentences. That subdivision currently provides a list of factors that a lead agency should use when evaluating a project's greenhouse gas emissions. First, the Agency added a sentence clarifying that the focus of the lead agency's analysis should be on the project's effect on climate change. This clarification is necessary to avoid an incorrect focus on the quantity of emissions, and in particular how that quantity of emissions compares to statewide or global emissions. (*See, e.g., Friends of Oroville v. City of Oroville* (2013) 219 Cal.App.4th 832, 842 [invalidating an EIR that based its significance determination partly on comparing the project's emissions to statewide emissions]; *Center for Biological Diversity v. Dept. of Fish & Wildlife* (2015) 62 Cal.4th 204, 228 [invalidating an EIR because the lead agency did not provide sufficient evidence that "the Scoping Plan's statewide measure of emissions reduction can also serve as the criterion for an individual land use project"]; s*ee also Mission Bay Alliance v. Office of Community Investment & Infrastructure* (2016) 6 Cal.App.5th 160-198-200 [upholding agency's greenhouse gas analysis that did not quantify emissions].) The Agency further clarified that lead agencies should consider the reasonably foreseeable incremental contribution of the project's emissions to the effects of climate change. In doing that analysis, agencies should avoid in speculation. (CEQA Guidelines, §§ 15144 ["an agency must use its best efforts to find out and disclose all that it reasonably can"], 15145 ["[i]f, after a thorough investigation, a lead agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact"].)

In the second sentence of subdivision (b), the Agency clarified that a project's incremental contribution may be cumulatively considerable even if it appears relatively small compared to statewide, national or global emissions. This change is consistent with existing case law discussing cumulative impacts and the applicable portions of the Public Resources Code. The impacts analysis of greenhouse gas emissions is global in nature; "the fact that carbon dioxide and other greenhouse gases, once released into the atmosphere, are not contained in the local area of their emission means that the impacts to be evaluated are also global rather than local." (*Center for Biological Diversity v. Dept. of Fish & Wildlife*, *supra*, 62 Cal.4th at p. 220; *SANDAG*, *supra*, 3 Cal.5th at p. 512.) "[A]n individual project's emissions will most likely not have any appreciable impact on the global problem by themselves, but they will contribute to the significant cumulative impact caused by greenhouse gas emissions from other sources around the globe." (*Center for Biological Diversity v. Dept. of Fish & Wildlife*, *supra*, 62 Cal.4th at p. 219; *SANDAG*, *supra*, 3 Cal.5th at p. 512.) Thus, the primary question to be answered in the impacts analysis is "whether the project's incremental addition of greenhouse gases is 'cumulatively considerable' in light of the global problem, and thus significant." (*Ibid*.) Depending on the proposed project, the project's incremental contribution of greenhouse gases, even if minor, may be cumulatively considerable. (*See SANDAG*, *supra*, 3 Cal.5th at p. 515 ["The fact that a regional plan's contribution to reducing greenhouse gas emissions is likely to be small on a statewide level is not necessarily a basis for concluding that its impact will be insignificant in the context of a statewide goal."].)

In the third sentence of subdivision (b), the Agency added that lead agencies should consider a timeframe for the analysis that is appropriate for the project. CEQA requires agencies to consider a project's direct and indirect significant impacts on the environment, "giving due consideration to both the short-term and long-term effects." (CEQA Guidelines, § 15126.2, subd. (a); *see* Pub. Resources Code,

§ 21001, subd. (d) [state policy "[e]nsure[s] that the long-term protection of the environment . . . shall be the guiding criterion in public decisions"]; § 21001, subd. (g) [state policy requires "governmental agencies at all levels to consider . . . long-term benefits and costs, in addition to short-term benefits and costs . . . ."]; § 21083 [requiring preparation of an EIR for a project that "has the potential to . . . achieve short-term, to the disadvantage of long-term, environmental goals"].) In some cases, it would be appropriate for agencies to consider a project's long-term greenhouse gas impacts, such as for projects with long time horizons for implementation.

In the fourth sentence of subdivision (b), the Agency clarified that an agency's analysis must reasonably reflect evolving scientific knowledge and state regulatory schemes. This clarification acknowledges *SANDAG*, *supra*, 3 Cal.5th 497. In that case, the California Supreme Court addressed the adequacy of an EIR prepared for a long-range regional transportation plan. In addressing the plan's greenhouse gas emissions, the Court held the lead agency did not abuse its discretion by declining to analyze the consistency of projected long-term greenhouse gas emissions with the goals of an executive order declaring an emissions reduction goals for 2050. But the Court further stated: "we do not hold that the analysis of greenhouse gas impacts employed by SANDAG in this case will necessarily be sufficient going forward. CEQA requires public agencies like SANDAG to ensure that such analysis stay in step with evolving scientific knowledge and state regulatory schemes." (*Id*. at p. 504; *see id*. at p. 519.)

The agency also changed subdivision (b)(3) of section 15064.4. That subdivision currently discusses the consideration of whether a project complies with a plan or regulation to reduce greenhouse gas emissions. The Agency clarified the first sentence of subdivision (b)(3) by adding a reference to CEQA Guidelines section 15183.5, which governs the contents of an agency's plan for the reduction of greenhouse gas emissions. This addition is needed to clarify that lead agencies may rely on plans prepared pursuant to section 15183.5 in evaluating a project's greenhouse gas emissions. This change is consistent with the Agency's Final Statement of Reasons for the addition of section 15064.4, which states that "proposed section 15064.4 is intended to be read in conjunction with . . . proposed section 15183.5. Those sections each indicate that local and regional plans may be developed to reduce GHG emissions." (Natural Resources Agency, Final Statement of Reasons (December 2009), p. 27; *see Mission Bay Alliance v. Office of Community Investment & Infrastructure*, *supra*, 6 Cal.App.5th at pp. 201-202 [upholding agency's reliance on greenhouse gas strategy].)

Finally, the Agency added another sentence to subdivision (b)(3). The Agency clarified that in determining the significance of a project's impacts, the lead agency may consider a project's consistency with the State's long-term climate goals or strategies, provided that substantial evidence supports the agency's analysis of how those goals or strategies address the project's incremental contribution to climate change and its conclusion that the project's incremental contribution is consistent with those plans, goals, or strategies. This clarification implements the California Supreme Court's decision in *Center for Biological Diversity v. Dept. of Fish & Wildlife*, *supra*, 62 Cal.4th 204. In that case, the EIR used consistency with Assembly Bill 32's greenhouse gas emissions reduction goals as a significance threshold. The EIR also discussed the California Air Resources Board's Scoping Plan and "business as usual" (BAU) scenario, and found that the project would emit less than the BAU scenario. The Court concluded that the agency used a permissible significance threshold, but failed to support with

substantial evidence the finding that the project's greenhouse gas emissions would not have a cumulatively significant impact on the environment. (Id. at pp. 218-222, 225.) As the Court stated, the lead agency failed to establish through substantial evidence "a quantitative equivalence between the Scoping Plan's statewide comparison and the EIR's own project-level comparison . . . ." (Id. at p. 227.)

Subdivision (c)

The Agency added subdivision (c) to address the use of models and methodologies. The Agency clarifies that the lead agency has discretion to select the model or methodology it considers most appropriate to enable decision makers to intelligently take into account the project's incremental contribution to climate change. Most of the text in the new subdivision (c) was taken from subdivision (a)(1) of the current section 15064.4. Additionally, the clarification regarding the agency's discretion in selecting an appropriate model or methodology is consistent with CEQA Guidelines section 15151, which addresses the standards for adequacy of EIRs. (*Ibid*. ["An EIR should be prepared with a sufficient degree of analysis to provide decisionmakers with information which enables them to make decision which intelligently takes account of environmental consequences."].) Models play a role not only in estimating a project's greenhouse gas emissions, but also in determining baseline emissions and applying thresholds. Moving the text to subdivision (c) clarifies that the guidance on models applies to the entire section. However, when an agency relies completely on a single quantitative method, it must research and document the quantitative parameters essential to that method. (*Center for Biological Diversity v. Dept. of Fish & Wildlife*, *supra*, 62 Cal.4th at p. 228.)

Necessity

The proposed amendments to CEQA Guidelines section 15064.4 are necessary to reflect recent case law involving climate change analysis, including decisions from the California Supreme Court. (*Cleveland National Forest Foundation v. San Diego Assn. of Governments* (2017) 3 Cal.5th 497; *Center for Biological Diversity v. Dept. of Fish & Wildlife* (2015) 62 Cal.4th 204; *Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70.) In addition to proposing necessary updates to this section, the Agency intends these changes to result in analyses that help decisionmakers and the public to meaningfully understand a project's potential contribution to climate change.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with case law. Additionally, the proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only and would be implementing existing case law.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The action implements and clarifies existing case law. Because the action does not add new substantive requirements, it will not result in an adverse impact on businesses in California.

15064.7. THRESHOLDS OF SIGNIFICANCE

Specific Purposes of the Amendment

This section provides additional explanation of thresholds of significance. Section 15064.7 defines a threshold as "an identifiable quantitative, qualitative or performance level of a particular environmental effect, non-compliance with which means the effect will *normally* be determined to be significant by the agency and compliance with which means the effect *normally* will be determined to be less than significant." (CEQA Guidelines § 15064.7, subd. (a) (emphasis added).)

Thresholds of significance can inform not only the decision of whether to prepare an EIR but also the identification of effects to be analyzed in depth in the EIR, the requirement to make detailed findings on the feasibility of alternatives or mitigation measures to reduce or avoid the significant effects, and when found to be feasible, changes in the project to lessen the adverse environmental impacts.

Because environmental standards, if used correctly, may promote efficiency in the environmental review process, the Natural Resources Agency added subdivision (d) to CEQA Guidelines, Section 15064.7 on thresholds of significance. Consistent with the rulings in both *Communities for a Better Environment, et al., v. Resources Agency* (2002) 103 Cal.App.4th and *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal. App. 4th, the first sentence recognizes that lead agencies may treat environmental standards as thresholds of significance. By promoting the use of environmental standards as thresholds of significance, the changes in Section 15064.7 are intended to make determinations of significance simpler and more predictable for all participants in the environmental review process.

The second sentence explains that in adopting or applying an environmental standard as a threshold, the lead agency should explain how application of the environmental standard indicates a less than significant effect. This sentence recognizes the court's caution in *Protect the Historic Amador Waterways* that "thresholds cannot be used to determine automatically whether a given effect will or will not be significant." (*Protect the Historic Amador Waterways*, *supra*, 116 Cal. App. 4th at pp. 1108-1109; see also *Rominger v. County of Colusa* (2014) 229 Cal.App.4th 690, 717.) This sentence is also consistent with a similar provision in existing subdivision (h)(3), which states: "When relying on a plan, regulation or program [to evaluate cumulative impacts], the lead agency should explain how implementing the particular requirements in the plan, regulation or program ensure that the project's incremental

contribution to the cumulative effect is not cumulatively considerable." (CEQA Guidelines, § 15064, subd. (h)(3); see also §§ 15063, subd. (d)(3) (requiring an initial study to include sufficient information to support its conclusions); and, 15128 (requiring a lead agency to explain briefly the reasons that an impact is determined to be less than significant and therefore was not analyzed in an EIR).)

Finally, the third sentence provides criteria to assist a lead agency in determining whether a particular environmental standard is appropriate for use as a threshold of significance. The first criterion requires that the standard actually be adopted by some formal mechanism. Standards that have already undergone the scrutiny of a formal adoption process are more likely to provide a sound benchmark against which to measure a particular project's impacts. The second criterion requires the standard to actually be adopted for the purpose of environmental protection. Such standards are more likely to provide useful information about a project's environmental impacts than, for example, consumer protection standards. The third criterion requires that the standard actually govern the impact at issue. This is necessary to ensure that the standard relates to the impact of concern. (See, e.g., *Californians for Alternatives to Toxics v. Department of Food & Agriculture* (2005) 136 Cal.App.4th 1, 16–20; *Berkeley Keep Jets Over the Bay Com. v. Board of Port Comm.* (2001) 91 Cal.App.4th 1344, 1382 (requiring analysis of single event noise despite compliance with cumulative noise standard).) The last criterion is that the standard must actually govern the project type. For example, some standards address plan-level activities, while others address project-specific activities.

Other changes in this section clarify that lead agencies may, but are not required to, formally adopt thresholds. Lead agencies may also use thresholds on a case-by-case basis.

Necessity

The change is necessary to clarify a lead agency's obligation to determine the significance of a proposed project and what evidence it must consider in reaching that conclusion. The Natural Resources Agency's revision clarifies that compliance with relevant standards may be a basis for determining that the project's impacts are less than significant. The changes in this section are necessary to assist lead agencies in determining when environmental standards may be used for this purpose.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Natural Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Natural Resources Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with current case law, and the proposed action adds no new substantive

requirements. The Natural Resources Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15072. NOTICE OF INTENT TO ADOPT A NEGATIVE DECLARATION OR MITIGATED NEGATIVE DECLARATION

Specific Purposes of the Amendment

CEQA Guidelines section 15072 describes a lead agency's obligations to provide notices of intent to specified recipients before the lead agency adopts a negative declaration or a mitigated negative declaration. The Natural Resources Agency made two changes to this section in response to concerns raised by stakeholders.

First, stakeholders have noted that there is some confusion about the word "referenced" as used in the CEQA Guidelines. (CEQA Guidelines, §§ 15072 and 15087.) Specifically, Section 15072(h) states that a notice of intent must list the address where all documents referenced in an initial study must be specified. Some agencies interpret "referenced" to mean every document that is cited in the environmental document, where others interpret it to mean every document that is incorporated by reference into the document pursuant to CEQA Guidelines, section 15150.

Documents that are "incorporated by reference" provide a portion of the document's overall analysis, and because the final initial study must reflect the independent judgment of the lead agency, one would expect a copy of the incorporated document to actually be among the lead agency's files. Other referenced documents may only provide supplementary information, and may be contained in a consultant's files or research libraries. While still valid sources of information, it is less important for such documents to actually be in the lead agency's possession. The Natural Resources Agency, therefore, finds that the latter interpretation to be a more practical interpretation of CEQA.

Second, the Natural Resources Agency added a sentence to subdivision (e) of Section 15072. The purpose of this subdivision is to list the agencies and entities in which a lead agency shall or may consult prior to completing an environmental impact report. (See, Pub. Resources Code, § 21104 (stating that the lead agency shall consult with, and obtain comments from each responsible,

trustee, or public agency that has jurisdiction over the project).) The Agency has clarified in this subdivision that lead agencies should consult public transit agencies with facilities within one-half mile of the proposed project. Doing so is likely to promote early information sharing and to avoid potential conflicts.

Necessity

This addition is necessary to improve noticing standards, provide internal consistency between sections 15072, 15082 and 15150 of the CEQA Guidelines, and clarify that CEQA itself does not mandate that a lead agency include every document cited in an EIR for public review.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Natural Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Natural Resources Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be internally consistent, and the proposed action adds no new substantive requirements. The Natural Resources Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15075. NOTICE OF DETERMINATION ON A PROJECT FOR WHICH A PROPOSED NEGATIVE OR MITIGATED NEGATIVE DECLARATION HAS BEEN APPROVED

Specific Purposes of the Amendment

This section prescribes the use and content of a Notice of Determination on a project for which a proposed negative or mitigated negative declaration has been approved. The existing regulation spells out minimum contents so that people can recognize whether a particular notice applies to the project with which they are concerned. The section notes that the effect of filing the notice is to start a short statute of limitations period. If the notice is not filed, a longer period would apply. Failure to comply with all the requirements for filing notices of determination results in the longer, 180-day, statute of limitations.

Pursuant to Assembly Bill 320 (Hill, 2011), the Natural Resources Agency has added a new subdivision (b)(8) to Section 15075 of the CEQA Guidelines. AB 320 amended Public Resource Code sections 21108 and 21152 to require certain information to be included in the Notice of Determination consistent with CEQA Guidelines section 21065, subdivisions (b) and (c). AB 320 requires the Notice of Determination to include the identity of the person undertaking an activity, in whole or in part, through contracts, grants, subsidies, loans, or other forms of assistance from one or more public agencies or the identity of the person receiving a lease, permit, license, certificate, or other entitlement for use. Thus, the Natural Resources Agency added subdivision (b)(8) to section 15075 of the CEQA Guidelines to provide consistency with Public Resources Code, section 21108 and 21152.

Necessity

The amendment to CEQA Guidelines section 15075 is necessary to reflect the Legislative changes. The language of this section of the CEQA Guidelines follows the direction of the Legislature and ensures that that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Natural Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Natural Resources Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with Sections 21108 and 21152 of the Public Resources Code, and the proposed action adds no new substantive requirements per se. Rather, additional information regarding the project applicant must be included in the forms filed by public agencies. The Natural Resources Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15082. NOTICE OF PREPARATION AND DETERMINATION OF SCOPE OF EIR

Specific Purposes of the Amendment

CEQA Guidelines section 15082 describes the consultation process (commonly referred to as "scoping"), including the use of a notice of preparation of a draft EIR, among a lead agency and responsible and trustee agencies where the lead agency is preparing an EIR that will be used by these agencies in reviewing and approving a project.

The Natural Resources Agency amended subdivision (a) of Section 15082 of the CEQA Guidelines. Currently, subdivision (a) of Section 15082 states that a lead agency must send a notice of preparation stating that an environmental impact report will be prepared to the Office of Planning and Research and each responsible and trustee agency involved in the project. Public Resources Code, Section 21092.3 also requires that the notices be posted in the office of the county clerk of each county in which the project will be located. The Natural Resources Agency, therefore, included a statement that the notice must also be filed with the county clerk of each county within which the project is located.

Necessity

This addition is necessary to accurately reflect the procedural requirement stated in the Public Resources Code, which also requires posting with the county clerk.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Natural Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Natural Resources Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with the Act, and the proposed action adds no new substantive requirements. The Natural Resources Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15086. CONSULTATION CONCERNING DRAFT EIR

Specific Purposes of the Amendment

This section implements the statutory requirements for consultation with other public agencies and the authority to consult with people who have special expertise concerning the environmental effects of the project. (Pub. Resources Code, § 21092.4.)

Among the other agencies with whom a lead agency should consult, the Natural Resources Agency clarified in subdivision (a)(5) of Section 15086 that lead agencies should also consult public transit agencies facilities within one-half mile of the proposed project. Doing so is likely to promote early information sharing and resolution of potential conflicts.

Necessity

This addition is necessary to improve noticing standards by involving affected public transit agencies in the preparation of an environmental impact report and to ensure environmental transportation impacts are fully considered in accordance to the general statutory mandate under CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Natural Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Natural Resources Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with the Act, and the proposed action adds no new substantive requirements. The Natural Resources Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15087. PUBLIC REVIEW AND DRAFT EIR

Specific Purposes of the Amendment

CEQA Guidelines section 15087 sets forth procedures for public notice applying to the public review of draft EIRs.

The Natural Resources Agency made two separate amendments to this section. The first is an addition to subdivision (c)(2) of section 15087 that the lead agency may specify the manner in

which it will receive written comments. The second clarifies the requirement in (g)(4) of section 15087 that all documents referenced in the draft environmental impact report or negative declaration be available for review.

CEQA Guidelines section 15087, subd. (c)(2)

Advances in technology have altered the nature of the public's interactions with government agencies. Many public agencies now incorporate the internet and social media into their outreach and public participation strategies. (See, e.g., Office of Planning and Research, Book of Lists (2003), pp. 94-99 (listing local governments that use the internet and e-mail as forms of public engagement); see also Institute for Local Government, "A Local Official's Guide to Online Public Engagement" (2012).) In light of these changes, it is appropriate to allow a lead agency to specify that formal written comments must be submitted to a particular physical or electronic mail address and not, for example, a posting on social media.

Similarly, the public has expanded its use of the internet and digital storage to provide increasing amounts of data and information to decision-makers.

Therefore, the Natural Resources Agency clarified in Section 15087, subdivision (c)(2) that the lead agency may specify the manner in which it will receive written comments. This is an important clarification given that failure to respond to a timely submitted comment may lead to invalidation of a project for failure to comply with CEQA. Further, it is important for the public to understand the way to best make its views known to decisionmakers. Thus, this change promotes both public participation in the CEQA process and predictable outcomes in the CEQA process.

CEQA Guidelines, 15087, subd. (c)(5)

CEQA requires a lead agency to provide notice that it is preparing an EIR or a negative declaration, and such notice "shall specify … the address where copies of the draft environmental impact report or negative declaration, and all documents referenced in the draft environmental impact report or negative declaration, are available for review …." (Pub. Resources Code § 21092, subds. (a) and (b).) Stakeholders have noted that there is some confusion about the word "referenced" as used in that section and in the CEQA Guidelines. (CEQA Guidelines §§ 15072, 15087.) Some agencies interpret "referenced" to mean every document that is cited in the environmental document, where others interpret it to mean every document that is incorporated by reference into the document pursuant to Section 15150.

Documents that are "incorporated by reference" provide a portion of the document's overall analysis, and because the final initial study must reflect the independent judgment of the lead agency, one would expect a copy of the incorporated document to actually be among the lead agency's files. Other referenced documents may only provide supplementary information, and may be contained in a consultant's files or research libraries. While still valid sources of information, it is less important for

such documents to actually be in the lead agency's possession. The Natural Resources Agency, therefore, finds that the latter interpretation to be a more practical interpretation of CEQA.

Necessity

The clarification of subdivision (c)(2), of section 15087 is necessary to accommodate those agencies that wish to publicize the availability a draft environmental impact report on the internet or social media, and to make clear that responses will not be prepared for comments made in internet chat-rooms or via social media.

Additionally, in enacting CEQA, the Legislature declared that "it is the policy of the state that … [a]ll persons and public agencies involved in the environmental review process be responsible for carrying out the process in the most efficient, expeditious manner …." (Pub. Resources Code § 21003, subd. (f).) The changes to subdivision (c)(5) would also provide internal consistency between sections 15072, 15082 and 15150 of the Guidelines and would clarify that CEQA itself does not mandate that a lead agency include every document cited in an EIR for public review.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Natural Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Natural Resources Agency's determination that the proposed action is necessary to update the CEQA Guidelines to carry out the CEQA process in the most efficient, expeditious manner, to be internally consistent, and the proposed action adds no new substantive requirements. The Natural Resources Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15088. EVALUATION OF AND RESPONSE TO COMMENTS

Specific Purposes of the Amendment

This section explains that evaluation and response to public comments is an essential part of the CEQA process. Failure to comply with these requirements can lead to disapproval of a project. To avoid this problem, it is necessary to identify the requirements for responding to comments

in the CEQA Guidelines. This section is also necessary to explain different ways in which the responses to comments can be prepared. The options of revising the draft or adding the comments and responses as a separate section of the final EIR match the permissible approaches under NEPA.

In light of the increasing use of the internet in public engagement, as well as current case law, the Natural Resources Agency clarified the scope of a lead agency's duty to respond to comments as described in Section 15088. Specifically, the Agency updated that section to state that responses to general comments may be general. Further, the Agency clarified that general responses may be appropriate when a comment does not explain the relevance of information submitted with the comment, and when a comment refers to information that is not included or is not readily available to the agency.

The Natural Resources Agency also clarified in Section 15088, subdivision (b) that a lead agency may provide proposed responses to public agency comments in electronic form. This change is consistent with the policy stated in Public Resources Code Section 21003, subdivision (f), that "agencies involved in the environmental review process be responsible for carrying out the process in the most efficient, expeditious manner[.]" The change is also consistent with the trend of making more government documents available electronically. (*See, e.g.*, Senate Bill 122 (Jackson, 2016) (allowing the State Clearinghouse to require submission of documents in electronic form).)

Necessity

This clarification is necessary to define the scope of a lead agency's duty to respond to comments as described in section 15088. Specifically, these changes are necessary to clarify that responses to general comments may be general. Further, these changes are necessary to clarify that general responses may be appropriate when a comment does not explain the relevance of information submitted with the comment, and when a comment refers to information that is not included or is not readily available to the agency. Additionally, in enacting CEQA, the Legislature declared that "it is the policy of the state that … [a]ll persons and public agencies involved in the environmental review process be responsible for carrying out the process in the most efficient, expeditious manner …." (Pub. Resources Code § 21003, subd. (f).)

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to carry out the CEQA process in the most efficient, expeditious manner, to be internally consistent, and the

proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15094. NOTICE OF DETERMINATION

Specific Purposes of the Amendment

This section prescribes the use and content of the Notice of Determination. The existing regulation spells out minimum contents so that people can recognize whether a particular notice applies to the project with which they are concerned. The section notes that the effect of filing the notice is to start a short statute of limitations period. If the notice is not filed, a longer period would apply. Failure to comply with all of the requirements for filing notices of determination results in the longer, 180-day, statute of limitations.

Pursuant to Assembly Bill 320 (Hill, 2011), the Natural Resources Agency added a new subdivision (b)(10) to Section 15094 of the CEQA Guidelines. AB 320 amended Public Resource Code, sections 21108 and 21152 requiring information to be included in the Notice of Determination consistent with CEQA Guidelines section 21065, subdivisions (b) and (c). AB 320 requires the Notice of Determination to include the identity of the person undertaking an activity, in whole or in part, through contracts, grants, subsidies, loans, or other forms of assistance from one or more public agencies or the identity of the person receiving a lease, permit, license, certificate, or other entitlement for use. Thus, the Agency added subdivision (b)(10) to section 15094 of the CEQA Guidelines to provide consistency with Public Resources Code, section 21108 and 21152.

Necessity

The amendment to CEQA Guidelines section 15094 is necessary to reflect the Legislative changes made in AB 320 (2011). The language of this section of the CEQA Guidelines follows the direction of the Legislature and ensures that that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with Sections 21108 and 21152 of the Public Resources Code, and the proposed action adds no new substantive requirements. Rather, additional information regarding the project applicant must be included in the forms filed by public agencies. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15107. COMPLETION OF NEGATIVE DECLARATION FOR CERTAIN PRIVATE PROJECTS

Specific Purposes of the Amendment

This section reflects the statutory requirement that a Negative Declaration be completed and adopted within 180 days of the day a private project is accepted as complete for processing. The Natural Resources Agency added a sentence to Section 15107 clarifying that a lead agency may extend the 180-day time limit once for a period of no more than 90 days upon the consent of both the lead agency and the applicant.

Necessity

This addition is necessary to allow the lead agency the same flexibility to extend the deadline for the completion of a negative declaration as is allotted for the completion of an environmental impact report. (CEQA Guidelines, § 15108 (lead agency may extend the deadline for the completion of an environmental impact report "…[O]nce for a period of not more than 90 days upon consent of the lead agency and the applicant").)

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be

internally consistent, and the proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15124. PROJECT DESCRIPTION

Specific Purposes of the Amendment

This section requires the EIR to describe the proposed project in a way that will be meaningful to the public, to the other reviewing agencies, and to the decision-makers. The Natural Resources Agency amended subdivision (b) of Section 15124 to clarify that the general description of a project may also discuss the proposed project's benefits to ensure the project description allows decision makers to balance, if needed, a project's benefit against its environmental cost.

Necessity

This clarification is necessary to ensure that the CEQA Guidelines are consistent with case law. (See *County of Inyo v. City of Los Angeles*, 71 Cal. App. 3d 185, 192 (determined an accurate project description allows decision makers to balance the proposal's benefit against its environmental cost).) The clarification ensures that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with the case law, and the proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15125. ENVIRONMENTAL SETTING

Specific Purposes of the Amendment

This section of the CEQA Guidelines requires an EIR to describe the environmental setting of the project so that the changes can be seen in context. Section 15125 of the CEQA Guidelines has for years described the general rule: "normally," the baseline consists of physical environmental conditions "as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced." In recent years, several decisions of the courts of appeal and the California Supreme Court have focused on exceptions to this general rule. In response, the Natural Resources Agency has added a statement of purpose and three subdivisions to subdivision Section 15125, subdivision (a).

Subdivision (a) – Purpose

In the body of subdivision (a), the Natural Resources Agency added a sentence stating that the purpose of defining the environmental setting is to give decision-makers and the public an accurate picture of the project's likely impacts, both near-term and long-term. This sentence paraphrases the Supreme Court's description of the requirement in *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal. 4th 439. (See *id.* at 455 ("Even when a project is intended and expected to improve conditions in the long term--20 or 30 years after an EIR is prepared--decision makers and members of the public are entitled under CEQA to know the short- and medium-term environmental costs of achieving that desirable improvement. … [¶] … The public and decision makers are entitled to the most accurate information on project impacts practically possible, and the choice of a baseline must reflect that goal"); see also *Communities for a Better Environment v. South Coast Air Quality Management Dist.* (2010) 48 Cal.4th 310).) The purpose of adding this sentence to subdivision (a) is to guide lead agencies in the choice between potential alternative baselines. When in doubt, lead agencies should choose the baseline that most meaningfully informs decision-makers and the public of the project's possible impacts.

Subdivision (a)(1) – General Rule

New subdivision (a)(1) sets forth the general rule: normally, conditions existing at the time of the environmental review should be considered the baseline. The first sentence largely consists of language that was moved from the body of existing subdivision (a) and that states this general rule. The second sentence provides that a lead agency may look back to historic conditions to establish a baseline where existing conditions fluctuate, provided that it can

document such historic conditions with substantial evidence. (See, *Communities for a Better Environment, supra*, 48 Cal.4th at pp. 327-328 ("Environmental conditions may vary from year to year and in some cases it is necessary to consider conditions over a range of time periods") (quoting *Save Our Peninsula Committee v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 125); see also *Cherry Valley Pass Acres & Neighbors v. City of Beaumont* (2010) 190 Cal.App.4th 316.)

The third sentence provides that a lead agency may describe both existing conditions as well as future conditions. (*Neighbors, supra*, 57 Cal. 4th at p. 454 ("nothing in CEQA law precludes an agency… from considering both types of baseline--existing and future conditions--in its primary analysis of the project's significant adverse effects").) The court in the *Neighbors* decision described examples of when it might be appropriate to focus on conditions existing at the time the project commences operations:

> For example, in an EIR for a new office building, the analysis of impacts on sunlight and views in the surrounding neighborhood might reasonably take account of a larger tower already under construction on an adjacent site at the time of EIR preparation. For a large-scale transportation project …, to the extent changing background conditions during the project's lengthy approval and construction period are expected to affect the project's likely impacts, the agency has discretion to consider those changing background conditions in formulating its analytical baseline.

(*Id.* at 453.)

Subdivision (a)(2) – Exceptions to the General Rule

Proposed subdivision (a)(2) sets forth the exception to the general rule, and conditions allowing lead agencies to use an alternative baseline. The first sentence explains that existing conditions may be omitted in favor of an alternate baseline where "use of existing conditions would be either misleading or without informative value to decision-makers and the public." (See, *Neighbors, supra*, 57 Cal.4th at p. 453 ("To the extent a departure from the 'norm[]' of an existing conditions baseline (CEQA Guidelines, § 15125(a)) promotes public participation and more informed decisionmaking by providing a more accurate picture of a proposed project's likely impacts, CEQA permits the departure. Thus, an agency may forego analysis of a project's impacts on existing environmental conditions if such an analysis would be uninformative or misleading to decision makers and the public").) Notably, the Court in the *Neighbors* case highlighted a useful example of when future conditions might provide a more useful analysis:

> In this illustration, an existing industrial facility currently emits an air pollutant in the amount of 1,000 pounds per day. By the year 2020, if no new project is undertaken at the facility, emissions of the pollutant are projected to fall to 500 pounds per day due to enforcement of regulations already adopted and to turnover in the facility's vehicle fleet. The operator proposes to use the facility for a new project that will emit 750 pounds per day of the pollutant upon implementation and through at least 2020. An

> analysis comparing the project's emissions to existing emissions would conclude the project would reduce pollution and thus have no significant adverse impact, while an analysis using a baseline of projected year 2020 conditions would show the project is likely to increase emissions by 250 pounds per day, a (presumably significant) 50 percent increase over baseline conditions.

(*Neighbors, supra,* 57 Cal. 4th at 453, n 5.)

The first sentence in subdivision (a)(2) also describes the procedural requirement that the lead agency must expressly justify its decision not to use existing conditions as the baseline for environmental analysis, and that justification must be supported with substantial evidence in the record. (See *id.* at 457.) The second sentence provides that if future conditions are to be used, they must be based on reliable projections grounded in substantial evidence. This provision reflects the court's concern regarding gamesmanship and manipulation as stated in the *Neighbors* decision, as well as the concern that predictive modeling may not be readily understood by the public. (*Id*. at pp. 455-456; see also Pub. Resources Code, §§ 21003(b) (CEQA documents shall "be organized and written in a manner that will be meaningful and useful to decision makers and to the public"), 21080(e)(2) ("Substantial evidence" does not include "speculation … or … evidence that is clearly inaccurate or erroneous").)

Subdivision (a)(3) – Hypothetical Conditions

Subdivision (a)(3) specifies that hypothetical conditions may not be used as a baseline. Specifically, this proposed subdivision states that lead agencies may not measure project impacts against conditions that are neither existing nor historic, such as those that might be allowed under existing permits or plans. As the Supreme Court explained in its *CBE* decision: "[a]n approach using hypothetical allowable conditions as the baseline results in 'illusory' comparisons that 'can only mislead the public as to the reality of the impacts and subvert full consideration of the actual environmental impacts,' a result at direct odds with CEQA's intent." (*Communities for a Better Environment, supra*, 48 Cal. 4th at 322 (quoting *Environmental Planning & Information Council v. County of El Dorado* (1982) 131 Cal. App. 3d 350, 358).)

These changes reflect in large part suggestions of the Association of Environmental Professionals and American Planning Association, and, to a degree, those submitted by the California Building Industry Association. (See "Recommendations for Updating the State CEQA Guidelines American Planning Association, California Chapter; Association of Environmental Professionals; and Enhanced CEQA Action Team (August 30, 2013), at pp. 1-2; see also Letter from the California Building Industry Association, February 14, 2014.) This proposal, however, breaks the new guidance into subdivisions to more clearly identify (1) the general rule, (2) acceptable exceptions to the general rule and conditions for using alternative baselines, and (3) prohibited alternative baselines.

Necessity

This clarification is necessary to reflect the California Supreme Court's decision in *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal.4th 439. The description of the environmental setting plays a key role in the CEQA process by providing the baseline against which the project's potential impacts are measured. It is necessary to guide lead agencies in the choice between potential alternative baselines.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with the California Supreme Court's decision, and the proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15126.2. CONSIDERATION AND DISCUSSION OF SIGNIFICANT ENVIRONMENTAL IMPACTS

Specific Purposes of the Amendment

This section of the CEQA Guidelines describes how an EIR must identify and focus on the significant environmental effects, unavoidable significant environmental effects, unavoidable significant environmental effects, significant irreversible environmental changes, and growth-inducing impacts which may result from a project. The Natural Resources Agency made two separate additions to this section.

Changes in Subdivision (a), Relating to Hazards

First, the Natural Resources Agency changed subdivision (a) to specifically address the California Supreme Court's decision in *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369. In that case, the Court held that "agencies subject to CEQA generally are not required to analyze the impact of existing environmental conditions on a project's future users or residents" but they must analyze hazards the project might risk

exacerbating. In reaching that conclusion, the Court also found that two sentences in existing Section 15126.2, subdivision (a), were invalid.

Changes appear in the first, as well as the fifth through the eighth, sentences in existing Section 15126.2(a). The first change clarifies that the focus of a CEQA analysis is the project's effect on the environment. Second, these changes add the words "or risks exacerbating" to the fifth sentence regarding impacts a project may cause by bringing people or development to the affected area. This addition clarifies that an EIR must analyze not just impacts that a project might cause, but also existing hazards that the project might make worse. This clarification implements the Supreme Court's holding in the *CBIA* case. (62 Cal. 4th at 377 ("when a proposed project risks exacerbating those environmental hazards or conditions that already exist, an agency must analyze the potential impact of such hazards on future residents or users").) In this context, an effect that a project "risks exacerbating" is similar to an "indirect" effect. Describing "indirect effects," the CEQA Guidelines state: "If a direct physical change in the environment in turn causes another change in the environment, then the other change is an indirect physical change in the environment." (State CEQA Guidelines § 15064(d)(2).) Just as with indirect effects, a lead agency should confine its analysis of exacerbating effects to those that are reasonably foreseeable. (*Id*. at subd. (d)(3).) Notably, by stating that EIRs should analyze effects that a project might "cause or risk exacerbating," this clarification also makes clear that EIRs need not analyze effects that the project does not cause directly or indirectly.

The third change deletes the sentences (using developing on a fault-line as an example of a hazard that requires analysis) that the Supreme Court specifically held exceeded CEQA's scope. This change is necessary to implement the Court's holding regarding the scope of analysis that CEQA requires.

Notably other laws require analysis of seismic hazards. Public Resources Code Section 2697, for example, requires cities and counties to prepare a site-specific geologic report prior to approval of most projects in a seismic hazard zone. Regulations further clarify that such "project shall be approved only when the nature and severity of the seismic hazards at the site have been evaluated in a geotechnical report and appropriate mitigation measures have been proposed." (Cal. Code Regs, tit. 14, § 3724.) Further, the California Building Code contains provisions requiring all buildings to be designed to withstand some seismic activity. (See, e.g., tit. 24, § 1613.1.)

The safety elements of local general plans will also describe potential hazards, including: "any unreasonable risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche, and dam failure; slope instability leading to mudslides and landslides; subsidence; liquefaction; and other seismic hazards …, and other geologic hazards known to the legislative body; flooding; and wildland and urban fires." (Gov. Code § 65302(g)(1).) Hazards associated with flooding, wildfire and climate change require special consideration. (*Id*. at subd. (g)(2)-(g)(4).) Lead agencies must "discuss any inconsistencies between the proposed project and applicable general plans" related to a project's potential environmental impacts in a project's environmental review. (State CEQA Guidelines § 15125(d).) Local governments may regulate land use to protect public health and welfare pursuant to their police power. (Cal. Const., art. XI, § 7; *California Building Industry Assn. v. City of San*

Jose (2015) 61 Cal. 4th 435, 455 ("so long as a land use restriction or regulation bears a reasonable relationship to the public welfare, the restriction or regulation is constitutionally permissible").)

The fourth change clarifies that a project's direct and indirect and cumulative effects may affect the hazardous condition, and therefore, must still be evaluated in CEQA. In fact, such effects are particularly important when a project locates in a hazardous location. For example, a project proposed on a coastline may not itself cause pre-existing erosive forces. However, according to the Court in the *CBIA* case, a lead agency would need to include any relevant hazards in the environmental document's description of the environmental setting. Further, in the case of coastal development, if sea walls or other shoreline structures are necessary to protect the project from erosion, the sea wall may contribute to cumulative erosion impacts nearby on the coast. Such a development might also lead to indirect effects such as dispersion of pollutants from inundation, increased maintenance and repair-related construction, impedance of evacuation routes, increased demand on emergency services, etc. Thus, harm to the project would not mandate a finding of a significant effect; however, any environmental effects that might result from the harm to the project, and predictable responses to that harm, are properly evaluated in a CEQA evaluation.

The final addition clarifies that a lead agency should consider not just existing hazards, but the potential for increasing severity of hazards over time. This change is necessary because certain types of hazards are expected to be more severe in the future due to our changing climate. Examples include increased flooding (resulting from more precipitation falling as rain instead of snow as well as from rising sea levels) and more intense wildfires. These types of climate change impacts may worsen a proposed project's direct, indirect, or cumulative environmental effects in the future. A lead agency need not engage in speculation regarding such effects. Rather, hazard zones may be clearly identified in authoritative maps, such as those found on the Cal-Adapt website (http://cal-adapt.org/), or in locally adopted general plan safety elements and local hazard mitigation plans. Notably, pursuant to new requirements in Government Code section 65302(g)(4), added by Senate Bill 379, general plans will identify "geographic areas at risk from climate change impacts[.]" Focus on both short-term and long-term effects is also necessary to implement express legislative policy. (Pub. Resources Code §§ 21001(d), (g); 21083(b)(1).)

Consideration of future conditions in determining whether a project's impacts may be significant is consistent with CEQA's rules regarding baseline. "[N]othing in CEQA law precludes an agency … from considering both types of baseline—existing and future conditions—in its primary analysis of the project's significant adverse effects." (*Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal. 4th 439, 454.) "The key … is the EIR's role as an informational document." (*Id*. at 453.)

New Subdivision (b), Relating to Energy Impacts

The Natural Resources Agency also added a new subdivision (b) to Section 15126.2 discussing the required contents of an environmental impact report. The new subdivision specifically addressed the required analysis of a project's potential energy impacts which is currently

housed within Appendix F of the CEQA Guidelines. Appendix F was revised in 2009 to clarify that analysis of energy impacts is mandatory. The Agency adds a subdivision on energy impacts to further elevate the issue and remove any question about whether such an analysis is required.

As background, in 1974, the Legislature adopted the Warren-Alquist State Energy Resources Conservation and Development Act. (Pub. Resources Code, § 25000 et seq.) That act created what is now known as the California Energy Commission, and enabled it to adopt building energy standards. (See, e.g., *id.* at § 25402.) At that time, the Legislature found the "rapid rate of growth in demand for electric energy is in part due to wasteful, uneconomic, inefficient, and unnecessary uses of power and a continuation of this trend will result in serious depletion or irreversible commitment of energy, land and water resources, and potential threats to the state's environmental quality." (*Id*. at § 25002; see also § 25007 ("It is further the policy of the state and the intent of the Legislature to employ a range of measures to reduce wasteful, uneconomical, and unnecessary uses of energy, thereby reducing the rate of growth of energy consumption, prudently conserve energy resources, and assure statewide environmental, public safety, and land use goals").)

The same year that the Legislature adopted Warren-Alquist, it also added section 21100(b)(3) to CEQA, requiring environmental impact reports to include "measures to reduce the wasteful, inefficient, and unnecessary consumption of energy." As explained by a court shortly after that provision was enacted, the "energy mitigation amendment is *substantive* and not procedural in nature and was enacted for the purpose of requiring the lead agencies to focus upon the energy problem in the preparation of the final EIR." (*People v. County of Kern* (1976) 62 Cal.App.3d 761, 774 (emphasis added).) It compels an affirmative investigation of the project's potential energy use and feasible ways to reduce that use.

Though Appendix F of the CEQA Guidelines has contained guidance on energy analysis for decades, implementation among lead agencies has not been consistent. (See, e.g., *California Clean Energy Committee v. City of Woodland* (2014) 225 Cal.App.4th 173, 209.) While California is a leader in energy conservation, the importance of addressing energy impacts has not diminished since 1974. On the contrary, given the need to avoid the effects of climate change, energy use is an issue that we cannot afford to ignore. As the California Energy Commission's Integrated Energy Policy Report (2016) explains:

> Energy fuels the economy, but it is also the biggest source of greenhouse gas emissions that lead to climate change. Despite California's leadership, Californians are experiencing the impacts of climate change including higher temperatures, prolonged drought, and more wildfires. There is an urgent need to reduce greenhouse gas emissions and increase the state's resiliency to climate change. . . . ¶ . . . With transportation accounting for about 37 percent of California's greenhouse gas emissions in 2014, transforming California's transportation system away from gasoline to zero-emission and near-zero-emission vehicles is a fundamental part of the state's efforts to meet its climate goals. . . . ¶ . . . Energy efficiency and demand response are also key components of the state's strategy to reduce greenhouse gas emissions.

(*Id.* at pp. 5, 8, 10.)

Appendix F was revised in 2009 to clarify that analysis of energy impacts is mandatory. The Agency now adds a subdivision in section 15126.2 on energy impacts to further elevate the issue, and remove any question about whether such an analysis is required.

The first sentence clarifies that an EIR must analyze whether a project will result in significant environmental effects due to "wasteful, inefficient, or unnecessary consumption of energy." This clarification is necessary to implement Public Resources Code section 21100(b)(3). Because the duty to impose mitigation measures arises when a lead agency determines that the project may have a significant effect, section 21100(b)(3) necessarily requires both analysis and a determination of significance in addition to energy efficiency measures. (Pub. Resources Code, § 21002.)

The second sentence further clarifies that all aspects of the project must be considered in the analysis. This clarification is consistent with the rule that lead agencies must consider the "whole of the project" in considering impacts. It is also necessary to ensure that lead agencies consider issues beyond just building design. (*See, e.g., California Clean Energy Com. v. City of Woodland*, *supra*, 225 Cal.App.4th at pp. 210-212.) The analysis of vehicle miles traveled provided in proposed section 15064.3 (implementing Public Resources Code section 21099 (SB 743)) on transportation impacts may be relevant to this analysis.

The third sentence signals that the analysis of energy impacts may need to extend beyond building code compliance. (*Ibid*.) The requirement to determine whether a project's use of energy is "wasteful, inefficient, and unnecessary" compels consideration of the project in its context. (Pub. Resources Code, § 21100(b)(3).) While building code compliance is a relevant factor, the generalized rules in the building code will not necessarily indicate whether a particular project's energy use could be improved. (*Tracy First v. City of Tracy* (2009) 177 Cal.App.4th 912, 933 (after analysis, lead agency concludes that project proposed to be at least 25% more energy efficient than the building code requires would have a less than significant impact); *see also* CEQA Guidelines, Appendix F, § II.C.4 (describing building code compliance as one of several different considerations in determining the significance of a project's energy impacts).) That the Legislature added the energy analysis requirement in CEQA at the same time that it created an Energy Commission authorized to impose building energy standards indicates that compliance with the building code is a necessary but not exclusive means of satisfying CEQA's independent requirement to analyze energy impacts broadly.

The new subdivision (b) also provides a cross-reference to Appendix F. This cross-reference is necessary to direct lead agencies to the more detailed provisions contained in that appendix.

Finally, new subdivision (b) cautions that the analysis of energy impacts is subject to the rule of reason, and must focus on energy demand caused by the project. This sentence is necessary to place reasonable limits on the analysis. Specifically, it signals that a full "lifecycle" analysis that would account for energy used in building materials and consumer products will generally not

be required. (See also Cal. Natural Resources Agency, Final Statement of Reasons for Regulatory Action: Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB97 (Dec. 2009) at pp. 71-72.)

Necessity

The changes in subdivision (a) are necessary to assist lead agencies in applying the California Supreme Court's holding agencies subject to CEQA are generally are not required to analyze the impact of existing environmental conditions on a project's future users or residents unless the impacts of the project risk exacerbation of the impact. Further, the proposed changes will assist lead agencies in applying the principles identified by the California Supreme Court in the *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369 decision.

Additionally, it is necessary to add the language to the CEQA Guidelines regarding energy impact analyses because CEQA has long required energy impact analyses. However, the description of the required analysis is currently located in a stand-alone Appendix and goes largely unnoticed and implementation among lead agencies has not been consistent. Further, the proposed changes will assist lead agencies in applying the principles identified by courts in several recent cases, including *Ukiah Citizens for Safety First v. City of Ukiah* (2016) 248 Cal.App.4th 256.

The additional language in both subdivisions will ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with case law, and the proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15126.4. CONSIDERATION AND DISCUSSION OF MITIGATION MEASURES PROPOSED TO MINIMIZE SIGNIFICANT EFFECTS

Specific Purposes of the Amendment

When a lead agency identifies a potentially significant environmental impact, it must propose feasible mitigation measures in the environmental document for a project. (Pub. Resources Code, §§ 21002 (duty to mitigate), 21080(c)(2) (mitigated negative declaration), 21100(b)(3) (EIR must include mitigation measures).) The formulation of mitigation measures cannot be deferred until after project approval. (*Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70, 92 ("reliance on tentative plans for future mitigation after completion of the CEQA process significantly undermines CEQA's goals of full disclosure and informed decisionmaking; and consequently, these mitigation plans have been overturned on judicial review as constituting improper deferral of environmental assessment").)

Practical considerations, however, sometimes preclude development of detailed mitigation plans at the time of project consideration. In such cases, courts have permitted lead agencies to defer some of the *details* of mitigation measures provided that the agency commits itself to mitigation and analyzes the different mitigation alternatives that might ultimately be incorporated into the project. (See, e.g., *Sacramento Old City Assn. v. City Council* (1991) 229 Cal.App.3d 1011, 1028–1030.)

A line of recent cases developed more specific rules on what details may or may not be deferred. (See, e.g., *Preserve Wild Santee v. City of Santee* (2012) 210 Cal.App.4th 260; *Rialto Citizens for Responsible Growth v. City of Rialto* (2012) 208 Cal.App.4th 899; *City of Maywood v. Los Angeles Unified School Dist.*(2012) 208 Cal.App.4th 362; *Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70; *Sheryl Gray v. County of Madera* (2008) 167 Cal.App.4th 1099; *San Joaquin Raptor Rescue Center v. County of Merced* (2007) 149 Cal.App.4th 645; *Endangered Habitats League, Inc. v. County of Orange* (2005) 131 Cal.App.4th 777; *Defend the Bay v. City of Irvine* (2004) 119 Cal.App.4th 1261.)

In light of those cases, and stakeholder requests for clarification in the CEQA Guidelines, the Natural Resources Agency made several amendments to Section 15126.4.

First, the amendments clarify in section 15126.4, subdivision (a)(1)(B), that the lead agency "shall" not defer identification of mitigation measures. This binding requirement is clearly stated in a number of cases. (See, e.g., *Preserve Wild Santee, supra*, 210 Cal.App.4th 260; *Rialto Citizens for Responsible Growth, supra*, 208 Cal.App.4th 899; *City of Maywood, supra*, 208 Cal.App.4th 362; *CBE*, *supra*, 184 Cal.App.4th 70; *Gray v. County of Madera*, *supra*, 167 Cal.App.4th 1099; *San Joaquin Raptor Rescue Center*, *supra*, 149 Cal.App.4th 645; *Endangered Habitats League*, *supra*, 131 Cal.App.4th 777; *Defend the Bay*, *supra*, 119 Cal.App.4th 1261.) Therefore, replacing the word 'should' with 'shall' conforms the Guidelines to case law. (State CEQA Guidelines § 15005.)

Second, the amendments describe situations when deferral of the *specific details* of mitigation may be allowable under CEQA, including which commitments the agency should make in the environmental document. Specifically, the amendments explain that deferral may be permissible when it is impractical or infeasible to fully formulate the details of a mitigation measure at the time of project approval and the agency commits to mitigation. (See, e.g., *Oakland Heritage Alliance v. City of Oakland* (2011) 195 Cal.App.4th 884 (deferral of mitigation was proper where practical considerations prohibited devising mitigation measures early in the planning process, and the agency committed to performance criteria); *Defend the Bay*, *supra*, 119 Cal.App.4th 1261 (deferral of specifics of mitigation measures was permissible where practical considerations prohibited devising such measures for a general plan amendment and zoning change); and *Preserve Wild Santee, supra*, 210 Cal.App.4th 260 (deferral of mitigation details was improper where performance standards were not specified and lead agency did not provide an explanation for why such standards were impractical or infeasible to provide at the time of certification of the EIR).)

Further, these changes clarify that when deferring the specifics of mitigation, the lead agency should adopt specific performance standards and provide a list of the types of possible mitigation measures that would achieve the standard. This approach is summarized in *Defend the Bay v. City of Irvine, supra*. In that case, the court stated that deferral may be appropriate where the lead agency "lists the alternatives to be considered, analyzed and possibly incorporated into the mitigation plan." (*Defend the Bay, supra*, at p. 1275; see also *Laurel Heights Improvement Association v. Regents of the University of California* (1988) 47 Cal.3d 376; *Rialto Citizens for Responsible Growth, supra*, 208 Cal.App.4th 899; *Gray v. County of Madera*, *supra*, 167 Cal.App.4th 1099; *San Joaquin Raptor Rescue Center*, *supra*, 149 Cal.App.4th 645; *Endangered Habitats League*, *supra*, 131 Cal.App.4th 777.)

Adoption of performance standards in the environmental document is described by the court in *Rialto Citizens for Responsible Growth v. City of Rialto, supra*. There, the court ruled that where mitigation measures incorporated specific performance criteria and were not so open-ended that they allowed potential impacts to remain significant, deferral was proper. (*Rialto Citizens for Responsible Growth, supra*, 208 Cal.App.4th 899; see also *Laurel Heights*, *supra*, 47 Cal.3d 376; *Preserve Wild Santee, supra*, 210 Cal.App.4th 260; *City of Maywood, supra*, 208 Cal.App.4th 362; *CBE*, *supra*, 184 Cal.App.4th 70; *Gray v. County of Madera*, *supra*, 167 Cal.App.4th 1099; *San Joaquin Raptor Rescue Center*, *supra*, 149 Cal.App.4th 645; *Endangered Habitats League*, *supra*, 131 Cal.App.4th 777.)

Finally, the amendments explain that such deferral may be appropriate "where another regulatory agency will issue a permit for the project and is expected to impose mitigation requirements independent of the CEQA process so long as the EIR included performance criteria and the lead agency committed itself to mitigation." (*Clover Valley Foundation v. City of Rocklin* (2011) 197 Cal.App.4th 200, 237; see also *Oakland Heritage Alliance*, *supra*, 195 Cal.App.4th 884; *Defend the Bay*, *supra*, 119 Cal.App.4th 1261.)

Necessity

The amendments are necessary to bring the current CEQA Guidelines in conformance to recent case law. The amendments will ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with case law. Additionally, the proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15152. TIERING

Specific Purposes of the Amendment

The tiering concept authorized in this section is designed to promote efficiency in the CEQA review process. This section recognizes that the approval of many projects will move through a series of separate public agency decisions, going from approval of a general plan, to approval of an intermediate plan or zoning, and finally to approval of a specific development proposal. Tiering focuses environmental review on the environmental issues that are relevant to the approval being considered. At the same time, tiering requires the lead agency to analyze reasonably foreseeable significant effects and does not allow deferral of such analysis to a later tier document.

The Natural Resources Agency has updated CEQA Guidelines, Section 15152, subdivision (h). That section currently states that "[t]here are various types of EIRs that may be used in a tiering situation." The Agency rewrote that section to clarify that tiering is only one of several streamlining mechanisms that can simplify the environmental review process. (See, e.g., CEQA Guidelines, § 15006 (lists methods to reduce or eliminate duplication in the CEQA process).) Tiering is one such efficiency measure. (See, e.g., Pub. Resources Code, § 21093 (states that

tiering may be appropriate "to exclude duplicative analysis" completed in previous EIRs), § 21094 (states that a lead agency may examine significant effects of a project by using a tiered EIR).) Public Resources Code Section 21094 is broadly worded to potentially be used for any number of programs, plans, policies, or ordinances, with a wide variety of content. (*Ibid*.) In adopting Section 21094, the legislature did not indicate that it intended to replace any other streamlining mechanisms. For example, the legislature did not override existing provisions including, but not limited to, Program EIRs (CEQA Guidelines, § 15168) and projects consistent with general plans (Pub. Resources Code, § 21083.3). In fact, the legislature created additional streamlining mechanisms after tiering was adopted. (See, e.g., Pub. Resources Code, § 21157 (Master EIR), § 21158 (Focused EIR).) Thus, this revision clarifies that tiering describes one mechanism for streamlining the environmental review process, but where other methods have more specific provisions, those provisions shall apply. The revision also adds infill streamlining to the list of specialized streamlining tools.

Necessity

The amendments are necessary to clarify that tiering describes one mechanism for streamlining the environmental review process, but where other methods have more specific provisions, those provisions shall apply. The amendments will ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with Public Resources Code as well as internally consistent with other sections of the CEQA Guidelines. The proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15155. CITY OR COUNTY CONSULTATION WITH WATER AGENCIES

Specific Purposes of the Amendment

California recently experienced the worst water crisis in our state's modern history over multiple consecutive years of extremely dry conditions. During that time, precipitation and snowpack were a small fraction of their normal averages, reservoirs were at extremely low levels, and rivers had severely diminished flows. In response to the growing crisis, Governor Brown proclaimed a state of emergency in January 2014 and called on all Californians to reduce their water consumption by 20 percent. In April 2014, the Department of Water Resources announced a five percent allocation of the State Water Project—the lowest ever. (DWR, Water Conditions.) Allocations remained low in 2015. The State Water Resources Control Board began to notify water rights holders that they must curtail their diversions in certain watersheds. (See State Water Resources Control Board, "Notices of Water Availability (Curtailment and Emergency Regulations)".) In September 2014, Governor Brown signed into law the Sustainable Groundwater Management Act, historic legislation to strengthen local management and monitoring of groundwater basins most critical to the state's water needs. Responding to continuing dry conditions, in April 2015, the Governor issued Executive Order B-29-15, calling on Californians to redouble their water conservation efforts. Specifically, urban water agencies are required to reduce water use by a combined 25 percent. After unprecedented water conservation efforts and high levels of winter water and snow, Governor Brown issued Executive Order B-40-17 in April 2017, lifting the drought emergency in all counties except Fresno, Kings, Tulare, and Tuolumne.

Even so, climate change is expected to increase long-term variability in California's water supplies. (Esther Conrad, "Preparing for New Risks: Addressing Climate Change in California's Urban Water Management Plans" (June 2013).)

The Department of Water Resources has identified several climate change effects that could affect water supplies, including:

- Water Demand — Hotter days and nights, as well as a longer irrigation season, will increase landscaping water needs, and power plants and industrial processes will have increased cooling water needs.

- Water Supply and Quality — Reduced snowpack, shifting spring runoff to earlier in the year …, increased potential for algal bloom, and increased potential for seawater intrusion—each has the potential to impact water supply and water quality.

- Sea Level Rise — It is expected that sea level will continue to rise, resulting in near shore ocean changes such as stronger storm surges, more forceful wave energy, and more extreme tides. This will also affect levee stability in low-lying areas and increase flooding.

- Disaster — Disasters are expected to become more frequent as climate change brings increased climate variability, resulting in more extreme droughts and floods. This will challenge water supplier operations in several ways as wildfires are expected to become larger and hotter, droughts will become deeper and longer, and floods can become larger and more frequent.

(Department of Water Resources, "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan," (March 2011), at G-3.) These risks are now being incorporated into long-term water supply planning.

California courts have long recognized CEQA's requirement to analyze the adequacy of water supplies needed to serve a proposed project. (See, e.g., *Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818.) Accordingly, the sample initial study checklist in Appendix G asks whether the project would have "sufficient water supplies available to serve the project…." (CEQA Guidelines, App. G., § XVII(d).)

In recent years, the California Legislature added water supply assessment and verification requirements for certain types of projects. (See Wat. Code, §§ 10910 et seq. (water supply assessments); Gov. Code, § 66473.7 (water supply verifications).) Shortly after those statutory requirements were enacted, the California Supreme Court articulated several principles describing the content requirements for an adequate water supply evaluation in CEQA. (*Vineyard, supra,* 40 Cal.4th 412.) The Natural Resources Agency added section 15155 to the CEQA Guidelines to describe the consultation and documentation that must be occur between water suppliers and lead agencies. (CEQA Guidelines, § 15155.) Because that section was developed before the Supreme Court's decision in *Vineyard*, it focuses on compliance with the consultation requirements in SB 610, and does not discuss the issue of adequacy of a water supply analysis in CEQA more broadly.

CEQA Guidelines section 15155 describes the process city or county lead agencies must follow with respect to the development of a water supply assessment for specified types of projects and required the inclusion of the water supply assessment and other information in any environmental document prepared for the project. Because water is such a critical resource in California, and because California courts have required specific content in environmental documents regarding water supply, the Natural Resources Agency proposes to revise section 15155 to incorporate the adequacy principles described in the Supreme Court's decision in *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* (2007) 40 Cal.4th 412. Doing so should ensure that lead agencies consistently develop the information needed to evaluate the impacts associated with providing water to their projects.

New Subdivision (f) – Water Supply Analysis and Degree of Specificity

The Natural Resources Agency added a new subdivision (f) to section 15155 to set forth the content requirements for a water supply analysis in CEQA. While subdivision (f) describes these content requirements, it is important to note that the Agency is not creating new requirements. Rather, it is merely stating explicitly in the CEQA Guidelines the Supreme Court's holding in the *Vineyard* case. (See, Pub. Resources Code, § 21060.5 ("environment" defined as "the physical conditions that exist within the area which will be affected by a proposed project, including … water …"); *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* (2007) 40 Cal. 4th 412 (setting forth the required elements of a water supply analysis).)

The first two sentences in subdivision (f) state the rule that the level of certainty regarding water supplies will increase as the analysis moves from general to specific. (*Vineyard, supra*, 40 Cal. 4th at 434 ("we emphasize that the burden of identifying likely water sources for a project varies with the stage of project approval involved; the necessary degree of confidence involved for approval of a conceptual plan is much lower than for issuance of building permits").) This rule is consistent with other portions of the CEQA Guidelines governing forecasting and the degree of specificity required in environmental documents. (CEQA Guidelines, §§ 15144 "[w]hile foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can"), 15146 ("degree of specificity required in an EIR will correspond to the degree of specificity involved in the underlying activity which is described in the EIR").)

Subdivision (f)(1) – Purpose

Subdivision (f)(1) states the requirement that a water supply analysis provide enough information to the lead agency to evaluate the pros and cons of providing water to the project. (*Vineyard, supra*, 40 Cal. 4th at 431; *Santiago, supra*, 118 Cal. App. 3d at pp. 829-831.) This will necessarily require information regarding the project's water demand as well as the quantity of water that is available to serve the project.

Subdivision (f)(2) – Environmental Impacts of Supplying the Water

Subdivision (f)(2) states the requirement to analyze the environmental effects of supplying water to the project. This sentence further specifies that the analysis must account for all phases of the project. (*Vineyard, supra*, 40 Cal. 4th at 431 ("an adequate environmental impact analysis for a large project, to be built and occupied over a number of years, cannot be limited to the water supply for the first stage or the first few years").) This is an important clarification because the water supply assessment and verification statutes only require looking twenty years into the future. Some projects may have a lifespan of fifty or more years. In that circumstance, some degree of forecasting may be required. (CEQA Guidelines § 15144.) Pure speculation, however, is not required. (*Id.* at § 15145.)

Additionally, the focus of this subdivision should be on the environmental impacts associated with a particular water supply. (*Vineyard, supra*, 40 Cal. 4th at 434 (the "ultimate question under CEQA … is not whether an EIR establishes a likely source of water, but whether it adequately addresses the reasonably foreseeable impacts of supplying water to the project") (emphasis in original).) For example, after establishing the amount of water a project will need, the analysis might examine whether supplying that amount from groundwater might lead to subsidence or unsafe yield, or whether diverting that amount from surface flow might adversely affect fish and wildlife.

Subdivision (f)(3) – Circumstances Affecting the Likelihood of Supplies

Since water supply availability is variable in California, subdivision (f)(3) requires acknowledging any circumstances that might affect the availability of water supplies identified for a project. (*Vineyard, supra*, 40 Cal. 4th at 432 (an environmental document "must address the impacts of likely future water sources, and the EIR's discussion must include a reasoned analysis of the circumstances affecting the likelihood of the water's availability").) The magnitude of variability should also be disclosed. (*Id.* at p. 434 ("an EIR may satisfy CEQA if it acknowledges the degree of uncertainty involved").) Subdivision (f)(3) also provides a list of circumstances that might potentially affect water supplies, including but not limited to: "drought, salt-water intrusion, regulatory or contractual curtailments, and other reasonably foreseeable demands on the water supply."

Subdivision (f)(4) – Alternatives and Mitigation

Subdivision (f)(4) provides that when supplies for the project are not certain, the analysis should address alternatives. (*Vineyard, supra*, 40 Cal. 4th at 432.) Again, the focus of the analysis should be on the environmental impacts that would flow from using those alternative sources of supply. (*Ibid*.) However, the level of detail of that analysis need not be as great as that provided for the project itself. (See, CEQA Guidelines § 15126.6(d) ("If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative shall be discussed, but in less detail than the significant effects of the project as proposed").) Thus, subdivision (f)(4) states that the analysis of impacts from alternative sources should be stated "at least in general terms." (*Napa Citizens for Honest Government v. Napa County Bd. of Sup.* (2001) 91 Cal. App. 4th 342, 373.) Further, subdivision (f)(4) provides that in addition to analyzing alternative water supplies when identified supplies are uncertain, a lead agency may also consider project alternatives that require less water. For example, if supplies are certain up to a certain amount, a lead agency should be able to consider alternative project designs that would use less water and that could be confidently served.

Finally, subdivision (f)(4) provides that if water supplies are not certain, and if the agency has fully analyzed water supply availability as described above, curtailing later project phases may be an appropriate mitigation measure.

Necessity

The additions are necessary to ensure that the CEQA Guidelines are consistent with current case law. The amendments will ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with the Public Resources Code as well as current case law. The proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15168. PROGRAM EIR

Specific Purposes of the Amendment

Administrative efficiency has long been an explicit policy in CEQA. (See Pub. Resources Code, § 21003(f) (statement of legislative intent that "[a]ll persons and public agencies involved in the environmental review process be responsible for carrying out the process in the most efficient, expeditious manner in order to conserve the available financial, governmental, physical, and social resources with the objective that those resources may be better applied toward the mitigation of actual significant effects on the environment").) The CEQA Guidelines encourage efficiency in several ways, including the provisions regarding program EIRs.

Program EIRs can be used to evaluate a series of connected actions, such as adoption and implementation of regulations or land use plans, in one environmental document. Section 15168 of the CEQA Guidelines governs the preparation and later use of program EIRs. It suggests that program EIRs are particularly useful in addressing big picture alternatives and cumulative impacts. When a program EIR is sufficiently detailed, later activities may be approved on the basis of that document without conducting further environmental review. The key question in determining whether additional review is required is whether the later activity falls "within the scope" of the program analyzed in the EIR. (CEQA Guidelines, § 15168(c)(2).)

Courts have treated the determination of whether an activity is within the scope of a program EIR to be a question of fact to be resolved by the lead agency. Several organizations representing CEQA practitioners have suggested that additional guidance should be provided to help lead agencies make that determination. (See, "Recommendations for Updating the State CEQA Guidelines," American Planning Association, California Chapter; Association of Environmental Professionals; and Enhanced CEQA Action Team (August 30, 2013).)

In response to those cases, and suggestions from stakeholders, the Natural Resources Agency updated Section 15168 on Program EIRs.

First, the additions to subdivision (c)(2) clarify that the determination of whether a later activity falls within the scope of the program EIR is a question of fact to be resolved by the lead agency, and supported with substantial evidence in the record. This addition implements judicial opinions that have addressed the issue. (See, e.g., *Citizens for Responsible Equitable Environmental Development v. City of San Diego Redevelopment Agency* (2005) 134 Cal.App.4th 598, 610 (*CREED*) ("the fair argument standard does not apply to judicial review of an agency's determination that a project is within the scope of a previously completed EIR"); *Sierra Club v. County of Sonoma* (1992) 6 Cal.App.4th 1307, 1320-1321 ("evidence does not support a determination that [the] proposed site-specific project was either the same as or within the scope of the project, program, or plan described in the program EIR").)

Second, the additions to subdivision (c)(2) provide a list of factors that may assist a lead agency in determining whether a later activity is within the scope of a program EIR. Again, those factors have been recognized in judicial opinions as being instructive. Those factors include:

- Consistency with allowable land uses included in the project description (*compare Sierra Club*, *supra*, 6 Cal.App.4th at pp. 1320-1321 (later activity could not have been within the scope of the prior EIR because it involved engaging "in terrace mining on land which was specifically designated in the Plan as an agricultural resource") *with CREED*, *supra*, 134 Cal.App.4th at p. 616 ("the Community Plan designated the area where the hotel [project] is to be built as a "Commercial/Office District" in which "hotels and motels" would be emphasized as among the allowable land uses"));

- Consistency with densities and building intensities included in the project description (see *ibid* (the "MEIR forecast[ed] that a total of 5,880 additional hotel rooms would be constructed over a 35-year period within the Planning Area, and expressly contemplate[d] the completion of the Horton Plaza Redevelopment Project, which the hotel project will complete"));

- Being within the geographic area that the program EIR analyzed for potential impacts (see, e.g., *Santa Teresa Citizen Action Group v. City of San Jose* (2003) 114 Cal.App.4th 689, 704 (the project "will use recycled water in the same way and in the same general location evaluated by the previous studies"));

- Being included in the infrastructure described in the program EIR (see *ibid*).

Notably, this list of factors is not intended to be exclusive.

Third, the Natural Resources Agency added a sentence to subdivision (c)(1) to clarify how to proceed with the analysis of a later activity that a lead agency determines is not "within the scope" of the program EIR. Specifically, the new sentence states that if additional analysis is needed, that analysis should follow the tiering process described in section 15152. This addition is necessary to clarify that even if a project is not "within the scope" of a program EIR, the lead agency might still streamline the

later analysis using the tiering process. This might allow a lead agency, for example, to focus the analysis of the later activity on effects that were not adequately analyzed in the program EIR. (See CEQA Guidelines, § 15152(d).) This addition promotes administrative efficiency. (Pub. Resources Code, § 21093(b) ("environmental impact reports shall be tiered whenever feasible").) This addition also follows the analysis in the *Sierra Club* decision, which addressed the relationship between program EIRs and tiering. (*Sierra Club*, *supra*, 6 Cal.App.4th at pp. 1320-1321 (because the project was not within the scope of the program EIR, "section 21166 was inapplicable, and the [agency] was obligated by section 21094, subdivision (c), to consider whether [the] site- specific new project might cause significant effects on the environment that were not examined in the prior program EIR").)

Fourth, in subdivision (c)(5), the Natural Resources Agency notes that program EIRs will be most useful for evaluating later activities when those activities have been included in the program EIR's project description. (*CREED*, *supra*, 134 Cal.App.4th at p. 616.)

Finally, the Natural Resources Agency made minor word changes throughout this section to improve clarity.

Necessity

This addition is necessary to clarify rules from case law governing whether a project is "within the scope" of a program EIR. These additions are also necessary to assist lead agencies in making the CEQA process as efficient as possible. Finally, these changes are necessary to ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with the Public Resources Code as well as current case law and to add clarity. The proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15182. RESIDENTIAL PROJECTS PURSUANT TO A SPECIFIC PLAN

Specific Purposes of the Amendment

In 1978, Governor Brown adopted California's first Environmental Goals and Policy Report. Known as the Urban Strategy, it set forth key statewide environmental goals as well as an action plan to attain those goals. One of the recommendations in the action plan was to exempt certain types of projects that are consistent with a specific plan from further CEQA review. (An Urban Strategy for California (February 1978), at p. 14.) Shortly after adoption of the Urban Strategy, the legislature created an exemption, found in the Government Code, for residential projects that are consistent with a specific plan. (See Gov. Code, § 65453 (added in 1979, later renumbered to section 65457).) That exemption is described in existing section 15182 of the CEQA Guidelines.

The exemption in the Government Code was much more limited than the Urban Strategy's original recommendation. First, its provisions were difficult to apply in practice. For example, if changed circumstances occurred, the exemption could not be used until a supplemental EIR was prepared to cover the entire specific plan, even if the analysis remained valid for the individual project. Second, rather than exempting a variety of uses, section 65457 exempts only purely residential development. Commercial projects, or even projects that included a commercial component, could not use the exemption. In the decades since the exemption was first enacted, planners have recognized that promoting mixed use developments may reduce land consumption, air pollution, and other environmental ills.

In 2013, Governor Brown's administration proposed, and the Legislature enacted, a set of amendments to CEQA designed to better align the statute with other environmental goals, including the reduction of greenhouse gas emissions and promotion of infill development. (Senate Bill 743, Steinberg 2013.) One of those amendments added section 21155.4 to the Public Resources Code. That section resembles Government Code section 65457, but extends beyond purely residential projects to include commercial and mixed-use projects as well. The trigger for requiring additional review also is more closely tied to the project under consideration, instead of to the entire specific plan area. This expanded exemption is available to projects that are located near transit and that are consistent with regional plans for reducing greenhouse gas emissions.

Section 15182 of the CEQA Guidelines discusses special provisions regarding specific plans. The Natural Resources Agency updated existing CEQA Guidelines section 15182 to reflect the new exemption in Public Resources Code section 21155.4 as well as the exemption in Government Code section 65457. The Agency included cross-references for further clarification to alert planners of the relevant statute of limitations. The specific amendments are explained in detail below.

Subdivision (a)

The Natural Resources Agency reorganized section 15182 to describe both the exemption in Public Resources Code section 21155.4 as well as the exemption in Government Code section 65457. As amended, subdivision (a) is a general section that points to the more specific provisions in subdivisions (b) and (c). Importantly, subdivision (a) clarifies that a specific plan is a plan that is adopted pursuant to the requirements set forth in Article 8, Chapter 3 of the Government Code. This clarification is necessary because cities and counties may give qualifying plans various titles, such as Master Plan or Downtown Plan. So long as the plan includes the contents described in the Government Code, it should enable use of the exemptions described in section 15182.

Subdivision (b)

As amended, subdivision (b) contains the provisions applicable to projects within transit priority areas.

Subdivision (b)(1) describes the eligibility criteria for use of the exemption. Those eligibility criteria are drawn directly from Section 21155.4(a). Notably, while section 21155.4 uses the term "employment center project," proposed subdivision (b)(1) clarifies that term by referring to a commercial project with a floor area ratio of at least 0.75. (See Pub. Resources Code § 21099(a)(1) (defining "employment center project").

Subdivision (b)(2) describes the limitation to the exemption. Specifically, it clarifies that additional review may be required if the project triggers one of the requirements for further review described in section 15162. New review may be required if, for example, the project requires changes in the specific plan that would result in new or worse significant impacts, or if circumstances have changed since adoption of the specific plan that would lead to new or worse significant impacts.

Subdivision (b)(3) includes a cross reference to the statute of limitation periods described in section 15112. This subdivision is necessary to alert planners that, unlike the exemption in section 65457 which provides for a 30 day statute of limitations regardless of whether a notice of exemption is filed, the exemption in section 21155.4 is subject to CEQA's normal statute of limitations.

Subdivision (c)

As amended, subdivision (c) contains the provisions that apply to purely residential projects. The content in subdivision (c) largely mirrors the text in existing section 15182. The Natural Resources Agency made several clarifications, however. For example, section 15182 currently states that no further environmental impact report or negative declaration is required for residential projects that are consistent with a specific plan. Section 65457 actually states that such projects are exempt from any of CEQA requirements, not just preparation of a new environmental document. Therefore, the Agency clarified in subdivision (c) that such projects are exempt.

Also, the Natural Resources Agency pulled the existing description of the special statute of limitations into subdivision (c)(3).

Subdivision (d)

Subdivision (d) in existing section 15182 allows local governments to collect fees to cover the cost of preparing a specific plan. That authority is found in Government Code section 65456. Because fees may be collected to cover the preparation of specific plans, regardless of whether the plans cover residential, commercial or other uses, the Natural Resources Agency has left subdivision (d) as currently written.

Necessity

This clarification is necessary to alert planners to the important differences between two similar statutory exemptions for projects that are consistent with a specific plan. Additionally, clarification is necessary to alert planners of the relevant statute of limitations. The amendments will ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be consistent with current law. The proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15222. PREPARATION OF JOINT DOCUMENTS

Specific Purposes of the Amendment

This section strongly encourages state and local agencies to work with the federal agency involved with the same projects.

The Natural Resources Agency amended CEQA Guidelines section 15222 to add a sentence encouraging a lead agency to enter into a Memorandum of Understanding with appropriate Federal agencies. This addition will encourage increased cooperation between the state and Federal agencies to coordinate project requirements, timelines, and reduce duplication under CEQA and NEPA provisions. The White House Council on Environmental Quality and the California Governor's Office of Planning and Research (OPR) jointly prepared a handbook, "NEPA and CEQA: Integrating Federal and State Environmental

Reviews," that included a sample Memorandum of Understanding to assist state and Federal agencies in this process. (Available online at http://opr.ca.gov/docs/NEPA_CEQA_Handbook_Feb2014.pdf.)

Necessity

This amendment is necessary to ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to be clarify current law. The proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15234. REMEDIES AND REMAND

Specific Purposes of the Amendment

CEQA is in most instances enforced through a form of judicial review known as a writ of mandate proceeding.[5] In reviewing a petition for writ of mandate, the court examines an agency's administrative record to determine whether it properly implemented CEQA in connection with a project approval. If the court concludes that the agency did not comply with CEQA, it may order the agency to take further action before proceeding with the project. At that

[5] Exceptions apply where challenges to certain types of agency actions specifically require a different procedure. For example, Government Code section 56103 requires that any challenge to any change of organization, reorganization, or sphere of influence determination approved by a local agency formation commission be accomplished through a validating action pursuant to Code of Civil Procedure section 860 et seq. (See *Protect Agricultural Land v. Stanislaus County Local Agency Formation Com.* (2014) 223 Cal.App.4th 550.)

point, questions may arise regarding what further environmental review is needed, and what project activities, if any, may continue while the agency takes further action. Proposed new section 15234 will assist agencies in complying with CEQA in response to a court's remand, and help the public and project proponents understand the effect of the remand on project implementation. Specifically, proposed new section 15234 reflects the language of the statutory provision governing remedies in CEQA cases, Public Resources Code section 21168.9, as well as case law interpreting that statute.

The Natural Resources Agency added a new section to the CEQA Guidelines, Section 15234, to codify the California Supreme Court's ruling in *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal. 4th 439, among other cases interpreting Section 21168.9. The court in that case held that not every violation of CEQA will compel a court to set aside project approvals and further explained that the court may order the agency to set aside all or a portion of the project approvals, and may require the agency to conduct additional environmental review.

Subdivision (a) of new Section 15234 is necessary to explain to public agencies and the public how CEQA litigation may affect project implementation. First, it clarifies that not every violation of CEQA will compel a court to set aside project approvals. Public Resources Code Section 21005 provides that "courts shall continue to follow the established principle that there is no presumption that error is prejudicial." The California Supreme Court recently reiterated that "[i]nsubstantial or merely technical omissions are not grounds for relief." (*Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal. 4th 439, 463.) In order to justify setting aside a project approval, a violation must "preclude relevant information from being presented to the public agency." (Pub. Resources Code, § 21005, subd. (a).)

Second, subdivision (a) states that, except as provided in Public Resources Code section 21168.9 itself, CEQA does not limit the traditional equitable powers of the judicial branch and that remedies may be tailored based on the circumstances of the project. It further explains that the court may order the agency to set aside all or a portion of the project approvals, and may require the agency to conduct additional environmental review.

Next, subdivision (b) clarifies that in certain circumstances, portions of the project approvals or the project itself may proceed while the agency conducts further review. Specifically, Section 21168.9 of the Public Resources Code provides that a court may allow certain project approvals or activities to proceed as long as continued implementation of the project would not prevent the agency from fully complying with CEQA. In 1993, the legislature amended that section "to expand the authority of courts to fashion a remedy that permits a part of the project to continue while the agency seeks to correct its CEQA violations." (*Poet, LLC v. State Air Resources Bd.* (2013) 218 Cal.App. 4th 681, 756.)

Next, subdivision (c) codifies the outcome in *Poet, LLC v. State Air Resources Bd.* (2013) 218 Cal. App. 4th 681, in which the Court of Appeal found that the California Air Resources Board had

failed to fully comply with CEQA in enacting Low Carbon Fuel Standards regulations, but nevertheless exercised its equitable discretion to leave the challenged regulations in place during the remand period. The court reasoned that a remedy that left the regulations in place would achieve a higher level of environmental protection than would a remedy that left them inoperative.

Finally, subdivision (d) addresses how an agency should proceed with additional environmental review if required by a court. Specifically, it indicates that where a court upholds portions of an agency's environmental document, additional review of topics covered in the upheld portions is only required if the project or circumstances surrounding the project have changed in a way that results in new or worse environmental impacts. To illustrate, assume that a court concludes that an agency's analysis of noise impacts is inadequate, but that the remainder of its environmental impact report complies with CEQA. The agency may prepare a revised environmental impact report that focuses solely on noise. It would only need to revise the air quality analysis, for example, if the agency concluded that changes in the circumstances surrounding the project would result in substantially more severe air quality impacts.

Necessity

The new CEQA Guidelines section is necessary to explain to public agencies how CEQA litigation may affect project implementation and to ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

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Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15269. EMERGENCY PROJECTS.

Specific Purposes of the Amendment

This section identifies the emergency exemptions from CEQA. The Natural Resources Agency amended subdivisions (b) and (c) of Section 15269. Currently, subdivisions (b) and (c) state that emergency repairs may be exempt under CEQA and that this exemption does not apply to long-term projects undertaken for the purpose of preventing or mitigating an emergency. The Agency added a sentence to subdivision (b) clarifying that emergency repairs may require planning and qualify under this exemption. Further, the Agency added two subsections under subdivision (c) clarifying how imminent an emergency must be to fall within the statutory exemption. (See *CalBeach Advocates v. City of Solana Beach* (2002) 103 Cal.App.4th 529, 537 (emergency repairs need not be "unexpected" and "in order to design a project to prevent an emergency, the designer must anticipate the emergency").

Necessity

These additions are necessary to clarify the application of this emergency exemption and to maintain consistency with a Court of Appeal decision stating that an emergency repair may be anticipated and to ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to clarify current case law. The proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

15301. EXISTING FACILITIES

Specific Purposes of the Amendment

Section 15301 of the CEQA Guidelines exempts ongoing operations and minor alterations of existing facilities from CEQA. The key in determining whether the exemption applies is whether the project involves an expansion to an existing use. Projects that involve no or only a negligible expansion may be exempt. This exemption plays an important role in implementing the state's goal of prioritizing infill development.

The Natural Resources Agency made two changes to Section 15301.

The first change appears in the first sentence of the exemption. It deletes the phrase "beyond that existing at the time of the lead agency's determination." Stakeholders noted that this phrase could be interpreted to preclude use of the exemption if a facility were vacant "at the time of the lead agency's determination," even if it had a history of productive use, because compared to an empty building, *any* use would be an expansion of use. (See, Comments of the Building Industry Association, August 30, 2013.) Such an interpretation is inconsistent with California's policy goals of promoting infill development.

It would also not reflect recent case law regarding "baseline." Those cases have found that a lead agency may look back to historic conditions to establish a baseline where existing conditions fluctuate, again provided that it can document such historic conditions with substantial evidence. (See *Communities for a Better Environment v. South Coast Air Quality Management Dist.* (2010) 48 Cal.4th 310, 327-328 ("Environmental conditions may vary from year to year and in some cases it is necessary to consider conditions over a range of time periods") (quoting *Save Our Peninsula Committee v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 125); see also *Cherry Valley Pass Acres & Neighbors v. City of Beaumont* (2010) 190 Cal.App.4th 316.)

The phrase at issue was apparently added in response to *Bloom v. McGurk* (1994) 26 Cal.App.4th 1307. The court in that case was asked to decide whether the fact that the facility in question had never undergone CEQA review triggered an exception to the exemption. In analyzing that question, the court in *Bloom* relied on the analysis of a prior Supreme Court decision. It explained:

> Under *Wine Train's* analysis, the term "existing facility" in the class 1 exemption would mean a facility as it exists at the time of the agency's determination, *rather than a facility existing at the time CEQA was enacted*. For purposes of the exception to the categorical exemptions, "significant effect on the environment" would mean a change in the environment existing at the time of the agency's determination, rather than a change in the environment that existed when CEQA was enacted.

(*Id*. at p. 1315 (citing *Napa Valley Wine Train, Inc. v. Public Utilities Com*. (1990) 50 Cal.3d 370, 378, fn. 12) (emphasis added).) Nothing in that decision indicates, however, that a lead agency could not consider actual historic use in deciding whether the project would expand beyond that use.

The second change appears in subdivision (c). The purpose of this change is to clarify that improvements within a public right of way that enable use by multiple modes (i.e., bicycles, pedestrians, transit, etc.) would normally not cause significant environmental impacts. This change is consistent with the Complete Streets Act of 2008, which requires cities and counties to plan for the needs of all users of their streets. In this regard, because such improvements involve operation of public rights of way, they may be similar to the imposition of water conservation requirements for existing water facilities (see, *Turlock Irrigation Dist. v. Zanker* (2006) 140 Cal. App. 4th 1047,1065), or the regulation of the right of way for parking (see, *Santa Monica Chamber of Commerce v. City of Santa Monica* (2002) 101 Cal.App.4th 786, 793 ("it is clear that the Class 1 exemption applies to the legislation/project here[; it] involves adjusting the particular group of persons permitted to use 'existing facilities,' in other words, the existing, unmetered, curbside parking on residential streets")). Improvements to the existing right of way have long been understood to fall within the category of activities in subdivision (c), provided that the activity does not involve roadway widening. (See, *Erven v. Board of Supervisors* (1975) 53 Cal. App. 3d 1004.)

Necessity

These additions are necessary to maintain consistency between this CEQA Guideline section and current case law. These additions are also necessary to ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

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15357. DISCRETIONARY PROJECT

Specific Purposes of the Amendment

The Natural Resources Agency has amended Section 15357 to clarify that a discretionary project is one in which a public agency can shape the project in any way to respond to concerns raised in an environmental impact report. This addition reflects various cases distinguishing the term "discretionary" from the term "ministerial." (See, e.g., *Friends of Westwood, Inc. v. City of Los Angeles* (1987) 191 Cal.App.3d 259, 267 ("[T]he touchstone is whether the approval process involved allows the government to shape the project in any way that could respond to any of the concerns … in an environmental impact report").) The California Supreme Court and Fourth District Court of Appeal have consistently followed this interpretation. (See, e.g., *Mountain Lion Foundation v. Fish & Game Comm*. (1997) 16 Cal.4th 105, 177; *San Diego Navy Broadway Complex Coalition v. City of San Diego* (2010) 185 Cal.App.4th 924, 933*; Friends of Juana Briones House v. City of Palo Alto* (2010) 190 Cal.App.4th 286, 299.) This clarification is necessary to maintain consistency in determining "discretionary" projects and to improve practitioners' ability identify when a project is required to complete environmental review under CEQA.

The Natural Resources Agency also added the words "fixed standards" to the end of the first sentence in the definition to be consistent with the holding in *Health First v. March Joint Powers Authority* (2009) 174 Cal. App. 4th 1135. Notably, the definition of "discretionary" in these Guidelines should be read in context with other statutes. For example, Government Code sections 65583(a)(4) and 65583.2(h) require that local governments zone specified areas for specified uses for "use by right." In those circumstances, local government review cannot be considered discretionary pursuant to CEQA.

Necessity

This clarification is necessary to maintain consistency in determining "discretionary" projects and to improve practitioners' ability identify when a project is required to complete environmental review under CEQA. This change is necessary to ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to clarify current case law as well as other statutory law. The proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the

objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

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15370. MITIGATION

Specific Purposes of the Amendment

The definition of the term "mitigation" in the CEQA Guidelines originally mirrored the definition contained in the federal NEPA regulations. The Natural Resources Agency revised Section 15370 of the CEQA Guidelines, however, to clarify in the CEQA Guidelines that permanent protection of off-site resources through conservation easements constitutes mitigation. The proposed changes incorporate the First District Court of Appeal holding in *Masonite Corporation v. County of Mendocino* (2013) 218 Cal.App.4th 230 wherein the court ruled that off-site agricultural conservation easements constitute a potential means to mitigate for direct, in addition to cumulative and indirect, impacts to farmland.

Necessity

These additions are necessary to maintain consistency between this CEQA Guideline section and current case law. These additions are also necessary to ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to clarify current case law. The proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

APPENDIX G. ENVIRONMENTAL CHECKLIST FORM

Specific Purposes of the Amendment

Appendix G in the CEQA Guidelines contains a sample initial study format. The purpose of an initial study is to assist lead agencies in determining whether a project may cause a significant impact on the environment. (CEQA Guidelines, § 15063.) To help guide that determination, Appendix G asks a series of questions regarding a range of environmental resources and potential impacts. Appendix G's questions are not an exhaustive list of all potential impacts. (*Protect the Historic Amador Waterways, supra,* 116 Cal.App.4th at pp. 1109-1112 (seasonal reduction of surface flow in local streams may be an impact on the environment, even though that particular impact is not specifically listed in Appendix G).) For that reason, Appendix G advises that "[s]ubstantial evidence of potential impacts that are not listed on this form must also be considered." Appendix G further advises that its environmental checklist is only a *sample* form that can be tailored to address local conditions and project characteristics.

When the checklist was originally developed, it contained only a handful of questions. Over time, the list of questions has grown in response to increasing awareness of the effects of development on the environment. Currently, the sample checklist contains 89 questions divided into 18 categories of potential impacts. Depending on the project's location and circumstances, the sample checklist questions may be both under- and over-inclusive. Because the purpose of an initial study is to provoke thought and investigation, and because the checklist cannot contain an exhaustive list, the sample in Appendix G should, in the Natural Resources Agency's view, contain questions that are (1) broadly worded, (2) highlight environmental issues *commonly* associated with *most* types of new development, and (3) alert lead agencies to environmental issues that might otherwise be overlooked in the project planning and approval process.

The Natural Resources Agency revised the sample environmental checklist in several ways. First, it reframed or deleted certain questions that should be addressed in the planning process to focus attention on those issues that must be addressed in the CEQA process. Second, it added questions that, although required by current law, tend to be overlooked in the environmental review process. Finally, it revised the questions related to transportation impacts, and wildfire risk as required by SB 743 and SB 1241, respectively, and relocated questions related to paleontological resources as required by AB 52 (Gatto, 2014).

While OPR originally proposed a far more streamlined and consolidated set of questions, stakeholders objected that confusion might ensue. The Natural Resources Agency agrees with OPR that further discussion of ways to streamline the checklist is appropriate. The changes in this package, however, are more narrowly tailored. A narrative description of the changes, and the intent behind those changes, is provided below.

Deleted or Consolidated Questions

The Natural Agency deleted or consolidated numerous questions from the Appendix G checklist. Those questions, and the reason that they were deleted, are discussed below.

Soils Incapable of Supporting Septic Systems: Regarding Geology and Soils, Appendix G currently asks whether a project would "[h]ave soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water." According to the U.S. Environmental Protection Agency, inappropriately placed or operated septic systems may be a source of significant groundwater contamination. The Agency revised the questions in Appendix G related to water quality. Specifically, among other revisions, the Agency clarified that the question asking whether a project would "substantially degrade water quality" refers to both surface and ground water quality. Thus, as revised, the broader question about groundwater quality would capture not just impacts from inappropriately placed septic tanks, but also any other possible sources of uncontrolled leachate.

Conflicts with a Habitat Conservation Plan: Existing Appendix G asks whether a project would conflict with a habitat conservation plan and other related plans in two separate sections: biological resources and land use planning. The Agency deleted the question from the land use planning section. The question in the biological resources section remains unchanged.

Wastewater Treatment Requirements: In the section on utilities, Appendix G currently asks whether a project would exceed wastewater treatment requirements of an applicable regional water quality control board. Similarly, in the water quality section, Appendix G asks whether a project would violate any waste discharge requirements. Since the question in the water quality section would encompass wastewater treatment requirements as well as other water quality standards, the Agency deleted the question from the utilities section.

Updated Considerations

As part of the reorganization of Appendix G, the Natural Resources Agency also updated some considerations or questions to the checklist. Those considerations, and the reason that they are have been revised, are discussed below.

Aesthetics: Existing Appendix G asks whether a project would degrade the existing visual character of a site. Visual character is a particularly difficult issue to address in the context of environmental review, in large part because it calls for exceedingly subjective judgments. Both federal and state courts have struggled with the issue of precisely what questions related to aesthetics are relevant to an analysis of environmental impact. (See, e.g., *Maryland-National Cap. Pk. & Pl. Com'n. v. U.S. Postal Serv*. (D.C. Cir. 1973) 159 U.S. App. D.C. 158; see also *Bowman v. City of Berkeley* (2006) 122 Cal.App.4th 572.) As a practical matter, infill projects are often challenged on the grounds of aesthetics. (See, e.g., Pub. Resources Code, § 21099(d) (exempting certain types of infill projects from the requirement to analyze aesthetics).)

For these reasons, the Natural Resources Agency recast the existing question on "visual character" to ask whether the project is consistent with zoning or other regulations governing visual character. This

change is intended to align with the analysis of the aesthetics issue in the *Bowman* case, *supra*. The court in that case, which involved a challenge to a multifamily residential project in an urban area, noted:

> Virtually every city in this state has enacted zoning ordinances for the purpose of improving the appearance of the urban environment" …, and architectural or design review ordinances, adopted "solely to protect aesthetics," are increasingly common…. While those local laws obviously do not preempt CEQA, we agree with the Developer and the amicus curiae brief of the Sierra Club in support of the Project that aesthetic issues like the one raised here are ordinarily the province of local design review, not CEQA.

(*Bowman*, *supra*, 122 Cal.App.4th at p. 593 (citations omitted).) This revision is also consistent with the proposed changes in sections 15064 and 15064.7 that recognize the appropriate role of environmental standards in a CEQA analysis.

Air Quality: Existing Appendix G asks whether the project would create objectionable odors. The Agency updated this question in several ways. First, the term "objectionable" is subjective. Sensitivities to odors may vary widely. Therefore, the Agency recast the question to focus on the project's potential to cause adverse impacts to substantial numbers of people. (See *Mira Mar Mobile Community v. City of Oceanside* (2004) 119 Cal.App.4th 477, 492–493 ("Under CEQA, the question is whether a project will affect the environment of persons in general, not whether a project will affect particular persons"); see also *Banker's Hill, Hillcrest, Park West Community Preservation Group v. City of San Diego* (2006) 139 Cal.App.4th 249, 279.) Similarly, the Agency included odor as one of several examples of potential localized air quality impacts.

Biological Resources and State Wetlands: Appendix G currently asks whether a project would substantially adversely affect a federally protected wetland. California law protects all waters of the state, while the federal Clean Water Act governs only "navigable waters". Because nothing in CEQA's definition of environment limits consideration to federally regulated resources, the Agency clarified in Appendix G that lead agencies should consider impacts to wetlands that are protected by either the state or the federal government.

Cultural Resources: AB 52 required an update to Appendix G to separate the consideration of paleontological resources from tribal cultural resources and update the relevant sample questions, and to add consideration of tribal cultural resources with relevant sample questions. In September 2016, the Office of Administrative Law approved changes to Appendix G adding consideration of tribal cultural resources. This current package includes an amendment to Appendix G that separates the consideration of paleontological resources from cultural resources, and includes consideration of paleontological resources among the relevant sample questions related to geology and soils.

Energy: As explained in the discussion of proposed amendments to section 15126.2, CEQA has long required analysis of energy impacts. (Pub. Resources Code, § 21100(b)(3) (added in 1974, requiring EIRs to include measures to avoid wasteful and inefficient uses of energy); *California Clean Energy Com. v.*

City of Woodland (2014) 225 Cal.App.4th 173.) However, the description of the required analysis sits largely unnoticed in a stand-alone Appendix F. To better integrate the energy analysis with the rest of CEQA, the Agency replaced relevant questions regarding potential energy impacts to the sample environmental checklist that had been previously deleted from Appendix G.

Impervious Surfaces: Appendix G currently asks a series of questions about hydrology, one of which asks whether the project will alter the drainage patterns of the site through alteration of the course of a stream or river. Another relevant factor in determining the effect of a project on existing drainage systems, however, is how much impervious surfaces a project might add. (See State Water Resources Control Board, Non-Point Source Encyclopedia, § 3.1 (Impervious Surfaces).) OPR's Technical Advisory on "low impact design" identifies the development of new impervious surfaces as a contributor to non-point source pollution and hydromodification. (Office of Planning and Research, "CEQA and Low Impact Development Stormwater Design: Preserving Stormwater Quality and Stream Integrity Through California Environmental Quality Act (CEQA) Review" (August 2009).) Therefore, the Agency added "impervious surfaces" to the considerations in the hydrology portion of the checklist.

Notably, the proposed addition of impervious surfaces as a consideration is not intended to imply that *any* addition of impervious material will necessarily lead to a significant impact. Rather, the modified question asks whether the addition of impervious surface would lead to substantial erosion, exceed the capacity of stormwater drainage systems, etc. Also, some water quality permits do already address the addition of impervious surfaces, and, as provided in updated sections 15064 and 15064.7, a project's compliance with those requirements will be relevant in determining whether the added surfaces create a significant impact.

Geology and Soils: The Agency clarified questions in Appendix G related to geology and soils by suggesting that agencies consider direct and indirect impacts to those resources. This change is consistent with CEQA's general requirement that agencies consider the direct and indirect impacts caused by a proposed project. (See generally, Pub. Resources Code, §§ 21065 [definition of a "project"], 21065.3 [definition of a "project-specific effect"].) And as noted earlier, this package includes an amendment to Appendix G that separates the consideration of paleontological resources from cultural resources, and includes consideration of paleontological resources among the relevant sample questions related to geology and soils.

Groundwater: The Agency made two changes to the existing question in Appendix G asking about a project's impacts to groundwater. First, the existing question asks whether a project will "substantially *deplete*" groundwater supplies. The word "deplete" could be interpreted to mean "empty". Therefore, the Agency revised the question to ask whether the project would "substantially *decrease* groundwater supplies." Second, the existing question asks whether the project would lower the groundwater table level and provides the following example: "e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted." There are many other potential impacts that could result from lowering groundwater levels, including subsidence, altering surface stream hydrology, causing migration of contaminants, etc.

Therefore, the Agency deleted the example from the question. These changes are consistent with the new regime governing groundwater passed in 2014.

Land Use Plans: Appendix G currently asks whether a project conflicts with certain land use plans. The question largely mirrors section 15125(d), which requires an EIR to analyze any inconsistencies with any applicable plans. The Agency revised that question in two ways in order to better focus the analysis.

First, the Agency clarified that the focus of the analysis should not be on the "conflict" with the plan, but instead, on any adverse environmental impact that might result from a conflict. For example, destruction of habitat that results from development in conflict with a habitat conservation plan might lead to a significant environmental impact. The focus, however, should be on the impact on the environment, not on the conflict with the plan. (See, e.g., *Marin Mun. Water Dist. v. Kg Land Cal. Corp*. (1991) 235 Cal.App.3d 1652, 1668 ("A local agency engaged in EIR analysis may not ignore regional needs and the cumulative impacts of a proposed project. … Thus the Guidelines require an EIR to discuss any inconsistencies between the proposed project and applicable general and regional plans"); see also Pub. Resources Code, § 21100(e) ("Previously approved land use documents, including, but not limited to, general plans, specific plans, and local coastal plans, *may be used in cumulative impact analysis*") (emphasis added).) Application of a density bonus to exceed limits in a general plan or zoning, on the other hand, might not lead to any environmental impact. (See, e.g., *Wollmer v. City of Berkeley* (2009) 179 Cal.App.4th 933.)

Second, the Agency deleted the phrase "with jurisdiction over the project" from the question, again for the purpose of focusing the analysis on any *actual environmental impacts* that might result from the project. Finally, the Agency deleted the list of examples of plans from the question. Section 15125(d) contains numerous examples of potentially relevant land use plans, and so repetition in the question in Appendix G is not necessary.

Population Growth: Appendix G currently asks whether a project will cause substantial population growth. The Agency clarified that the question should focus on whether such growth is *unplanned*. Growth that is planned, and the environmental effects of which have been analyzed in connection with a land use plan or a regional plan, should not by itself be considered an impact.

Transportation: The Agency made several changes to the questions related to transportation in Appendix G. First, the Agency revised the questions related to "measures of effectiveness" so that the focus is more on the circulation element and other plans governing transportation. Second, the Agency deleted the second question related to level of service, and instead inserted a references to new Guideline section 16054.3, subdivisions (b), to focus on vehicle miles traveled where appropriate. Third, the Agency clarified the question related to design features.

Water Supply: Appendix G currently asks whether the project has adequate water supplies. The Agency updated the question to better reflect the factors identified by the Supreme Court in *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, as well as the water supply assessment and verification statutes. (Wat. Code, § 10910; Gov. Code, § 66473.7.)

Wildfire: Senate Bill 1241 (Kehoe, 2012) required the Office of Planning and Research, the Natural Resources Agency, and CalFire to develop "amendments to the initial study checklist of the [CEQA Guidelines] for the inclusion of questions related to fire hazard impacts for projects located on lands classified as state responsibility areas, as defined in section 4102, and on lands classified as very high fire hazard severity zones, as defined in subdivision (i) of section 51177 of the Government Code." (Pub. Resources Code, § 21083.01 (emphasis added).) The Agency added several questions addressing this issue. Notably, while SB 1241 required the questions to address specific locations, it did not necessarily limit the analysis to those locations, and so the Agency posed the questions for projects located within "or near" those zones. Lead agencies will be best placed to determine precisely where such analysis is needed outside of the specified zones.

Corrected Typo

Finally, the Agency corrected a typo in the Note following question 11 in Appendix G. The Note briefly describes the tribal consultation process. It contains a reference to Public Resources Code Section 21083.3.2. The correct citation is 21080.3.2. The Agency discovered the typo after circulating the changes for public review. However, because the correction is a change without regulatory effect, pursuant to section 100(a)(4) of the Office of Administrative Law's regulations governing the rulemaking process, no public review is required. (Cal. Code Regs., tit. 1, § 100(a)(4).)

Necessity

These changes are necessary to make the process simpler for lead agencies. These additions are also necessary to ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to clarify existing law. The proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action implements and clarifies existing law. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

APPENDIX M. PERFORMANCE STANDARDS FOR INFILL PROJECTS ELIGIBLE FOR STREAMLINED REVIEW

Specific Purposes of the Amendment

Appendix M in the CEQA Guidelines contains the performance standards that must be met for the streamlined environmental review process for infill projects under CEQA Guidelines section 15183.3. The Natural Resources Agency corrected typographical errors in Sections 4.A, 4.C, and 4.E of Appendix M to be consistent with the previously adopted regulatory text.

Necessity

These changes are necessary to correct the typographical errors in Appendix M and thus to clarify the substantive requirements for performance standards applying to certain infill projects. These additions are also necessary to ensure that the CEQA Guidelines best serve their function of providing a comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to clarify existing law. The proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The proposed action clarifies existing law by correcting typographical errors. Because the proposed action does not add any substantive requirements, it will not result in an adverse impact on businesses in California.

APPENDIX N. INFILL ENVIRONMENTAL CHECKLIST FORM

Specific Purposes of Amendment

Existing Appendix N provides a sample checklist that is intended to assist lead agencies in assessing infill projects according to the procedures in Public Resources Code section 21094.5. The Agency added Appendix N in 2013 when it added section 15183.3. In creating Appendix N, the Agency patterned the sample checklist on Appendix G, which also provides a sample environmental checklist that may be used by lead agencies in determining whether a project may cause a significant impact on the environment. In this package, the Agency updated Appendix N to be consistent with the changes to Appendix G, described above.

Necessity

These changes are necessary to make it simpler for lead agencies. These additions are also necessary to ensure that the CEQA Guidelines best serve their function of providing comprehensive, easily understood guide for the use of public agencies, project proponents, and other persons directly affected by CEQA.

Reasonable Alternatives to the Regulations, Including Alternatives that Would Lessen Any Adverse Impact on Small Business, and the Resources Agency's Reasons for Rejecting Those Alternatives

The Natural Resources Agency considered reasonable alternatives to the proposed action and determined that no reasonable alternative would be more effective in carrying out the purpose for which the action is proposed or would be as effective as, and less burdensome to affected private persons than, the proposed action. This conclusion is based on the Agency's determination that the proposed action is necessary to update the CEQA Guidelines to clarify existing law. Additionally, the proposed action adds no new substantive requirements. The Agency rejected the no action alternative because it would not achieve the objectives of the proposed revisions. There are no alternatives available that would lessen any adverse impacts on small businesses as the change is a clarifying change only.

Evidence Supporting an Initial Determination That the Action Will Not Have a Significant Adverse Economic Impact on Business

The action implements and clarifies existing law. Because the proposed action does not add substantive requirements, it will not result in an adverse impact on businesses in California. Appendix N, like Appendix G, advises that its environmental checklist is only a sample form that can be tailored to address local conditions and project characteristics.

Determinations

C. No Imposition of a Mandate on Local Agencies and School Districts

CEQA only applies to discretionary actions undertaken by public agencies, including school districts. Therefore, the proposed regulations do not impose any mandate on local agencies or school districts.

D. Master Responses

Many comments submitted on the CEQA Guideline Update raised similar issues. The following are responses that address many of those commonly raised themes.

1. The New CEQA Guideline Regarding Transportation Squarely Reflects Legislative Direction in Senate Bill 743 (Steinberg, 2013).

Some comments suggested that the Legislature never intended to make changes outside of urban areas, and so the Agency has exceeded the scope of its authority. The Agency disagrees.

Senate Bill 743 stated the policy that CEQA analysis of transportation impacts needed to be updated to be consistent with California's climate objectives. (Senate Bill 743, Steinberg 2013, § 1(a)(1) (noting prior legislation in which "the Legislature signaled its commitment to encouraging land use and transportation planning decisions and investments that reduce vehicle miles traveled and contribute to the reductions in greenhouse gas emissions").) Specifically, the Legislature stated:

> New methodologies under the California Environmental Quality Act are needed for evaluating transportation impacts that are better able to promote the state's goals of reducing greenhouse gas emissions and traffic-related air pollution, promoting the development of a multimodal transportation system, and providing clean, efficient access to destinations.

(*Id*. at subd. (a)(2).) To achieve that policy, the legislation required the Agency to adopt changes to the CEQA Guidelines "establishing criteria for determining the significance of transportation impacts of projects[.]" (Public Resources Code § 21099(b)(1).) While the statute required the change to be implemented within transit priority areas, it authorized the change to extend beyond those areas in the Agency's discretion. (*Id*. at subd. (c)(1).) Finally, the legislation suggested several potential metrics that could be used to measure transportation impacts, including "vehicle miles traveled, vehicle miles traveled per capita, automobile trip generation rates, or automobile trips generated." (*Id*. at subd. (b)(1).)

In sum, Senate Bill 743 required a change in the way that agencies evaluate transportation impacts, and left to the Agency to identify, following a public process, the metric to measure such impacts and the most appropriate geographic scope of the change. The Agency finds that proposed Section 15064.3 falls squarely within the authority provided in the Public Resources Code.

The Agency's reasons to identify vehicle miles traveled as the measure of transportation impact, and to apply the new rules statewide, are explained in greater detail below.

2. Vehicle Miles Traveled is the Most Appropriate Measure of Transportation Impacts.

Some comments argued that the CEQA Guidelines should either maintain the status quo, or that vehicle miles traveled was not the best measure of transportation impacts.

Shortly after SB 743 was enacted, the Governor's Office of Planning and Research released its evaluation of various potential metrics, and invited public input on that evaluation. (See OPR, *Preliminary Evaluation of Alternative Methods of Transportation Analysis* (December 30, 2013).) The measures evaluated included:

- Vehicle miles traveled
- Automobile Trips Generated
- Multi-Modal Level of Service
- Fuel Use
- Motor Vehicle Hours Traveled

Having considered public input on the evaluation of these alternatives, OPR identified vehicle miles traveled as the most appropriate measure of transportation impacts. The Agency concurs with OPR's recommendation, for several reasons.

First, as noted in OPR's Preliminary Evaluation, the Legislature specifically recommended vehicle miles traveled. (Pub. Resources Code § 21099(b)(1) (OPR "shall recommend potential metrics to measure transportation impacts that may include … vehicle miles traveled"); see also SB 743 (2013), § 1(a)(1) (noting Legislature's "commitment to encouraging land use and transportation planning decisions and investments that reduce vehicle miles traveled").)

Second, vehicle miles traveled achieves the purposes set forth in the statute. SB 743 required the new transportation metric to "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." Vehicle miles traveled strongly correlates with greenhouse gas emissions. Thus, reducing vehicle miles traveled is likely to reduce greenhouse gas emissions. Further, since transit, bicycle and pedestrian projects reduce vehicle miles traveled, and this proposal presumes that such projects will result in a less than significant impact, measuring vehicle miles traveled promotes multimodal transportation networks. (See Handy, Susan, et al. "Impacts of Transit Service Strategies on Passenger Vehicle Use and Greenhouse Gas Emissions." California Air Resources Board, Oct. 2013, https://www.arb.ca.gov/cc/sb375/policies/transitservice/transit_brief.pdf [discussing how improved transit service reduces VMT]; Handy, Susan, et al. "Impacts of Bicycling Strategies on Passenger Vehicle Use and Greenhouse Gas Emissions." California Air Resources Board, Sept. 2014, https://www.arb.ca.gov/cc/sb375/policies/bicycling/bicycling_brief.pdf [concluding that better cycling facilities and infrastructure reduce VMT]; Handy, Susan, et al. "Impacts of Pedestrian Strategies on Passenger Vehicle Use and Greenhouse Gas Emissions," California Air Resources Board, Sept. 2014, https://www.arb.ca.gov/cc/sb375/policies/ped/walking_brief.pdf [concluding that improved pedestrian facilities and infrastructure reduce VMT].) Finally, because mixed-use projects tend to reduce the need for driving, vehicle miles traveled is more likely to result in projects with a diversity of land uses. (Spears, Steven, et al. "Impacts of Land-Use Mix on Passenger Vehicle Use and Greenhouse Gas Emissions." California Air Resources Board, Sept. 2014, https://arb.ca.gov/cc/sb375/policies/mix/lu-mix_brief.pdf.)

In addition to meeting the statutory objectives in SB 743, the Agency finds that lowering vehicle miles traveled may also result in numerous public and private benefits. As explained in the Agency's Standardized Regulatory Impact Assessment, focusing on vehicle miles traveled instead of congestion in a CEQA analysis is anticipated to result in significant cost savings. Those savings result because studies are quicker and easier to perform, which reduces both the cost of the study but also the time spent on environmental review. The SRIA also explained that lowering vehicle miles traveled would also

- Better health and avoided health care costs
- Reduction in transportation, building energy, and water costs
- Reduction in travel times to destinations
- Cleaner water

The Agency received comments supporting the proposal from a broad cross-section of stakeholders that included, among others, developers of infill housing, local governments, environmental and public health organizations, and social equity advocates. Key points included:

- "San Francisco took a leadership position when we became the first county in California to remove automobile delay and adopt Vehicle Miles Traveled (VMT) as a measurement of transportation impacts in CEQA. We recognized that the prior paradigm of automobile delay was not allowing for the development and maintenance of a high-quality environment now and in the future, a legislative intent of CEQA; and it conflicted with numerous state, regional, and local plans, ordinances, and policies. *Two years later, we are seeing the benefits of this change as numerous transportation projects and infill developments that previously would have gone through time-consuming, costly vehicular level of service analysis with no beneficial environmental outcomes, are on the ground, approved, or under construction*." – City and County of San Francisco (emphasis added) (Comment 5.3)
- "The transition to using Vehicle Miles Traveled (VMT) for the analysis of transportation impacts, pursuant to Senate Bill (SB) 743, is an exciting and important change. This change gives cities and the State a new tool to address numerous mutual goals including achieving climate action targets, increasing livability and access, and relieving the affordable housing crisis. Our city leaders express support for this change as demonstrated in the attached letter to OPR last July. We recognize the responsibility of local jurisdictions to plan for future development in areas that will result in low VMT outcomes. The State's leadership in advancing to a VMT-based metric will help achieve this outcome." – City of Long Beach, et al.
- "The replacement of LOS with VMT will improve transit service and walkability, benefiting low-income households who are more likely to take transit and walk. In addition, the proposed guidelines will help streamline the development process of housing in low-VMT and transit-oriented locations, thereby helping increase the supply of housing options in areas with low transportation costs." – Climate Plan, et al.
- "Through its focus on infill development and greenhouse gas reduction, implementation of SB 743 will serve to facilitate achievement of many of the regional goals identified in our adopted 2016 RTP/SCS, specifically those pertaining to *regional sustainability, improving transportation*

system efficiency, providing more and better mobility options including transit and active transportation, encouraging construction of more affordable housing, improved air quality, and promoting environmental preservation. *These beneficial outcomes will improve economic, quality of life, and public health performance in the SCAG region and throughout the state while also supporting critical regional investments, particularly in active transportation and transit*." – Southern California Association of Governments (emphasis added)

- "The proposed guideline to implement SB 743 is a crucial step toward realizing climate policy priorities shared by both the State and the City of Los Angeles. SB 743 has the potential to transform the way transportation and infrastructure projects are delivered. Until the guidelines are implemented, the state environmental process will remain disconnected from climate policy objectives." – City of Los Angeles

Despite the anticipated benefits described above, the proposal to replace level of service with vehicle miles traveled as the primary measure of transportation impacts has been controversial. The Agency received comments from some business interests and some local governments expressing opposition to the proposal. Those opposing the proposal expressed fear that, among potential outcomes, mitigation costs and litigation may increase and, as a result, home building and business production may decrease. These are legitimate concerns; however, the Agency found those comments to be largely comprised of assumptions and opinion, but not evidence. (See, e.g., Comments of the Building Industry Association, et al.)

The Agency finds the comments of those agencies that have already switched to a vehicle miles traveled metric, including some of those quoted above, to be particularly persuasive because they are informed by real world experience. Notably, the Agency received no comments from any of the early adopters suggesting that the Agency should not proceed.

Finally, the Agency acknowledges those comments that expressed disappointment that their specific suggestion (largely, to maintain the status quo) was not adopted. In that regard, the Agency notes that the development of this rulemaking packages involved extensive stakeholder engagement over the course of several years. The proposal evolved substantially in response to that input. For example, much of the detail that OPR originally proposed to include in the new Guidelines section was moved to a purely advisory guidance document. OPR also refined its recommended thresholds of significance to provide more flexibility. Further, the proposal would enable many housing and infrastructure projects to be presumed, based on evidence in this rulemaking, to have a less than significant transportation impact. The proposal also includes an opt-in period allow those agencies that are ready to make the switch from level of service to vehicle miles traveled to do so, but gives time to other agencies that have indicated that they need more time to become acquainted with the new procedures. Finally, the proposal gives even greater discretion to agencies in how they evaluate roadway capacity projects. (Compare Preliminary Discussion Draft of Updates to the CEQA Guidelines Implementing Senate Bill 743 (2014), with Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA Implementing Senate Bill 743 (2016), and Proposed Updates to the CEQA Guidelines – Comprehensive Package (2017).)

In embarking on this update, the Agency and OPR announced their intention to develop a balanced package. Not every stakeholder will agree with the balance that has been struck. While the Agency acknowledges the disappointment expressed by some in the policy direction, the Agency the evolution of this proposal demonstrates that OPR and the Agency have indeed heard from stakeholders and responded as appropriate in light of statutory authority and policy objectives.

3. Vehicle Miles Traveled Should Be Analyzed Statewide, Not Just in Transit Priority Areas.

Some comments noted that while SB 743 gave the Agency the discretion to require analysis of vehicle miles traveled statewide, it only mandated new transportation methodologies within transit priority areas. Because the Guidelines propose a significant shift in how transportation impacts are analyzed, some comments suggested that implementation should begin in a smaller geographic area. The Agency declines to adopt that approach because it would not advance the purposes of the statute, and would forego the cost savings and environmental benefits expected to result from this change.

OPR and the Agency conducted extensive outreach since 2013 to craft this proposal. During that outreach, OPR asked stakeholders in various regions of the state whether the status quo would do a better job promoting the purposes of the statute. No evidence demonstrated that the status quo, which focuses on traffic congestion, provides a more accurate analysis of the environmental effects of transportation than a methodology that focuses on vehicle miles traveled.

Conversely, outreach with the Institute for Transportation Engineers, transportation professionals, transportation agencies, local governments, and metropolitan planning organizations demonstrated that studying vehicle miles traveled is possible and mitigation is feasible when needed. The evidence, including the Standardized Regulatory Impact Assessment prepared for these Guidelines, further shows that studying vehicle miles traveled is cheaper and quicker than studies of traffic congestion. The City and County of San Francisco, which has already begun using vehicle miles traveled as its primary measure of transportation impacts in CEQA, has found that using vehicle miles traveled instead of level of service has allowed for bringing much needed housing and transportation projects online much quicker. (See Comments from City and County of San Francisco.)

This Agency has previously considered the many benefits that result from development with lower vehicle miles traveled. As we observed in the rulemaking instituting a streamlined CEQA process for infill developments, projects with lower vehicle miles traveled promote significantly improved health and safety outcomes, as well as air quality benefits. More specifically, low VMT projects encourage more reliance on neighborhood-oriented businesses, walking, cycling, and public transit. These activities indirectly reduce greenhouse gas emissions and other emissions that lead to smog and air and water quality issues because they result in less vehicle miles traveled by residents who would traditionally have to drive to obtain the same services and products. Taken together, these benefits create sustainable, vibrant, and economically viable neighborhoods. (See Initial Statement of Reasons (July 2012), at pp. 12-17.) As this Agency found then, the evidence continues to demonstrate the benefits of lowering vehicle miles traveled.

As a legal matter, limiting the application of the new transportation guideline may invite litigation that would counter the goals of the statute. Specifically, the definition of "transit priority areas" is not clear in the statute.[6] For example, the boundaries of a transit priority area may shift as bus routes and service frequencies change, and as plans for future transit investments change. Those changes may be made by multiple agencies, and no one agency is charged with maintaining current and accurate delineations of transit priority areas. As a result, applying one set of rules within transit priority areas and another outside would impose a significant burden on lead agencies to determine on a project by project basis which rules apply. As the City of Los Angeles noted in its comments, that uncertainty would impose a unique burden on infill projects, the very projects that the statute was designed to promote. (See Comments from the City of Los Angeles.) Such uncertainty could also encourage litigation.

Moreover, even if the Agency were to limit application of this Guideline to transit priority areas, ample evidence in this rulemaking record and elsewhere demonstrates the relationship between vehicle miles traveled and environmental impacts. (See, e.g., Master Response 2; OPR, Technical Advisory.) Vehicle miles traveled is also regularly analyzed as part of analyses of air pollutants, greenhouse gas emissions and energy, the analysis is reasonably feasible. Because CEQA requires environmental documents to "provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences," and because courts look for "adequacy, completeness, and a good faith effort at full disclosure," a prudent lead agency would analyze a project's vehicle miles traveled regardless of whether the project is located near transit. (CEQA Guidelines § 15151.)

Thus, due to the substantial benefits of measuring vehicle miles traveled instead of level of service, and the serious potential for confusion and litigation risk of having two different measures of transportation impact, the Agency has determined that the new methodology should apply statewide.

The Agency recognizes that access to transit makes it easier to find that a project's vehicle miles traveled are low. However, mixing uses, designing projects so that customers only need to park once, enhancing bicycle and pedestrian networks, and many other strategies also exist to reduce vehicle miles traveled. Further, OPR's recommendations in its Technical Advisory recognize that rural areas are different, and so there, thresholds may be applied on a case by case basis that reflect local conditions.

4. Evidence Demonstrates that Projects Located Near Transit Are Likely to Reduce Vehicle Miles Traveled; Therefore, Agencies Should Presume that the Transportation Impact of Such Projects Is Less Than Significant.

A significant body of research indicates that projects located close to existing transit will enable lower vehicle use because of the availability of transit. (See, e.g., Cervero, R. (2002). *Built Environments and*

[6] "Transit priority area" means "an area within one-half mile of a major transit stop that is existing or planned, if the planned stop is scheduled to be completed within the planning horizon included in a Transportation Improvement Program adopted pursuant to Section 450.216 or 450.322 of Title 23 of the Code of Federal Regulations." (Pub. Resources Code § 21099(a)(7).) A "Major transit stop" means "a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods." (Id. at § 21064.3.)

Mode Choice: Toward a Normative Framework. Elsevier Science Ltd.; Cervero, R. & Duncan, M. (2006). *Which Reduces Vehicle Travel More: Jobs-Housing Balance or Retail-Housing Mixing?* Journal of the American Planning Association; Cervero, R. (2006). *Transit Oriented Development's Ridership Bonus: A Product of Self-Selection and Public Policies.* University of California Transportation Center; Ewing, R. & Cervero, R. (2001). *Travel and the Built Environment: A Synthesis*. Transportation Research Record 1780 – Paper No. 01-3515; Ewing, R. & Cervero, R. (2010). *Travel and the Built Environment: A Meta-Analysis.* Journal of the American Planning Association; Handy, S., Cao, X. & Mokhtarian, P. (2005). *Correlation or causality between the built environment and travel behavior? Evidence from Northern California.* Elsevier Ltd.; Kolko, J., Meija, M., Reed, D., & Schiff, E. (2011). *Make the Most of Transit: Density, Employment Growth, and Ridership around New Stations.* Public Policy Institute of California; Lund, H., Cervero, R., & Willson, R. (2004). *Travel Characteristics of Transit-Oriented Development in California.* Funded by Caltrans Transportation Grant – "Statewide Planning Studies" – FTA Section 5313 (b); Ewing, R., K. Bartholomew, S. Winkelman, J. Walters, and D. Chen, Growing Cooler: The Evidence on Urban Development and Climate Change, Washington, D.C.: Urban Land Institute, 2008 [see section 7.3.4, citing and discussing ample evidence of transit proximity reducing vehicle travel].) The California Air Pollution Control Officers Association's report "*Quantifying Greenhouse Gas Mitigation Measures*" also cites several studies that quantify VMT reductions resulting from transit proximity. (Lee, Barbara, et al. "Quantifying Greenhouse Gas Mitigation Measures." California Air Pollution Control Officers Association, Aug. 2010, pp. 171-174.) This reduction in vehicle miles traveled is most pronounced within one-half mile of transit. Notably, because many other programs and other statutory provisions focus on one-half mile surrounding transit, using that distance in the presumption promotes consistency with other policies. (See, e.g., Public Resources Code § 21155(b) (defining projects that may benefit from CEQA streamlining as those projects within one-half mile of transit); see also Strategic Growth Council, Affordable Housing and Sustainable Communities Program Guidelines.)

Some comments correctly noted that factors beyond transit proximity may affect vehicle miles traveled. The Agency does not disagree, and that is why the presumption is rebuttable. However, the body of evidence described above supports the Agency's statement in the Guidelines that agencies should presume that projects that locate near transit will have a less than significant transportation impact. That body of evidence, together with the statement in the Guidelines, also gives lead agencies a basis to fill out the initial study checklist and at least initially determine that a project's transportation impacts are less than significant.

5. Transportation Impacts of Roadway Capacity Expansion Can Be Measured in Multiple Ways.

Section 15064.3(b)(2) states that agencies analyzing roadway capacity projects have discretion to use a metric other than vehicle miles traveled. Allowing this discretion for such projects is appropriate at this time for several reasons. For example, many types of roadway capacity projects, such as the addition of new local streets or capacity on existing local streets, the addition of new collector streets or capacity on new collector streets, the addition of capacity in rural areas where there is not current or projected future congestion (i.e. solely to address safety issues), the addition of capacity on-ramps or off-ramps, methods may not yet exist or are still under development for assessing VMT impacts. Many capacity projects are also being conducted jointly with federal partners that may use other metrics. Therefore,

leaving the lead agency with the discretion to make this determination and tailor its metrics accordingly will be helpful to ensuring that impacts are adequately analyzed.

Meanwhile, where methods exist, measurement of induced travel needs to be undertaken in order to assess greenhouse gas emissions impacts, impacts from air pollutant emissions, energy impacts, and noise impacts, and transportation impacts described by any metric. In these cases, implementing vehicle miles traveled as the metric of transportation impact may assist the lead agency in addressing those other environmental impacts. Where vehicle miles traveled is already assessed as a step in analyzing other impacts, lead agencies would likely disclose the results of such analyses to promote informed public participation and decision-making. (*See*, Pub. Resources Code § 21099(b)(3) ("This subdivision does not relieve a public agency of the requirement to analyze a project's potentially significant transportation impacts related to air quality, noise, safety, or any other impact associated with transportation"); CEQA Guidelines § 15151 ("courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure"); *see also* proposed Section 15064.3(b)(2) ("For roadway capacity projects, agencies have discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements") (emphasis added); California Department of Transportation, *Guidance for Preparers of Growth-related, Indirect Impact Analyses* (2006).)

6. Mitigation to Reduce Vehicle Miles Traveled is Feasible.

CEQA requires mitigation of significant environmental impacts. Even independent of these Guidelines, some courts have found that this requirement includes consideration of measures to reduce the driving required by a project. (See, e.g., *Cleveland National Forest Foundation v. San Diego Association of Governments* (2017) 17 Cal.App.5th 413; *Ukiah Citizens for Safety First v. City of Ukiah* (2016) 248 Cal.App.4th 256; *California Clean Energy Committee v. City of Woodland* (2014) 225 Cal. App. 4th 173.)

Some comments, however, questioned whether the vehicle miles traveled of certain suburban or rural projects could be feasibly mitigated. Many mitigation options exist. The California Air Pollution Control Officers Association, for example, developed a guide, supported with peer-reviewed research, that includes various measures to reduce vehicle miles traveled in a variety of geographic settings. (California Pollution Control Officers Association, *Quantifying Greenhouse Gas Mitigation Measures, A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures* (2010) at pp. 155-331.)[7] The determination of whether any particular measure is feasible in connection with a specific project is to be made by the lead agency.

[7] The Agency finds the CAPCOA Guide to be a particularly credible source of information because it was prepared by expert air quality agencies, with the assistance of highly regarded consultants in air quality and transportation planning, and is supported by peer-reviewed research. Additionally, U.C. Berkeley's Center for Law, Energy & the Environment recently published a paper discussing the use of VMT banks and exchanges as possible mitigation options. (Elkind, et al. "Implementing SB 743: An Analysis of Vehicle Miles Traveled Banking and Exchange Frameworks," Oct. 2018, https://www.law.berkeley.edu/wp-content/uploads/2018/09/Implementing-SB-743-October-2018.pdf.) While the Agency has not relied on that document in developing this rulemaking, it is sharing this citation for informational purposes.

Notably, OPR's Technical Advisory explains that because such impacts of vehicle miles traveled are largely regional in nature, mitigation may also be regional in scope. Thus, regional mitigation programs to reduce vehicle miles traveled may be an effective way to reduce such impacts.

7. A Phase-In Period Will Allow Agencies Time to Update Their Own Procedures.

The Agency's current proposal states that the new rules for VMT analysis will become mandatory beginning on July 1, 2020. (July 2018 Proposed 15-Day Revisions, p. 11.) The regulatory text posted in January 2018 included a typographical error in Guidelines section 15064.3(c). In response, some comments expressed concerns about the proposed phase-in date of July 1, 2019, for lead agencies to apply the VMT metric in transportation analyses. The Agency corrected the error to July 1, 2020, in the 15-day revisions, which the Agency posted in July 2018. This correction aligns with the Initial Statement of Reasons, which states that "jurisdictions will have approximately two years to switch to VMT if they so choose." (Initial Statement of Reasons, p. 16.)

This phase-in period provides sufficient time for lead agencies to update their procedures. The Agency notes that typically, agencies must update their procedures within 120 days of revisions to the CEQA Guidelines. (See CEQA Guidelines, § 15007(d).) Although lead agencies would have a phase-in period, those who are ready to begin evaluating vehicle miles traveled may use the new transportation metric immediately upon the effectiveness of the Guidelines. In fact, some cities (namely, San Francisco, Oakland, Pasadena, and San Jose) have already updated their own procedures to analyze VMT. Those cities that have already updated their procedures to include vehicle miles traveled can serve as a model for other agencies. The Agency notes there are compelling reasons for other agencies to move forward as well.

First, the proposed vehicle miles traveled metric has been circulating in OPR's discussions with the public since 2013 when OPR began its process to comprehensively update the Guidelines. Notably, the proposed changes to section 15064.3 have been circulating in substantially similar form since 2014. Also, since the release of the preliminary discussion draft in August 2014, the Agency, OPR, or both engaged in nearly two hundred meetings, presentations, and conferences. (Initial Statement of Reasons, p. 46.) The Agency and OPR have also conducted extensive training and outreach to educate lead agencies on the proposed requirements. In short, the Agency believes that over the past four to five years, the public and lead agencies have had sufficient time to learn about the proposed changes in transportation impact metric.

Second, vehicle miles traveled is relatively simple to calculate compared to level of service, and the analysis is generally less costly and time consuming. That is because, unlike level of service, vehicle miles traveled does not require counting existing trips, estimating project trip distribution, or traffic microsimulation for determining congestion. (Standardized Regulatory Impact Assessment, pp. 8-12, 38.) Assessing vehicle miles traveled requires estimates of trip generation rates and trip length, and can be readily modeled using readily available and existing tools such as CalEEMod or URBEMIS. (Standardized Regulatory Impact Assessment, pp. 8, 16.) Because vehicle miles traveled analysis is much simpler and faster to do, the Standardized Regulatory Impact Assessment explained that while an

congestion-based study may cost approximately $25,000 on average, a study of vehicle miles traveled may be approximately $5,000. (Standardized Regulatory Impact Assessment, p. 16.)

Third, vehicle miles traveled is currently used to analyze a project's environmental impacts to other resources, including air quality, GHG emissions, and energy resources. More to the point, making a reasonably accurate estimate of transportation projects' effects on vehicle travel is important to making reasonably accurate estimates of GHG emissions, air quality emissions, energy impacts, and noise impacts. Additionally, two appellate courts have recently determined that the lead agency's failure to discuss the transportation energy impacts of a project in an EIR was a prejudicial abuse of discretion under CEQA. (*California Clean Energy Com. v. City of Woodland* (2014) 225 Cal.App.4th 173, 210 [EIR failed to consider project's transportation energy impacts]; *Ukiah Citizens for Safety First v. City of Ukiah* (2016) 248 Cal.App.4th 256, 266.) An analysis of transportation energy impacts generally includes assessing trip length and the number of trips, which is precisely the calculation for VMT. Lead agencies can streamline their environmental analyses by using VMT to measure a number of impacts, including transportation, air quality, greenhouse gas, noise, and energy impacts.

Finally, many professional organizations, such as the Association of Environmental Professionals and American Planning Association, have hosted continuing education seminars on this topic, and the Agency anticipates more once this rulemaking is complete. Thus, because the analysis is relatively simple to conduct, and in fact is being studied in connection with other impacts, and the opportunities for training are many, delaying full implementation until July 2020 is a reasonable phase-in period.

8. Analyzing Vehicle Miles Traveled, Instead of Congestion, Should Benefit Housing Production, Including Affordable Housing

The proposed shift to VMT analysis will benefit low-income earners in at least three ways.

First, it streamlines transit and active transit modes, which a disproportionate number of low income residents rely upon for transportation. Providing greater transportation choices, such as transit and active transit modes, can save low-income residents money. (See Fang, K. and Volker, J. "Cutting Greenhouse Gas Emissions Is Only the Beginning: A Literature Review of the Co-Benefits of Reducing Vehicle Miles Traveled," National Center for Sustainable Transportation, March 2017, pp. 12-13; see also California Department of Housing and Community Development, "California's Housing Future: Challenges and Opportunities," Feb. 2018, p. 3 ["In California's rural areas, high transportation costs often negate the relatively more affordable housing prices."], 50 ["The proximity of jobs and services, density, and the availability of public transportation are among the factors that can affect the need for automobile travel and thus transportation costs."; "When households move further from job- and transit-rich areas to find more affordable homes, they encounter consequences in the form of higher transportation costs and commute times."].)

Second, because low-income earners generate less household VMT, affordable housing is more likely to be found to have a less than significant transportation impact with VMT analysis. (See, e.g., Lee, Barbara, et al. "Quantifying Greenhouse Gas Mitigation Measures." California Air Pollution Control Officers Association, Aug. 2010, pp. 160-161, 176 ["Income has a statistically significant effect on the

probability that a commuter will take transit or walk to work. [Below market rate] housing provides greater opportunity for lower income families to live closer to jobs centers and achieve jobs/housing match near transit. . . Lower income families tend to have lower levels of auto ownership, allowing buildings to be designed with less parking . . . ."], 178 ["[R]egardless of distance from BART, lower income households generate at least 50% higher BART use for school trips than higher income households."].) This is particularly noteworthy because opponents to affordable housing often cite increased traffic congestion as a reason to oppose such projects.

Third, the shift to VMT analysis would lead to more infill and transit-oriented development, and such development often allows lower living costs when transportation and housing costs are both taken into account. (See Center for Neighborhood Technology, Losing Ground (2012) [available at https://www.cnt.org/sites/default/files/publications/CNT_LosingGround.pdf); Center for Neighborhood Technology, *Penny Wise, Pound Fuelish* (2010) [available at https://www.cnt.org/sites/default/files/publications/CNT_pwpf.pdf].) Relatedly, encouraging infill development is strongly correlated to economic mobility and thus infill would benefit low-income communities in urban areas. (See Fang, et al., supra, pp. 12-13 [discussing the direct financial impacts on households in reducing vehicle miles traveled]; see also Center for Neighborhood Technology, "Penny Wise, Pound Fuelish," March 2010, pp. 7-8 [concluding that location efficiency reduces transportation costs].)

Comments submitted by a coalition of equity advocates similarly suggest that focusing on vehicle miles traveled instead of congestion should benefit lower-income Californians by providing greater transportation options and access to housing. While recommending that further work be done to discourage displacement effects, the group explained:

> The replacement of LOS with VMT will improve transit service and walkability, benefiting low-income households who are more likely to take transit and walk. In addition, the proposed guidelines will help streamline the development process of housing in low-VMT and transit-oriented locations, thereby helping increase the supply of housing options in areas with low transportation costs.

(See, Comments Submitted by Climate Plan, et al.)

The Agency acknowledges comments to the contrary. Primarily submitted by proponents of the building industry, some comments assert that analyzing vehicle miles traveled will hinder the production of affordable housing. Some even argue that the change will disproportionately impact affordable housing.

No one disputes that far fewer homes are currently being built than are needed; however, the Agency does not find arguments that the CEQA Guidelines will worsen housing affordability to be persuasive for several reasons. First, the comments are unsupported with evidence. Instead, they consist largely of fear, speculation and unsubstantiated opinion. Second, while the Agency shares the concern about housing affordability, myriad factors affect housing production and pricing. They include, among others, availability and costs of skilled labor, availability and costs of buildable land, costs of materials (which

are now being affected by global markets and federal trade policy), building regulations, entitlement processes and profit expectations. While some comments referred to a study that described these factors,[8] neither the building industry nor those that represent them acknowledge these other factors in their comments on the Guidelines, nor did they offer any explanation of the complex interactions between those factors. Third, even focusing on the potential effect of environmental mitigation on ultimate housing costs, the comments fail to acknowledge that lead agencies today require applicants to study and mitigate congestion impacts. They offer no evidence to suggest that mitigation to reduce vehicle miles traveled would be any more expensive than mitigation of congestion.

For the reasons stated above, this Agency has little, if any, ability to affect housing affordability. However, within the scope of this rulemaking, the Agency has implemented the changes required by statute in a way that is expected to lower the costs of environmental study and to remove barriers to infill development. Evidence based on the experience of those agencies that have already implemented such changes on the local level indicates that housing approvals will happen quicker and with fewer costs under this proposal.

Some comments suggested that the proposed changes would make infill projects more difficult. Again, the evidence suggests otherwise. For example, the SRIA included a reference to an op-ed penned by the president of the Council of Infill Builders and advocate for infill development, urging completion of these changes. "As leading developers and advocates of infill projects throughout California, we recognize that this proposed reform will remove one of the most common roadblocks used to stop smart city-centered development[.]" (See "'Driving Miles' is best measure of new development," San Francisco Chronicle, Opinion by Curt Johansen and Jeremy Madsen (Nov. 19, 2014), available online at http://www.sfgate.com/opinion/openforum/article/Driving-miles-is-best-measure-of-new-5904868.php.) Similarly, as noted above, cities that have already made a similar change at the local level have observed that the change actually facilitates infill development. (See, e.g., Comments of the City and County of San Francisco ("Two years later, we are seeing the benefits of this change as numerous transportation projects and infill developments that previously would have gone through time-consuming, costly vehicular level of service analysis with no beneficial environmental outcomes, are on the ground, approved, or under construction").) Faced with conflicting assertions regarding the impact on housing, the Agency finds the assertions of the industry association that is focused on infill development, and the observations of local governments that approve infill developments, to be more credible than the unbacked assertions of the comments to the contrary.

[8] The study referenced is "California's High Housing Costs: Causes and Consequences," Legislative Analyst's Office (2015). The study noted, for example, that one way to reduce costs associated with high land values is to build more units per acre of land. (*See id*. at 13.) CEQA's current focus on congestion makes it more difficult to build more densely. That same report notes that traffic is a frequently raised concern and that developer responses usually include reducing the project's size and scope. (*See id*. at 18.) By focusing on vehicle miles traveled instead of congestion, this update to the CEQA Guidelines will remove an existing impediment to building more densely, which will enable lower housing costs. Other sources cited in the Standardized Regulatory Impact Assessment describe other reasons this Agency expects a positive impact on housing prices. The Agency discusses the LAO study only for the purpose of responding to the comments suggesting that it is relevant.

9. Local Governments that Wish to Address Congestion May Do So Through Their Planning Processes.

Some comments submitted by local governments objected to analyzing vehicle miles traveled in CEQA because they asserted that their community places a high value on avoiding traffic congestion. Others asserted that their communities also valued a suburban lifestyle. Studying vehicle miles traveled in CEQA will not prevent either objective. SB 743 states expressly that it "does not preclude the application of local general plan policies, zoning codes, conditions of approval, thresholds, or any other planning requirements pursuant to the police power or any other authority." (Pub. Resources Code § 21099(b)(4).) Thus, cities and counties can still plan for new development that is consistent with their community's values. Moreover, to the extent that cities and counties have already adopted fee programs to fund roadway infrastructure, nothing in the CEQA Guidelines will prevent them from continuing those programs.

10. The CEQA Guidelines Appropriately Leave Analysis of Transportation Safety to the Discretion of Lead Agencies.

Some comments suggested that the transportation guideline should specifically address transportation safety. The Agency declines to do so. In an initial draft of the transportation Guideline, OPR included a subdivision devoted to transportation-related safety. Many comments objected to that subdivision, however, indicating that the evaluation of safety is far more nuanced than any general statement in the Guidelines would allow. Therefore, OPR explained in a revised draft that "[w]hile safety is a proper consideration under CEQA, the precise nature of that analysis is best left to individual lead agencies to account for project-specific and location-specific factors." (Governor's Office of Planning and Research, "Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA, at p. 5.) Instead, OPR added a discussion of safety considerations to its Technical Advisory. The Agency concurs with OPR, and so declines the comment's suggestion to add a separate requirement to analyze safety in the transportation section.

11. OPR's Technical Advisory Provides Non-Binding Technical Assistance, and Is Not a Part of This Rulemaking Package.

Several comments addressed recommendations contained in the Governor's Office of Planning and Research's Technical Advisory on Evaluating Transportation Impacts in CEQA ("Technical Advisory"). That document explains its purpose as follows:

> This technical advisory is one in a series of advisories provided by the Governor's Office of Planning and Research (OPR) as a service to professional planners, land use officials, and CEQA practitioners. OPR issues technical assistance on issues that broadly affect the practice of land use planning and the California Environmental Quality Act (CEQA) (Pub.

> Resources Code, § 21000 et seq.). (Gov. Code, § 65040, subds. (g), (l), (m).) The purpose of this document is to provide advice and recommendations, which agencies and other entities may use at their discretion. This document does not alter lead agency discretion in preparing environmental documents subject to CEQA. This document should not be construed as legal advice.
>
> …
>
> This advisory contains technical recommendations regarding assessment of VMT, thresholds of significance, and mitigation measures. Again, OPR provides this Technical Advisory as a resource for the public to use at their discretion. OPR is not enforcing or attempting to enforce any part of the recommendations contained herein. (Gov. Code, § 65035 ["It is not the intent of the Legislature to vest in the Office of Planning and Research any direct operating or regulatory powers over land use, public works, or other state, regional, or local projects or programs."].)
>
> This April 2018 technical advisory is an update to the advisory it published in November 2017. OPR will continue to monitor implementation of these new provisions and may update or supplement this advisory in response to new information and advancements in modeling and methods.

(Technical Advisory, April 2018, at p. 1.) As the Technical Advisory explained, it offers non-binding technical assistance, and will be updated from time to time as the state of the art improves. That document is separate from this CEQA Guidelines rulemaking, and was developed pursuant to OPR's technical assistance function. (Gov. Code, § 65040, subds. (g), (l), (m).)

Where comments addressed matters that were involved in this rulemaking, the Agency responded in detail in the responses to comments. Where comments addressed the recommendations in OPR's Technical Advisory, the Agency has forwarded such comments to OPR for its consideration in a future update of that advisory document.

12. CEQA Requires Analysis of the Potential Impacts Associated with Wildfire.

Some comments suggested that the Agency should not include questions in Appendix G related to wildfire. In part, those comments suggested that the California Supreme Court's decision in *CBIA v. BAAQMD* (2015) 62 Cal.4th 369 precludes the analysis of such hazards on proposed projects. The Agency disagrees. In that decision, the Court held that "agencies subject to CEQA *generally* are not required to analyze the impact of existing environmental conditions on a project's future users or residents." (*Id.* at p. 377 (emphasis added).) The Court's opinion also included a significant caveat: "[w]hen a proposed project risks exacerbating those environmental hazards or conditions that already exist an agency must analyze the potential impact of such hazards on future residents or users." (*Id.*, at p. 377.) In this

context, an effect that a project "risks exacerbating" is similar to an "indirect" effect. Describing "indirect effects," the CEQA Guidelines state: "If a direct physical change in the environment in turn causes another change in the environment, then the other change is an indirect physical change in the environment." (CEQA Guidelines, § 15064, (d)(2).) Just as with indirect effects, a lead agency should confine its analysis of exacerbating effects to those that are reasonably foreseeable. (*Id.* at subdivision (d)(3).)

In the context of wildfire, it is clear that development may exacerbate wildfire risks. OPR's General Plan Guidelines, for example, includes an extensive discussion of the interaction between development and wildfire risk areas, including the "wildland-urban interface." While wildfire risk already exists in such areas, bringing development to those areas makes the risk worse, and not just for fire risk. Recent research explains:

> The close proximity of houses and wildland vegetation does more than increase fire risk. As houses are built in the WUI, native vegetation is lost and fragmented; landscaping introduces nonnative species and soils are disturbed, causing nonnatives to spread; pets kill large quantities of wildlife; and zoonotic disease, such as Lyme disease, are transmitted.

(Radeloff, et al., "Rapid growth of the US wildland-urban interface raises wildfire risk," PROC NATL ACAD SCI USA (March 27, 2018) 115 (13) 3314-3319 [citations omitted].) Not all development types are likely to create the same risks, however:

> The recognition that homes are vulnerable to wildfire in the wildland-urban interface (WUI) has been established for decades… Analysis of hundreds of homes that burned in southern California the last decade showed that housing arrangement and location strongly influence fire risk, particularly through housing density and spacing, location along the perimeter of development, slope, and fire history. Although high-density structure-to-structure loss can occur, structures in areas with low- to intermediate-housing density were most likely to burn, potentially due to intermingling with wildland vegetation or difficulty of firefighter access. Fire frequency also tends to be highest at low to intermediate housing density, at least in regions where humans are the primary cause of ignitions.

(Syphard AD, Bar Massada A, Butsic V, Keeley JE (2013) "Land Use Planning and Wildfire: Development Policies Influence Future Probability of Housing Loss." PLoS ONE 8(8): e71708. https://doi.org/10.1371/journal.pone.0071708 [citations omitted].) In other words, low-density, leapfrog development may create higher fire risk than high-density, infill development.

Notably, Senate Bill 1241 (Kehoe, 2012) specifically required the Agency to update Appendix G with questions related to wildfire risk. One could view wildfire as a specific legislatively-created exception to the general rule the Court described in the *CBIA* decision, though the Court did not specifically analyze its provisions. In any event, the Agency drafted the questions in the new wildfire section to focus on the effects of new projects in creating or exacerbating wildfire risks.

13. The CEQA Guidelines Appropriately Include a Discussion of Remand Following Judicial Review.

Some comments objected to the addition of a guideline addressing remand following a court challenge. As the Agency explained in the Initial Statement of Reasons, "questions may arise regarding what further environmental review is needed, and what project activities, if any, may continue while the agency takes further action. Proposed new section 15234 will assist agencies in complying with CEQA in response to a court's remand, and help the public and project proponents understand the effect of the remand on project implementation." The Agency does not intrude on the judicial branch in doing so. The new section states at the outset: "Courts may fashion equitable remedies in CEQA litigation." The new section does not limit a courts exercise of discretion in any way; rather, it explains to lead agencies and the public what a court may do, and what a lead agency's obligations may be, once a project has been challenged based on CEQA compliance. This explanation is necessary because some participants in the CEQA process continue to assert that a defect in an environmental document requires complete decertification. (See, e.g., Center for Biological Diversity v. Department of Fish & Wildlife (2017) 17 Cal.App.5th 1245.)

14. The Baseline is Normally Existing Conditions, But Some Circumstances May Justify Consideration of an Alternative Baseline.

CEQA Guidelines section 15125 requires an EIR to describe the environmental setting of the project so that the changes can be seen in context. Section 15125 describes the general rule for the environmental setting: "normally," the baseline consists of physical environmental conditions "as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced."

Recently, the California appellate courts have focused on exceptions to the general rule, particularly related to the use of a historic or future conditions baseline. In the January 2018 rulemaking package, the Agency proposed to add regulatory text to reflect those appellate decisions. In response to comments on the proposal, the Agency revised the proposed regulatory text in July 2018. As discussed below, the current proposal clarifies in Guidelines section 15125(a)(2) that the procedural requirement to justify a baseline other than existing conditions does not apply to reliance on historic conditions. Rather, that requirement only applies only to use of future conditions as a sole baseline.

Lead agencies have discretion to determine the appropriate environmental setting pursuant to Guidelines section 15125. (*Communities for a Better Environment v. South Coast Air Quality Management Dist*. (2010) 48 Cal.4th 310, 328 ["an agency enjoys the discretion to decide, in the first instance, exactly how the existing physical conditions without the project can most realistically be measured, subject to review, as with all CEQA factual determinations, for support by substantial evidence."].) The "existing" conditions may be represented by historic or future conditions, as reflected in the Agency's proposed addition of the following sentence to Guidelines section 15125(a)(1):

> Where existing conditions change or fluctuate over time, and where necessary to provide the most accurate picture practically possible of the project's impacts, a lead agency may define existing conditions by referencing historic conditions, or conditions

> expected when the project becomes operational, or both, that are supported with substantial evidence.

A lead agency may consider the historical conditions as the "existing conditions" against which to assess environmental impacts. That determination must be based on substantial evidence. (*North County Advocates v. City of Carlsbad* (2015) 241 Cal.App.4th 94, 105-106 [traffic baseline of unoccupied retail project was "based on the actual historical operation of the space at full occupancy for more than 30 years"; *San Francisco Baykeeper, Inc. v. State Lands Com*. (2015) 242 Cal.App.4th 202, 218 [lead agency "did not abuse its discretion by adopting a baseline that accounted for mining conditions during the five-year period prior to the filing of the" notice of preparation].)

Additionally, a lead agency has the discretion, under appropriate factual circumstances, to use a future baseline that is based on substantial evidence. The California Supreme Court's discussion in *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal.4th 439, 453-454, explains:

> Is it ever appropriate for an EIR's significant impacts analysis to use conditions predicted to prevail in the more distant future, well beyond the date the project is expected to begin operation, to the exclusion of an existing conditions baseline? We conclude agencies do have such discretion. The key, again, is the EIR's role as an informational document. To the extent a departure from the "norm[]" of an existing conditions baseline (Guidelines, § 15125(a)) promotes public participation and more informed decisionmaking by providing a more accurate picture of a proposed project's likely impacts, CEQA permits the departure. Thus an agency may forgo analysis of a project's impacts on existing environmental conditions if such an analysis would be uninformative or misleading to decision makers and the public.
>
> Parenthetically, we stress that the burden of justification articulated above applies when an agency *substitutes* a future conditions analysis for one based on existing conditions, omitting the latter, and not to an agency's decision to examine project impacts on *both* existing and future conditions.

(*Ibid,* italics in original.)

Further, the Court stated that "nothing in CEQA law precludes an agency, as well, from considering both types of baseline—existing and future conditions—in its primary analysis of the project's significant adverse effects." (*Id.* at p. 454.)

Some comments expressed that the originally proposed Guidelines section 15125(a)(2) incorrectly applied the heightened need for justification when an agency uses an historical baseline. In the 15-day revisions, the Agency omitted reference to a "historic conditions baseline" in the current proposed text of section 15125(a)(2). The Agency believes that the current text now accurately reflects the California Supreme Court's direction governing the appropriateness of the use of a future conditions baseline.

15. While Deferral of Some Details of Mitigation Measures is Permissible, Agencies Must Still Have Substantial Evidence Demonstrating Feasibility.

The Agency updated Section 15126.4 to describe the circumstances in which courts have upheld a lead agency's deferral of mitigation details. In doing so, the Agency examined the decisions in those cases to identify principles supporting the courts' analyses that can guide future agency decision-making. The Agency found that the cases articulated several common factors.

Some comments expressed a different view of the cases, however, or at least how they were described in the Initial Statement of Reasons. Those comments suggested that an agency should be able to defer details if it either adopts a performance standard, or it lists possible measures, but should not be required to do both. Those comments further suggest that the Initial Statement of Reasons appears to support an either/or approach. Comments submitted on the initially proposed language persuade the Agency that both the text of the guideline and the Final Statement of Reasons should be updated to better capture the common principles described in the case law.

As revised, the guideline on mitigation states: "The specific details of a mitigation measure, however, may be developed after project approval when it is impractical or infeasible to include those details during the project's environmental review, provided that the agency (1) commits itself to the mitigation, (2) adopts specific performance standards the mitigation will achieve, and (3) identifies the type(s) of potential action(s) that can feasibly achieve that performance standard and that will be considered, analyzed, and potentially incorporated in the mitigation measure."

Some comments on the 15-Day changes suggested that the guideline should not require all three factors to be present. Specifically, those comments relied primarily on *Defend the Bay* and *Rialto* to argue that a simple list of potential measures might be sufficient. Neither case supports that view, however. While there is a line in that case suggesting that a simple list will suffice, the analysis in the *Defend the Bay* case finds the measures were adequate because they specified performance standards and listed the potential actions that would ultimately mitigate the impacts. (*Defend the Bay v. City of Irvine* (2004) 119 Cal.App.4th 1261, 1276 ("The EIR was prepared at the beginning of the planning process, for a General Plan amendment and zoning change, the City has committed to mitigation, and it has specified the criteria to be met").) The court in the *Rialto* case summarized these requirements and the policy as follows:

> In sum, "it is sufficient to articulate specific performance criteria and make further [project] approvals contingent on finding a way to meet them." [Citation.] Essentially, the rule prohibiting deferred mitigation prohibits loose or open-ended performance criteria. Deferred mitigation measures must ensure that the applicant will be required to find some way to reduce impacts to less than significant levels. If the measures are loose or open-ended, such that they afford the applicant a means of avoiding mitigation during project implementation, it would be unreasonable to conclude that implementing the measures will reduce impacts to less than significant levels.

Each of the criteria identified in the guideline support such a finding. The first, that the agency commit to implementing the measure, is essential to support a finding that project impacts have, in fact, been mitigated. The second, that the agency identify performance standards, is a key feature found in all of

the cases allowing deferral of mitigation details. It is also necessary to supply substantial evidence that impacts will in fact be reduced to a less than significant level. The third, identification of the types of measures that could achieve the standard, goes to the requirement that measures must be feasible. The case in *Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70, illustrates the need for this criterion. In that case, the City committed to eliminating all new greenhouse gas emissions, essentially a net-zero standard. However, the court found the measure to be inadequate because there was no discussion of what measures could feasible attain that net-zero standard.

Other comments also opposed the statement in the guideline that deferral of mitigation details may be permissible when developing such details at the time of review is "impractical." Those comments that "impractical" was too lenient of a standard. The Agency notes, however, that is the standard described in the cases. It is also consistent with CEQA's policy favoring efficiency in the environmental review process. (See Pub. Resources Code § 21003(f) ("All persons and public agencies involved in the environmental review process be responsible for carrying out the process in the most efficient, expeditious manner in order to conserve the available financial, governmental, physical, and social resources with the objective that those resources may be better applied toward the mitigation of actual significant effects on the environment").)

16. The Existing Facilities Exemption Appropriately Covers New Uses That Do Not Exceed the Intensity of Either Existing or Former Uses of a Facility.

Some comments objected to the clarification that the Categorical Exemption for Existing Facilities applies when the activity would not expand upon an existing, *or former*, use. Such comments suggested that a use that has been abandoned for a long time, but is later restarted, is in effect a new use. Other comments suggested it would not be appropriate to reauthorize highly polluting uses without additional CEQA review.

As explained in the Initial Statement of Reasons, the phrase "beyond that existing at the time of the lead agency's determination," could be interpreted to preclude use of this exemption if a facility were vacant "at the time of the lead agency's determination," even if it had a history of productive use, because any use would be an expansion of use compared to an empty building. (See, Comments of the Building Industry Association, August 30, 2013.) The ISOR further noted that considering former uses in determining the applicability of the exemption is consistent with the reasoning in cases addressing the environmental baseline. (*See, e.g., Communities for a Better Environment v. South Coast Air Quality Management Dist.* (2010) 48 Cal.4th 310, 327-328 ("Environmental conditions may vary from year to year and in some cases it is necessary to consider conditions over a range of time periods"); *Cherry Valley Pass Acres & Neighbors v. City of Beaumont* (2010) 190 Cal.App.4th 316.)

Some comments argued that the caselaw on baseline is not instructive here. The Agency disagrees. The purpose of the requirement to identify a baseline is to allow an agency to determine the degree, and therefore, significance of a change in the environment. Projects that result in only a negligible increase in the use of existing facilities are appropriately exempt because they are likely to result in little change to the environment. If an agency may appropriately look back in time to set the yardstick for analysis of

impacts, it should also be able to look back in time to determine whether a project would intensify uses of existing facilities.

Not only is this interpretation consistent with the cases interpreting baseline, it is also consistent with state policy. The State's planning priorities, for example, emphasize the importance of infill development, reuse and revitalization before expanding beyond the existing urban fabric. (See, e.g., Gov. Code § 65041.1 ("The state planning priorities, which are intended to promote equity, strengthen the economy, protect the environment, and promote public health and safety in the state, including in urban, suburban, and rural communities, shall be … [t]o promote infill development and equity by rehabilitating, maintaining, and improving existing infrastructure that supports infill development and appropriate reuse and redevelopment of previously developed, underutilized land that is presently served by transit, streets, water, sewer, and other essential services, particularly in underserved areas, and to preserving cultural and historic resources").) Doing so preserves important environmental values such as agricultural and forested lands, biological habitat and open space. These planning priorities have been part of the state's discourse for many years, and were first discussed in California's 1978 Urban Strategy:

> Californians can no longer avoid city problems by moving farther and farther from the central cities. . . . ¶ The result is waste: waste of land, particularly valuable agricultural land; waste of older cities and suburbs; waste of air, water and other natural resources; waste of energy; waste of time spent in commuting; and, in the long, a vast waste of money. ¶ Future urban development should be determined with purpose, not solely by chance. Cities and suburbs should provide a productive and human environment for all: for the poor, the old and the disadvantaged, as well as those better able to protect their own interests.

(*Id.*, pp. 7-8, http://opr.ca.gov/docs/urban_strategy.pdf.)

The Agency is sympathetic to concerns about potential misuse of the exemption. Note, however, that categorical exemptions are subject to exceptions. Those exceptions, which include cumulative impacts and significant impacts due to unusual circumstances, will continue to provide a check on potential abuses. (See Public Resources Code, § 21084; CEQA Guidelines, §§ 15300, 15300.2.)

17. Conservation Easements May Be Appropriate Mitigation.

The Agency proposes to revise the definition of "mitigation" in CEQA Guidelines section 15370 to clarify in the CEQA Guidelines that permanent protection of off-site resources through conservation easements constitutes mitigation. Some comments stated that conservation easements should not be considered appropriate mitigation to compensate the loss of agricultural land and other resources. As described below, the Agency believes that the proposed revision to section 15370 is appropriate and consistent with case law.

The Agency proposes to revise CEQA Guidelines section 15370 to incorporate the First District Court of Appeal holding in *Masonite Corporation v. County of Mendocino* (2013) 218 Cal.App.4th 230. In that case, the court ruled that off-site agricultural conservation easements constitute a potential means to

mitigate for direct, in addition to cumulative and indirect, impacts to farmland. The court stated that although such easements do not replace lost onsite resources, they "may appropriately mitigate for the direct loss of farmland when a project converts agricultural land to a nonagricultural use…." (*Id.* at p. 238.) Furthermore, the court stated that this preservation of substitute resources fits within the definition of mitigation in section 15370, subdivision (e), of the Guidelines. (*Ibid.* ["By thus preserving substitute resources, [agricultural conservation easements] compensate for the loss of farmland within the Guidelines' definition of mitigation.", citing CEQA Guidelines, § 15370, subd. (e)].)

The Agency further points out that conservation easements are commonly used to mitigate and address adverse environmental impacts. (See *Masonite Corporation, supra,* 218 Cal.App.4th at p. 236 [California Department of Conservation's (DOC's) commenting that agricultural conservation easements are a "common and appropriate means of mitigating the loss of prime farmland"], 241 ["The DOC described [agricultural conservation easements] in its comments as 'accept[ed] and use[d] by lead agencies as an appropriate mitigation measure under CEQA,' and the administrative record includes evidence that [easements] are so employed by a number of cities and counties."].) Moreover, off-site conservation easements are used in a variety of contexts to mitigate for a number of resources such as agricultural land, biological resources, and wetlands. (*Masonite Corporation v. County of Mendocino* (2013) 218 Cal.App.4th 230, 238-239 ["[t]here is no good reason to distinguish the use of offsite [agricultural conservation easements] to mitigate the loss of agricultural lands from the offsite preservation of habitats for endangered species, an accepted means of mitigating impacts on biological resources"], citing *Preserve Wild Santee v. City of Santee* (2012) 210 Cal.App.4th 260, 278 [habitat loss was appropriately mitigated by conservation of other habitat at a one-to-one ratio]; *California Native Plant Society v. City of Rancho Cordova* (2009) 172 Cal.App.4th 603, 610–611, 614–626 [mitigation by offsite preservation of existing habitat or creation of new habitat]; *Endangered Habitats League, Inc. v. County of Orange* (2005) 131 Cal.App.4th 777, 794 [mitigation by "off-site preservation of similar habitat"]; *Environmental Council of Sacramento v. City of Sacramento* (2006) 142 Cal.App.4th 1018, 1038 [purchase of habitat reserves for every acre of development].)

Some comments also suggested that the reference to "permanent easements" should be modified to include temporary easements. The Agency notes that conservation easements generally conserve land in perpetuity. (See Gov. Code, § 65966, subd. (a); Civ. Code, § 815.2, subd. (b) ["A conservation easement shall be perpetual in duration."]; Pub. Resources Code, § 10211 ["shall be granted in perpetuity as the equivalent of covenants running with the land"]; Gov. Code, § 65966, subd. (a) ["conservation easement[s] created as a component of satisfying a local or state mitigation requirement shall be perpetual in duration . . . ."]; *Building Industry Assn. of Central California v. County of Stanislaus* (2010) 190 Cal.App.4th 582, 594 ["A conservation easement is a voluntarily created interest in real property that is freely transferable in whole or in part and is perpetual in duration. (§ 815.2, subds. (a) and (b).)".) Thus, the Agency finds it appropriate to refer to easements as "permanent" in the definition of "mitigation." The Agency acknowledges, however, that some dedications of land for conservation purposes may be of limited duration (such as a 30-year dedication). The proposed text does not preclude lead agencies from adopting temporary easements as mitigation measures, provided

that the lead agency has substantial evidence to support a finding that adopting such a temporary measure actually mitigates the impact of the project.

18. Appendix G is a Sample Form That Lead Agencies May Tailor As Appropriate.

Changes to Appendix G, which contains the sample checklist that agencies use to prepare an initial study, prompted more comments than perhaps any other change in this update to the CEQA Guidelines. As OPR explained in its submission to the Agency, it had originally recommended a major reorganization of the checklist to consolidate categories and remove redundant questions, but stakeholders strenuously objected.

> OPR continues to see value in rethinking Appendix G, and notes that Appendix G is just a sample format, not a binding mandate. Nevertheless, one of the purposes of this update is to make the process simpler for lead agencies, not more difficult. Therefore, OPR will not recommend a major reorganization of Appendix G at this time.

(OPR, Thematic Responses to Comments, November 2017.)

Thus, the changes the Agency proposes in this update represent a balance or removing redundant questions while keeping the overall format intact. Still, many comments objected, or suggested improvements, to the questions in Appendix G. Of those comments, many indicated that differently worded questions would better account for particular locations, agency activities, or unique circumstances. Again, the Agency reiterates that Appendix G is only a sample form. As explained in a recent case:

> "[T]he Guidelines make clear that the checklist form in appendix G is 'only suggested, and public agencies are free to devise their own format for an initial study.' (Guidelines, § 15063, subd. (f).) Furthermore, 'CEQA grants agencies discretion to develop their own thresholds of significance (CEQA Guidelines, § 15064, subd. (d)).' [Citation] 'To require any deviation from [the standards of significance in appendix G] to be documented and justified ... is to elevate Appendix G from a suggested threshold to the presumptive threshold. This flatly contradicts both CEQA's description of Appendix G as only suggested and CEQA's mandate that agencies have the power to devise their own thresholds.' [Citation.]"

(*San Francisco Baykeeper, Inc. v. State Lands Com*. (2015) 242 Cal.App.4th 202, 227 (quoting *Rominger v. County of Colusa* (2014) 229 Cal.App.4th 690).)

Note, none of the changes proposed in Appendix G are intended to limit the scope of analysis that CEQA might otherwise require.

19. Consistency with Plans May Be Relevant to a CEQA Analysis, but Only to the Extent that Inconsistency May Lead to a Significant Environmental Impact.

Comments raised multiple variations of the following question: is inconsistency with a plan an environmental impact? Variations include: does it matter if that plan is "applicable" (i.e., legally binding, advisory, draft, etc.), and, even more specifically, what if a plan requires a certain roadway level of service, but the CEQA Guidelines state that automobile delay is not an environmental impact? Because those issues were raised repeatedly, the Agency addresses those themes below.

Consistency with plan is similar to compliance with a regulation.

Initially, the Agency notes that the question of consistency with a plan is similar to issues involving compliance with environmental regulations. Compliance or non-compliance does not conclusively indicate an impact or lack of impact, but it can be a starting point for a lead agency's analysis. For example, compliance with a plan that has been adopted to address a cumulative environmental problem can be evidence that the project's incremental contribution is not cumulatively considerable. (CEQA Guidelines § 15064(h)(3).) Additionally, the focus in the Guidelines has historically been, and continues to be, whether a project's inconsistency with a plan will result in a significant environmental impact. (*Id*. § 15125(d).) Courts have confirmed this approach. (See, e.g., *The Highway 68 Coalition v. County of Monterey* (2017) 14 Cal.App.5th 883, 893; *Wollmer v. City of Berkeley* (2009) 179 Cal.App.4th 933 (application of a density bonus to exceed limits in a general plan or zoning not necessarily an environmental impact); *Marin Mun. Water Dist. v. Kg Land Cal. Corp*. (1991) 235 Cal.App.3d 1652, 1668 ("A local agency engaged in EIR analysis may not ignore regional needs and the cumulative impacts of a proposed project. … Thus the Guidelines require an EIR to discuss any inconsistencies between the proposed project and applicable general and regional plans"); see also Pub. Resources Code, § 21100(e) ("Previously approved land use documents, including, but not limited to, general plans, specific plans, and local coastal plans, *may be used in cumulative impact analysis*") (emphasis added).)

Because the focus of the analysis should be on environmental impacts, whether the plan is "applicable" as a legal matter is not relevant to the environmental analysis.

Under CEQA, the focus of the analysis is generally on the project's impacts on the environment. When determining consistency with plans and policy documents, there are often questions asking whether the plan is "applicable," and if so, whether the project is inconsistent with the applicable plan. Both of these are legal determinations. Thus, it is only those plans and regulations that are enforceable against a particular project than a lead agency should consider. A project's inconsistency with an applicable plan may be relevant to analysis if the inconsistency supports whether a project may cause a significant effect. (*Lighthouse Field Beach Rescue v. City of Santa Cruz* (2005) 131 Cal.App.4th 1170, 1207 ("an inconsistency between a project and other land use controls does not in itself mandate a finding of significance. (Citations.) It is merely a factor to be considered in determining whether a particular project may cause a significant environmental effect.").)

Automobile delay, even in conflict with a plan, is not an environmental impact.

Because Public Resources Code section 21099 preserves local government authority to make planning decisions, congestion can still be measured for planning purposes. In fact, many general plans and zoning codes contain standards related to congestion. Some comments pointed to such standards to

argue that the Guidelines will still require level of service analysis. Those comments misapprehend the law. Public Resources Code section 21099 expressly states that upon the Agency Secretary's certification of the Guidelines, automobile delay is generally no longer a significant environmental impact. Because the statute states that delay is not an environmental impact, conflict with a plan's congestion standards is not relevant to a CEQA analysis.

20. The CEQA Guidelines Can Only Implement the Statute; Broad Changes in CEQA Practice Require Legislative Changes.

CEQA requires the Agency to adopt administrative regulations to guide the implementation of the statute. As recently explained by the California Supreme Court,

> Section 21083 provides the Guidelines "shall include objectives and criteria for the orderly evaluation of projects and the preparation of environmental impact reports and negative declarations in a manner consistent with [CEQA]." (§ 21083, subd. (a).) The Guidelines therefore serve to make the CEQA process tractable for those who must administer it, those who must comply with it, and ultimately, those members of the public who must live with its consequences.
>
> [¶]
>
> Through these Guidelines, the Resources Agency gives public agencies a more concrete indication of how to comply with CEQA—including whether such agencies must determine the impact of existing environmental conditions on a proposed project's residents and users. The Guidelines also prove consequential given that under section 21082, CEQA requires agencies subject to its provisions … to adopt "objectives, criteria and procedures" for evaluating projects and preparing environmental documents. These agencies may, in turn, adopt the Guidelines by reference to fulfill their statutory responsibilities. (§ 21082; see Guidelines, § 15022, subds. (a), (d).) The Guidelines, in effect, enable the Resources Agency to promote consistency in the evaluation process that constitutes the core of CEQA. And because these Guidelines allow the Resources Agency to affect how agencies comply with CEQA, they are central to the statutory scheme.

(*CBIA v. BAAQMD* (2015) 62 Cal.4th 369, 384-385.) While the Agency plays a key role in CEQA's statutory scheme, it is nevertheless constrained by the statute. It cannot adopt a guideline that "alters or amends the governing statute or case law, or enlarges or impairs its scope." (*CBE v. Resources Agency* (2002) 103 Cal.App.4th 98, 108.) In other words, the Agency cannot create a requirement that does not exist in the statute, nor can it relieve agencies of requirements that are provided in the statute.

As explained in more detail in the individual responses to comments, the Agency had to reject suggestions for changes to the Guidelines that it simply is not authorized to make. For example, the Agency noticed that some comments expressed dire concern about the requirement to study and mitigate impacts and the potential effect of such studies and mitigation requirements on the ability to

carry out projects. On the other hand, some comments suggested that the Agency require more notice of projects, or additional opportunities to comment. While the Agency is sympathetic to economic concerns, and appreciates the value of public participation, the Agency cannot re-write CEQA. That is the province of the legislature.

Similarly, some comments expressed concern that the Guidelines would enable litigation or give opponents of projects a tool to create delay. Litigation risk and the potential for project delays exist with or without these Guidelines, and with or without CEQA. Our state's constitution defers most land use approvals to local governments, many of which require applicants to go through one or more discretionary project reviews. Moreover, our system of laws provide for judicial review of administrative decisions. Again, the Agency is mindful of those concerns, and where possible, has written the Guidelines to avoid those outcomes. The Agency simply does not have the power to remove development uncertainty completely.

E. Summary and Response to Comments

See Appendix A.

F. Statement of Availability

In issuing its 15-day notice to make modifications to the original proposal, the California Natural Resources Agency (Agency) complied with the requirements of Title 1, section 44. The Agency began the available period for comment to the proposed modifications on July 2, 2018 and closed the official comment period at 5:00 p.m., July 20, 2018. It mailed the notice and the proposed modifications to all persons specified in 1 CCR 44 (a)(1)(4). That same day, it also emailed the notice and proposed modifications to its official list serve for electronic notification. Finally, it made the modifications and changes available on its website along with the official notice on July 2, 2018.

G. ALTERNATIVES THAT WOULD LESSEN ADVERSE ECONOMIC IMPACT ON SMALL BUSINESS

No alternatives were proposed to the Agency that would lessen any adverse economic impact on small business. Some commenters proposed limiting the analysis of vehicle miles traveled to transit priority areas, as that phrase is defined by Public Resource Code section 21099, instead of applying the measure statewide. While not expressly advocated, arguably a reduction in the scope of the application of the Guideline would reduce the negligible impact to impacted small-business consultants who are presently hired to analyze congestion. However, as has been described above, the Agency has determined this would not meet the objectives of the Legislature relative to lead agency consideration of impacts from transportation on the environment in a consistent or accurate way, nor would it result in more cost-savings, or efficiency, since vehicle miles traveled is a more affordable analysis that is already performed when greenhouse gas emissions are being analyzed. Accordingly, the Agency declines to adopt this

alternative. (See also Standardized Regulatory Impact Analysis, at pp. 24-27.) No other amendments or additions created any impacts to small business.

H. ALTERNATIVES DETERMINATION

The Agency has determined that no alternative it considered or that was otherwise identified and brought to its attention would be more effective in carrying out the purpose for which the action is proposed, would be as effective and less burdensome to affected private persons than the proposed action, or would be more cost-effective to affected private persons and equally effective in implementing the statutory policy or other provision of law.

The amendments adopted by the Agency, by and through the Secretary are the only regulatory provisions identified by the Agency that accomplish the goal of providing accurate and efficient environmental metrics for public agencies legally tasked with applying CEQA.

Except as set forth and discussed in the summary and responses to comments, no other alternatives have been proposed or otherwise brought to the Agency's attention.

California Washed Away: The Great Flood of 1862

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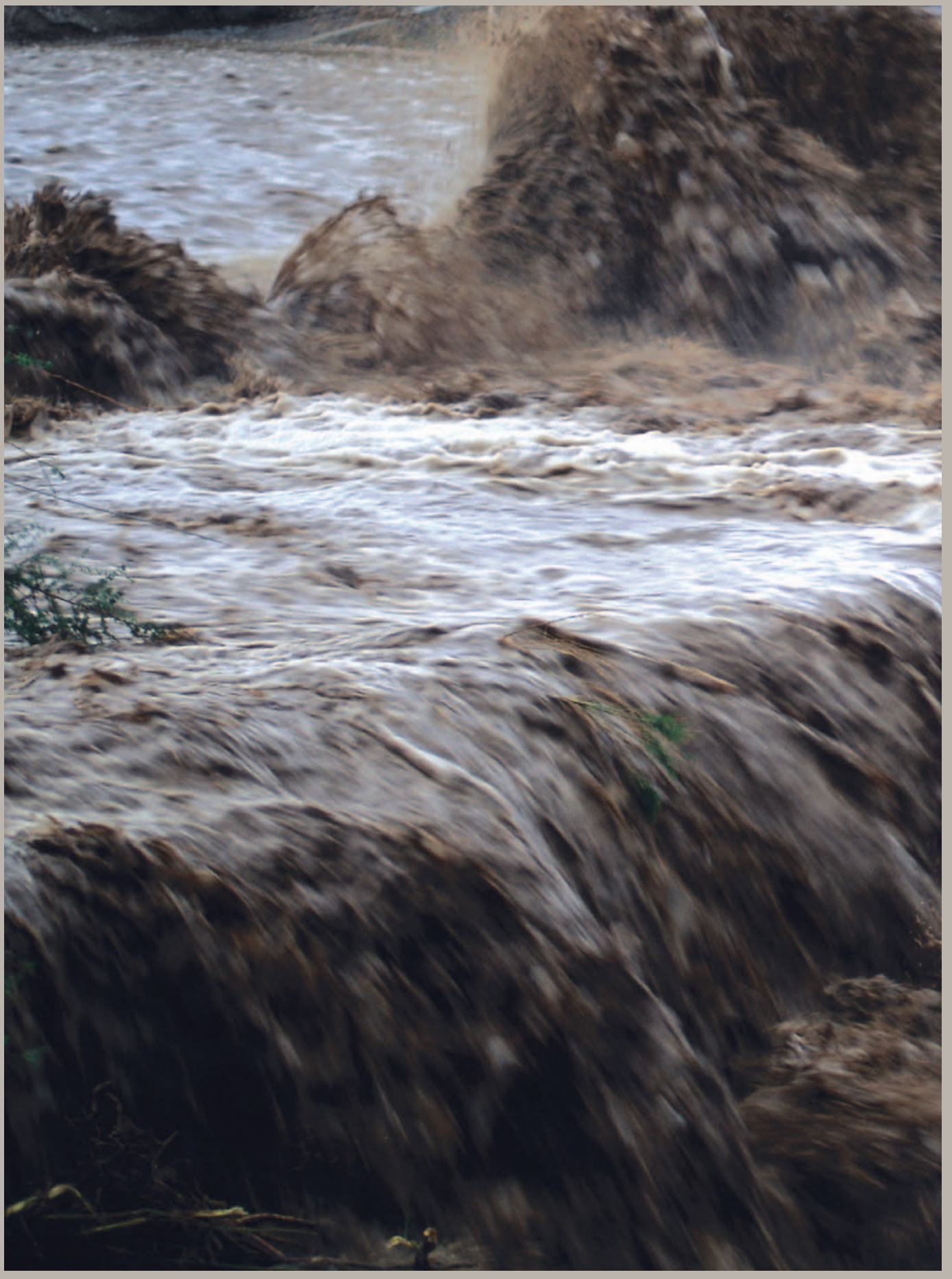


California Washed Away

The Great Flood of 1862

by Jan Null and Joelle Hulbert

When the first storms of the winter season arrived in California in December 2005, they were initially a welcome sign that the state's long dry season was finally over. But as 2006 began, rivers were pushed over their banks as heavy rains prevailed across the northern third of the Golden State. For many Californians, the localized flooding that occurred in the towns of Healdsburg, Guerneville, and Sacramento seemed near Biblical proportions, and there was a great gnashing of teeth and fear for the California levee system. Although the 2005-2006 season was alarming, many people likely would have been surprised to know that their Civil War-era ancestors faced a much larger crisis in 1862, as a record-setting rainy season prompted the construction of that same levee system and threatened to rain destruction on the many budding communities in the young state.

To put the issue in context, the December 2005 rainfall event in San Francisco recorded a little more than 11 inches, followed by 3.5 more inches in January 2006. Compare this to nearly 10 inches for San Francisco in December 1861, followed by an unprecedented 24 inches in January 1862. And unlike the winter 2005-2006 storms, the 1861-1862 storms caused record or near-record flooding events across the state, from Eureka and Humboldt counties in the northwest, all the way to Orange and San Diego counties in the south.

An artist's view of K Street in Sacramento during the 1862 flood.

Another view of K Street from 4th Street looking east during the 1862 flood.

A State Dependent on Its Rivers

To better understand the concern over river flooding and the levee system in California, one must first understand the geography of California's Central Valley. Composed of the Sacramento Valley from Redding to Sacramento, and the San Joaquin Valley from Modesto to Bakersfield, the terrain is generally flat and surrounded on all sides by mountains. The Coast Ranges lie to the west and the Sierra Nevada mountains to the east. When rain falls on these mountains, it runs into creeks that flow down the mountains into streams and rivers and into the Central Valley. From there it flows toward the only sea-level outlet to the ocean, the Sacramento-San Joaquin River Delta, and on out through the San Francisco Bay. In the Sacramento Valley, the American, Feather, and Sacramento rivers all rush through the Sacramento area and then toward the delta. In the San Joaquin Valley, the San Joaquin, Kern, Stanislaus, and Merced rivers also flow to the delta before heading out into the San Francisco Bay and into the Pacific Ocean.

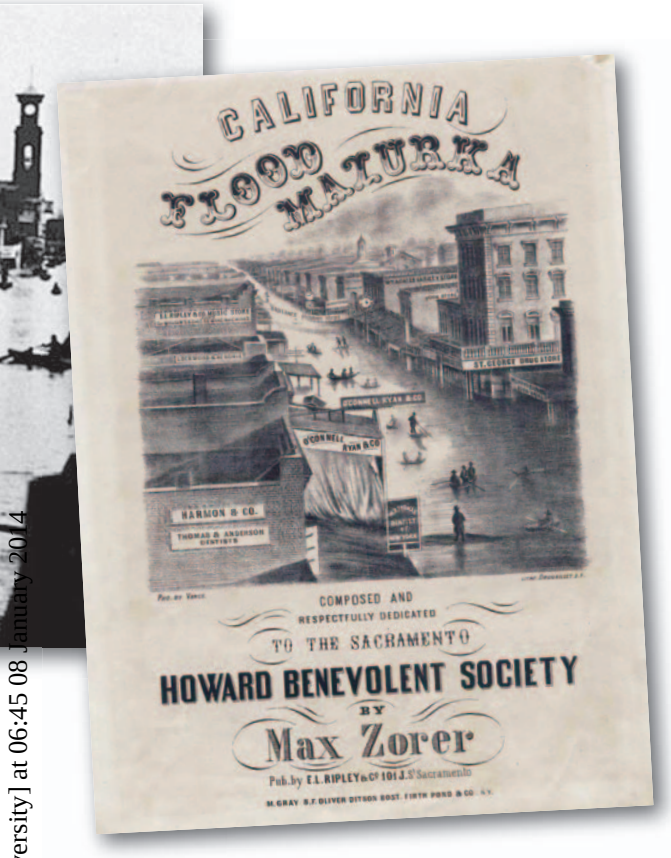
California's 30 days of rain in December 1861 and January 1862 was the equivalent of at least a 30,000-year [flood] event.

In the mid-1800s there were no interstate highways crisscrossing the state. The major highways of that era were the rivers, so life in California developed along its banks. The Gold Rush in the 1850s had resulted in an impressive influx of people whose livelihoods were tied to the rivers of California as commerce flowed along their waters. Meanwhile, scores of farmers had settled along the banks of the rivers, where the most fertile farmland could be found in the low-lying, flood-prone areas.

But the promise of rich cropland along the banks of the rivers came at a high risk. Farmers gambled their life savings on crops and livestock, and residents of burgeoning urban areas near the rivers lived with the constant knowledge that it would take only a couple of days of rain to destroy their operations and bankrupt their finances. In a natural desire to protect their property, people who made their homes along California's rivers constructed earthen levees along many riverbanks in an effort hold back the waters. From the early 1850s to 1861, more than $1.5 million was spent on building and improving the levee system in and around Sacramento. Adjusted to today's dollars, that is almost $30 million.

The Deluge

Although extremely wet weather in California is sometimes associated with an El-Niño weather pattern, the definitive paper on historic El Niños, written in 1992 by Oregon State Climatologist Victor Neal and William Quinn, an oceanographer at Oregon State University, determined that the synoptic weather pattern during the December 1861-January 1862 flooding event was non-El Niño.



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An artist's view of J Street in Sacramento during the 1862 flood.

The Signal Corps network of weather stations would not be established on the West Coast for another 10 years, but there were a number of Army observers and private weather observers in place when the 1862 floods occurred. According to these stations' records in December 1861, the polar jet stream was to the north as the Pacific Northwest experienced a mild rainy pattern for the first half of the month. The jet stream slid south, and on Christmas Day 1861 the Oregon stations reported freezing conditions. Heavy rainfall began falling in California as the longwave trough moved south over the state. This trough remained nearly stationary over California through the end of January 1862, allowing heavy rains to fall statewide just shy of the proverbial 40 days and 40 nights. Eventually, the polar jet slid even farther south, allowing several inches of snow to accumulate in the Central Valley and adjacent mountain ranges.

Daily rainfall was reported in the *Sacramento Union*, the *Los Angeles Star*, and the *Alta California*. During the period from December 24, 1861-January 21, 1862, rain occurred in the state on 28 out of the 30 days. San Francisco recorded nearly 34 inches of rain between December and January. Sacramento tallied over 37 inches for the 2 months, with a one-day maximum of 4 inches. Nevada City, in the lower reaches of the Sierra Nevada mountains reported snowfall equivalent to 115 inches of rain for the storm. At Red Dog, also in Nevada County, the 24-hour maximum rainfall was reported at 11 inches. Also in the Sierra Nevada foothills, the Tuolumne County mining town of Sonora reported over 102 inches of rainfall in December and January. In Southern California, flooding in Los Angeles was among the worst on record following nearly 35 inches of rainfall. San Diego also suffered the effects of the storms, recording over 7 inches of rain—300 percent of the January normal at the time! The San Diego River floodplain also suffered severe flooding as the tide backed its waters into the city, eventually cutting a new channel into the bay.

Widespread Flooding

When considering buying property or insurance, many people use the 100-year flood line as a safe benchmark. However, California's 30 days of rain in December 1861 and January 1862 was the equivalent of at least a 30,000-year event. In San Francisco, the storms resulted in a 10,000-year event, while in Sacramento, the flooding was "only" a 2,300-year event.

Preceding the actual flood-producing rains in Sacramento, there was a levee break on December 9, 1861. The Sacramento River flooded to a stage of 22 feet, 6 inches. This prompted the California state Legislature to propose moving the Capitol to San Francisco until the floodwaters receded. While it is not clear how much time the Legislature actually spent in San Francisco, the California Supreme Court moved its operations to the city and remains in San Francisco to this day. Notes from the court that were stored at the California Historical Society state, "...it appears that weather, water, and whiskey had a lot to do with it."

Attachment 4

The flooding was exacerbated by warm rains that caused an unusual December melting of the snow pack in the Sierra Nevadas. This prompted noted California naturalist and Sierra Club founder John Muir to comment, "The Sierra Rivers are flooded every spring by the melting of the snow as regularly as the famous old Nile. Strange to say, the greatest floods occur in winter, when one would suppose all the wild waters would be muffled and chained in frost and snow ... But at rare intervals, warm rains and warm winds invade the mountains and push back the snow line from 2,000 to 8,000, or even higher, and then come the big floods."

Newly elected Governor Leland Stanford, California's eighth governor, traveled to his own inauguration ceremony in a rowboat.

The state Legislature returned from its winter recess in early January—several weeks into the heavy rainfall—and was in session on Inauguration Day, January 10, 1862, when another levee broke on the Sacramento River. The event raised the flood level to a full 24 feet. Newly elected Governor Leland Stanford, California's eighth governor, traveled to his own inauguration ceremony in a rowboat. Newspaper accounts of the day were dramatic, and on January 13, the *Sacramento Union* reported, "Continuous rains and melting snows in the mountains have brought disaster and destruction upon those valleys and cities of California which have been the chief pride of the state."

William Brewer, a geologist from Yale University, was in Sacramento during the start of the storms in December. On January 19, 1862, he reported, "The great Central Valley of the state is under water—the Sacramento and San Joaquin valleys—a region 250 to 300 miles long and an average of at least 20 miles wide, a district of 5,000 or 6,000 square miles, or probably three to three and a half million acres! Although much of it is not cultivated, yet a part of it is the garden of the state. Thousands of farms are entirely under water—cattle starving and drowning. Benevolent societies are active, boats have been sent up, and thousands are fleeing to [San Francisco]. There have been some of the most stupendous charities I have ever seen ... A week ago today news came down by steamer of a worse condition at Sacramento than was anticipated. The news came at 9 o'clock at night. Men went to work, and before daylight tons of provisions were ready—11,000 pounds of ham alone were cooked. Before night two steamers, with over 30 tons of cooked and prepared provisions, 22 tons of clothing, several thousand dollars in money, and boats with crews, etc., were underway for the devastated city."

High Costs

Early American settlers in the Santa Ana Valley in modern-day Orange County laughed at the Spanish rancheros for building their homes in the hills, away from the valley and water. After 20 people drowned in the 1861-1862 flood, the settlers laughed no more.

Ruminating on the actual cost of the damage that resulted from the great flood of 1862, Brewer noted, "The floods have still more deranged finances and make some action imperative. The actual loss of taxable property will amount to probably ten or fifteen millions, some believe twice that, but I think not even the latter sum. I suppose the actual loss in all kinds of property, personal and real, will rank anywhere between fifty and a hundred million dollars, surely a calamity of no common magnitude!"

In today's dollars, the $50 million to $100 million figure translates into $1 billion to $2 billion. Taking into account the fact that the tax base was expected to be cut by over 30 percent, the losses would be considerably more tragic if the same storm were to occur today, given the massive influx of people into the state since the 1860s; the 1860 census counted 380,000 individuals in California, compared with a 2005 estimate of more 36 million. The statewide damage estimate of the flooding of December 2005-January 2006 exceeded $500 million.

Although memories of this storm are all but lost to the history books, we continue to look to our past for knowledge. In light of the failure of the levees in New Orleans following Hurricane Katrina in August-September 2005, much scrutiny is being given to the aging levee system in California. Following the 2005-2006 flooding in California, Governor Arnold Schwarzenegger asked Congress for over $1 billion in aid to shore up the levees in the state, an expenditure voters approved as part of a $4 billion statewide initiative to address infrastructure problems in California. Even a rainfall event that saw totals only half of those recorded in January 1862 would inundate huge populated areas in the Golden State. W

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RESEARCH ARTICLE | ATMOSPHERIC SCIENCE

Increasing co-occurrence of fine particulate matter and ground-level ozone extremes in the western United States

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Abstract

Wildfires and meteorological conditions influence the co-occurrence of multiple harmful air pollutants including fine particulate matter ($PM_{2.5}$) and ground-level ozone. We examine the spatiotemporal characteristics of $PM_{2.5}$/ozone co-occurrences and associated population exposure in the western United States (US). The frequency, spatial extent, and temporal persistence of extreme $PM_{2.5}$/ozone co-occurrences have increased significantly between 2001 and 2020, increasing annual population exposure to multiple harmful air pollutants by ~25 million person-days/year. Using a clustering methodology to characterize daily weather patterns, we identify significant increases in atmospheric ridging patterns conducive to widespread $PM_{2.5}$/ozone co-occurrences and population exposure. We further link the spatial extent of co-occurrence to the extent of extreme heat and wildfires. Our results suggest an increasing potential for co-occurring air pollution episodes in the western US with continued climate change.

INTRODUCTION

Air pollution is an urgent global health problem, and one that has gained additional attention during the coronavirus disease 2019 (COVID-19) pandemic due to the exacerbating effects of pollutant exposure on infectious disease spread and mortality (1–3). Two main air pollutants—fine particulate matter ($PM_{2.5}$, defined as particulate matter with diameter of ≤2.5 μm) and ground-level ozone (hereafter, "ozone")—are linked to significant human health concerns including cardiovascular and respiratory illnesses and mortality (4–7). $PM_{2.5}$ and ozone have also been linked to negative ecosystem impacts via their detrimental effects on plants and the broader environment (8–10). Although few studies have quantified the compounding health impacts of co-occurring $PM_{2.5}$ and ozone, existing research indicates that simultaneous exposure to both pollutants can have disproportionately more severe health impacts beyond the individual effect of either pollutant (11, 12).

Wildfires can cause simultaneous increases in both pollutants through the direct emission of $PM_{2.5}$ (13, 14) and ozone precursor compounds (15–18) in smoke plumes, and recent research has shown that ozone concentrations in urban areas in the western United States (US) can be enhanced in the presence of wildfire smoke (19–21). During years of limited wildfire activity, most of the western US experienced annual maximum $PM_{2.5}$ concentrations during the cool season when stagnant air conditions are typically prevalent (22). This seasonality would typically minimize co-occurrence risk with high ozone concentrations, which peak during the warm season when hot and dry conditions facilitate the formation and build-up of ozone (23). Summertime wildfires therefore present a mechanism for $PM_{2.5}$ extremes to occur at a time of year when ozone levels are seasonally high, leading to increased chances of elevated concentrations of both air pollutants occurring simultaneously.

Smoke from the unprecedented wildfire activity in the western US during August and September of 2020 contributed to several weeks of extremely hazardous air quality over a large area (3, 24). Similar conditions, although on a smaller scale, occurred during the 2015, 2017, and 2018 wildfire seasons (25, 26), and extensive wildfire smoke affected the region again in 2021. These widespread hazardous conditions acutely affected vulnerable communities in the region—those at enhanced risk due to socio-economic or demographic factors and underlying health conditions—contributing to an increased burden on the health care system through increased hospitalizations and emergency department visits (26). In addition, recent research has linked wildfire smoke in 2020 to higher risk and mortality associated with COVID-19 in many western US states (3). As recurrent and prolonged exposure to air pollution can exacerbate the public health impacts of wildfire smoke (27–31), recent wildfire seasons have thus raised significant concerns regarding the trajectory of air quality in the region.

Historical and projected climate and wildfire trends in the western US both point toward increasing risk of exposure to poor air quality. Increased wildfire activity has already contributed to rising extreme $PM_{2.5}$ concentrations in fire-prone regions of the western US (32, 33), offsetting national-level air quality improvements following the Clean Air

Act. Wildfires have contributed up to 50% of annual $PM_{2.5}$ in parts of the western US in recent years (34). Annual burned area across the western US has experienced exponential growth in recent decades (35, 36), partially due to drying of vegetation in the region tied to anthropogenic climate change (37–39). These observed trends are projected to continue in a warming climate (24, 40–42).

Long-term climate and daily-scale meteorological conditions both influence the formation, accumulation, and transport of air pollutants. Large-scale high-pressure systems (or "ridges") during the summer enhance surface temperatures, promote air stagnation, and can contribute to both increased wildfire activity and ozone production in the western US (23). Previous work has shown that these high-pressure systems are expected to increase in frequency and persistence due to climate change (43, 44), raising the potential for increased warm-season co-occurrence of $PM_{2.5}$/ozone extremes in the future. These conditions are amplified in the western US by topography that promotes air stagnation in populated regions adjacent to fire-prone lands (e.g., the Los Angeles Basin and the Willamette Valley near Portland).

Despite rising public health and air quality concerns, the influence of increasing wildfire activity and changing meteorology on widespread hazardous air quality conditions across the geographic extent of the western US has not yet been investigated. Schnell and Prather (45) systematically demonstrated the influence of meteorology on the co-occurrence of $PM_{2.5}$, ozone, and temperature extremes over eastern North America. Western North America, however, has fundamentally different seasonality and drivers of these pollutants, and previous studies investigating air pollutant co-occurrences have been restricted to urban areas [e.g., (19–21)]. Understanding how regional factors influence air pollutant characteristics and contribute to their changing risks is critical for assessing their public health impacts and anticipating future trends associated with climate variability and change.

Given the compounding human health impacts of air pollutant co-occurrences, we investigate the influence of wildfires and meteorological factors on the spatial and temporal characteristics of extreme $PM_{2.5}$/ozone co-occurrences across the western US and assess the associated population exposure. Using gridded 1° × 1° datasets of observed $PM_{2.5}$ and ozone developed by Schnell *et al.* (46) and atmospheric reanalyses, we (i) quantify trends in the frequency, persistence, and extent of widespread co-occurrence of $PM_{2.5}$/ozone extremes across the western US in the past two decades; (ii) identify the large-scale atmospheric patterns associated with widespread co-occurrences and population exposure; (iii) examine trends in atmospheric patterns that amplify or mitigate co-occurrence risk across the region; and (iv) investigate the relationship between the geographic extent of co-occurrence, wildfire activity, and extreme heat during and preceding widespread $PM_{2.5}$/ozone co-occurrences. We also investigate these factors in the context of the exceptional widespread and long-lasting co-occurrence episode during the record-breaking 2020 wildfire season.

RESULTS

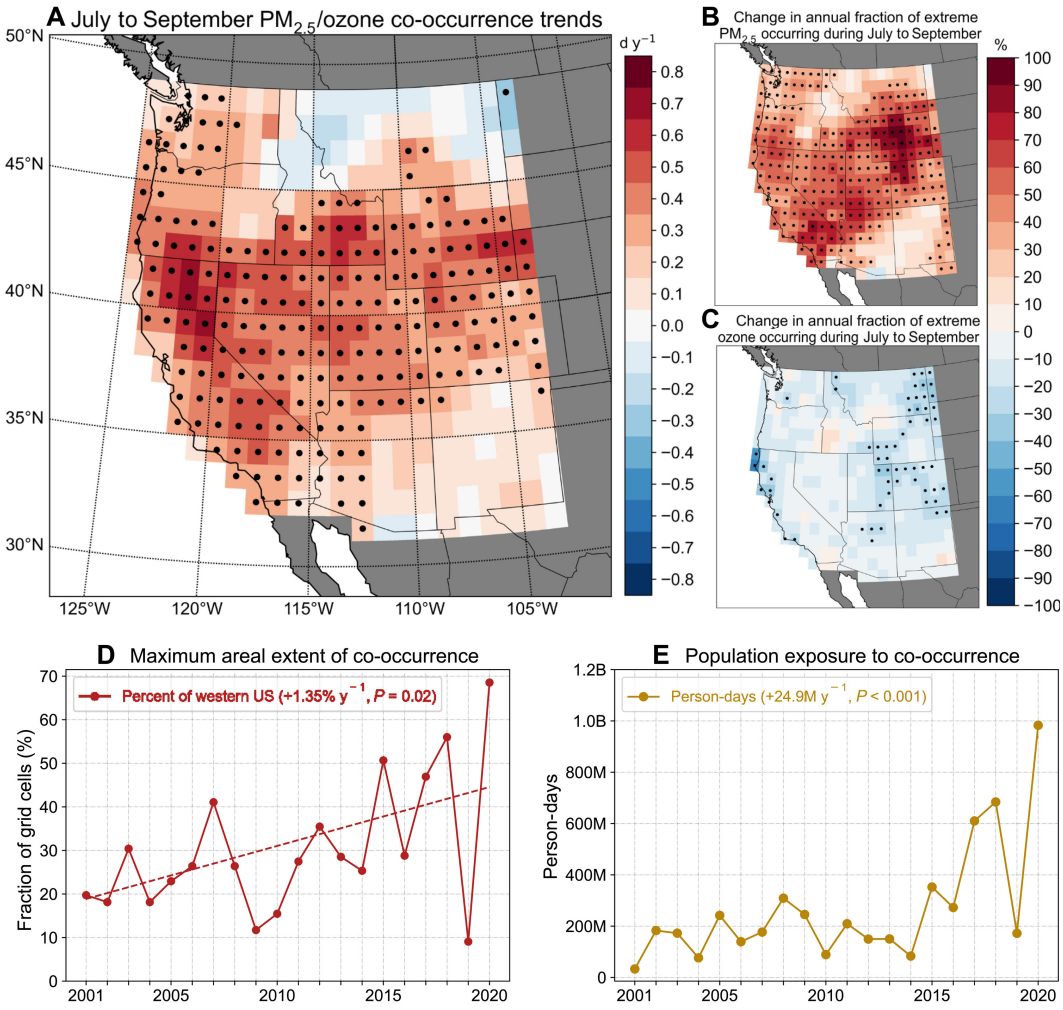
Increasing trends in the spatial and temporal characteristics of $PM_{2.5}$/ozone co-occurrence

Extremes in individual air pollutant concentrations are defined at each grid cell as exceedances of their annual 90th percentiles (~37 days each year). We find that the simultaneous, spatially colocated occurrence of local $PM_{2.5}$ and ozone extremes (hereafter "co-occurrence") has become significantly more frequent over large areas of the western US during the late-summer wildfire season—July to September—between 2001 and 2020, driven largely by the changing seasonality of extreme $PM_{2.5}$ concentrations (Fig. 1). High $PM_{2.5}$ concentrations typically peaked during cool-season months across much of this region during the early 2000s (fig. S1A). However, the fraction of the annual $PM_{2.5}$ extremes occurring during July to September has increased significantly in the past two decades (Fig. 1B). Parts of the region experienced a >80% increase in this fraction, indicating that, in these grid cells, most of $PM_{2.5}$ extremes are now concentrated during this season that previously rarely experienced $PM_{2.5}$ extremes. In contrast, ozone concentrations typically peak during warm-season months (fig. S1, C and D), and the fraction of annual ozone extremes occurring during July to September remains largely unchanged with the exception of small decreases over parts of the Rocky Mountains, High Plains, and coastal California (Fig. 1C). Therefore, the increased occurrence of $PM_{2.5}$ extremes during a time of year when ozone concentrations are seasonally high has largely driven the observed increases in $PM_{2.5}$/ozone co-occurrence during the late-summer wildfire season across the western US (Fig. 1A).

FIG. 1.

$PM_{2.5}$/OZONE CO-OCCURRENCE TRENDS DURING 2001 TO 2020 AND POPULATION EXPOSURE.

(**A**) Trends in the number of days (d y^{-1}) with $PM_{2.5}$/ozone co-occurrences at each grid cell during July to September. Co-occurrences are defined as values of each pollutant exceeding their respective local annual 90th percentile daily concentrations simultaneously. Trends in the annual fraction of (**B**) $PM_{2.5}$ extremes and (**C**) ozone extremes occurring at each grid cell during July to September relative to rest of year (October to June). The maximum possible number of co-occurrences is 37 per year in each grid cell, equal to the number of days above local annual 90th percentile daily concentration values for each pollutant. Black dots denote statistical significance of trends at $P < 0.05$ based on a nonparametric permutation test. (**D**) Maximum daily extent of western US grid cells simultaneously experiencing co-occurrences of local $PM_{2.5}$/ozone extremes during July to September each year. (**E**) Total population exposure to all local $PM_{2.5}$/ozone co-occurrences during July to September measured in million person-days (M) per year. Text in (D) and (E) indicates the linear trends and *P* values based on a permutation test.



In addition to occurring more frequently, local $PM_{2.5}$/ozone co-occurrences are increasingly occurring across a larger geographic region simultaneously. The maximum daily fraction of western US grid cells with simultaneous $PM_{2.5}$/ozone co-occurrence during July to September has more than doubled (from 18.9 to 44.6%) over the past two decades, with an increasing trend of ~1.35% per year ($P = 0.02$) (Fig. 1D). The largest spatial extents of co-occurrence were observed in 2015, 2017, 2018, and 2020—coincident with hot, dry summers and widespread fire activity, including the largest burned areas across the western US wildland-urban interface (*20*, *24*, *25*, *29*, *36*, *47*). Increases in the frequency and spatial extent of co-occurrences are associated with an increasing trend in July to September population exposure of ~24.9 million person-days/year ($P < 0.001$) in the western US during 2001 to 2020 (Fig. 1E). Cumulative population exposure over the season to $PM_{2.5}$/ozone co-occurrences exceeded 600 million person-days during the 2017, 2018, and 2020 wildfire seasons (Fig. 1E). Daily population exposure exceeded 35 million people during the most widespread air pollution conditions in these three seasons, peaking at ~46 million people (>50% of the western US population) on 21 August 2020 (table S1).

Widespread $PM_{2.5}$/ozone co-occurrences, defined as days on which at least 25% of grid

cells covering the western US simultaneously experience local $PM_{2.5}$/ozone co-occurrence, have occurred almost exclusively during July to September (72 of 75 total days; fig. S2). Widespread co-occurrences have become significantly more frequent and persistent (Fig. 2, A and B), with an increase of ~12.4 widespread co-occurrence days over 2001 to 2020 and the longest consecutive-day occurrence persisting for an additional ~6.2 days. The frequency of widespread co-occurrences was highest during the recent active wildfire seasons (Fig. 2A and fig. S3). Of the 72 July to September widespread co-occurrence days during 2001 to 2020, 59 occurred during 2015, 2017, 2018, and 2020. In addition, the longest persistence (12 consecutive days) of widespread $PM_{2.5}$/ozone co-occurrences on record occurred in 2020 (Fig. 2B), during which the daily maximum extent of co-occurrence peaked at ~68.5% of the western US on 24 August 2020 (Fig. 1D and table S1).

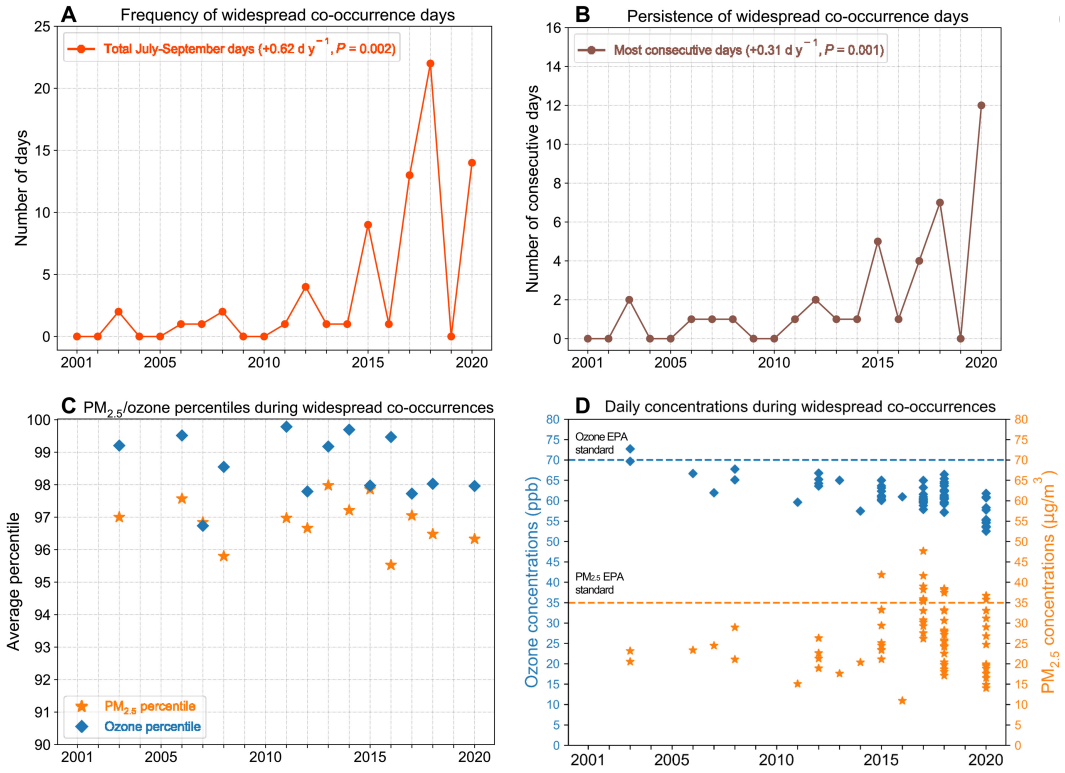


FIG. 2. Widespread $PM_{2.5}$/ozone co-occurrences. Time series of (**A**) the total number and (**B**) longest consecutive-day persistence of widespread July to September co-occurrence days, defined as days with simultaneous local $PM_{2.5}$/ozone co-occurrence in ≥25% of western US grid cells. Text in (A) and (B) indicates linear trends (d y^{-1}) with *P* values based on a permutation test. Characteristics of the individual pollutants during widespread co-occurrences are shown through (**C**) percentiles of $PM_{2.5}$ and ozone daily concentrations averaged across all affected grid cells and (**D**) pollutant concentrations averaged across affected grid cells on widespread co-occurrence days (*n* = 72). Note that percentiles in (C) are calculated on the basis of the distribution of concentrations in each year (refer to Materials and Methods). Dashed lines in (D) show concentrations corresponding to the Environmental Protection Agency (EPA) regulatory health standards for each pollutant [70 parts per billion (ppb) for ozone and 35 μg/m^3 for $PM_{2.5}$].

During widespread co-occurrences, the concentrations of both pollutants are elevated relative to co-occurrence conditions of smaller geographic extent. Although co-occurrences are defined as values above the local, annual 90th percentiles for both $PM_{2.5}$ and

ozone in each grid cell, average observed concentrations on all widespread co-occurrence days exceeded the 95th percentile for $PM_{2.5}$ and the ~97th percentile for ozone across all grid cells experiencing local $PM_{2.5}$/ozone co-occurrence (Fig. 2C). These findings are consistent with those of Schnell and Prather (*45*), who reported enhancements in $PM_{2.5}$ and ozone concentrations over eastern North America during large, multiday pollution episodes well above the statistical thresholds used to define individual extremes (e.g., 90th or 95th percentile). During widespread co-occurrence days in recent seasons (2015, 2017, 2018, and 2020), $PM_{2.5}$ concentrations averaged across all constituent grid cells experiencing $PM_{2.5}$/ozone co-occurrence exceeded the Environmental Protection Agency (EPA) regulatory limit of 35 $\mu g/m^3$ on 13 individual days (Fig. 2D, orange markers), peaking at 47.7 $\mu g/m^3$ on 3 September 2017 during a period of widespread fire activity and smoke conditions in the western US (*25*). Ozone concentrations averaged across the same grid cells on these days (n = 13) ranged from 57 to 63 parts per billion (ppb) (Fig. 2D, blue markers; see also fig. S4 for average concentrations during all co-occurrences). Although below the EPA regulatory limit of 70 ppb, the fact that these high ozone concentrations were present when averaged over a large geographic area and for prolonged periods in combination with widespread $PM_{2.5}$ regulatory exceedances illustrates the magnitude of human and environmental exposure to harmful air pollutants during recent wildfire seasons, the health impacts of which are emerging (*3*, *26*, *30*, *31*).

Increasing trends in atmospheric patterns conducive to co-occurrence

Although wildfires are a key source of emissions of $PM_{2.5}$ and ozone precursor compounds during the late-summer season, the spatial extent, local concentrations, and temporal persistence of their co-occurrences are modulated by a suite of meteorological factors, including surface temperature and atmospheric patterns (*45*). To understand whether and how atmospheric patterns that affect $PM_{2.5}$/ozone co-occurrence characteristics are changing, we use a spatial clustering approach known as self-organizing maps (SOMs) (*48*, *49*). Our SOM implementation categorizes daily large-scale weather patterns during July to September into 12 representative clusters (or "nodes") based on 500-hPa geopotential height anomalies from the European Centre for Medium-Range Weather Forecasts (ECMWF) ERA5 reanalysis product (1979 to 2020; refer to Materials and Methods).

We quantify the number of widespread co-occurrence days and population exposure to co-occurrence associated with each node (Table 1 and fig. S5) and identify the six SOM nodes with the largest (nodes 5, 9, and 10; hereafter, "high-exposure nodes") and smallest (nodes 2, 3, and 4; hereafter, "low-exposure nodes") $PM_{2.5}$/ozone co-occurrence risk (Fig. 3). High-exposure nodes are characterized by widespread positive geopotential height anomalies (hereafter, "ridging") and high daily maximum surface temperature anomalies across the region, which are largely colocated with those grid cells experiencing the highest number of local $PM_{2.5}$/ozone co-occurrences during widespread co-occurrence days in that node (Fig. 3, A to C). In contrast, low-exposure nodes are characterized by widespread anomalously low geopotential heights, cooler temperatures, and onshore airflow from the Pacific Ocean, providing critical natural ventilation for this re-

gion and suppressing widespread co-occurrence risk (Fig. 3, D to F) (*50*).

SOM	Number of	Cumulative $PM_{2.5}$./ozone co-occurrence exposure in million person-	Number of widespread $PM_{2.5}$/ozone co-occurrence	42-year change in SOM node frequency	42-year change in maximum SOM node persistence (consecutive

Expand for more

TABLE 1. Summary statistics for all 12 nodes of the self-organizing map (SOM). $PM_{2.5}$/ozone co-occurrence data represents all July to September days from 2001 to 2020. *Statistical significance of node trends (1979 to 2020) at $P < 0.05$.

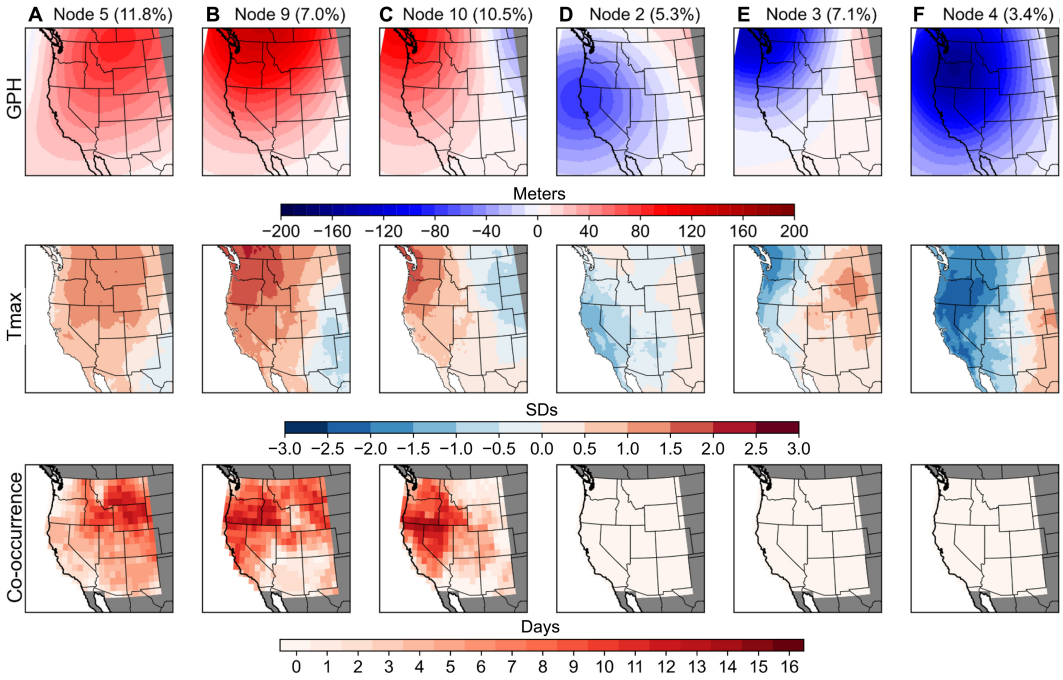


FIG. 3. The six SOM nodes with the largest [(A) to (C)] and smallest [(D) to (F)] $PM_{2.5}$/ozone co-occurrence risk. Top: Geopotential height (GPH) anomalies for each SOM node trained over 1979 to 2020. Middle: Composite standardized anomalies of daily maximum temperatures (T_{max}) on all days associated with each node during the 2001 to 2020 period. Bottom: Number of times each grid cell experienced local $PM_{2.5}$/ozone co-occurrences during all widespread co-occurrence days associated with that node. The maximum possible number of co-occurrence days in a given grid cell is equivalent to the total number of widespread co-occurrence days associated with that node (node 5, 14 days; node 9, 16 days; node 10, 13 days; Table 1). Values in parentheses on top row indicate the frequency of each SOM node relative to all July to September days during the period of overlap with air pollution data (2001 to 2020).

Large-scale atmospheric patterns represented by high-exposure nodes contributed 43 of

the 72 widespread co-occurrence days (~60%), despite accounting for only ~29% of all July to September days since 2001, indicating an elevated risk of $PM_{2.5}$/ozone co-occurrence across the region when these patterns occur. We find robust increases in the frequency and persistence of high-exposure nodes since 1979. These nodes now occur on an additional ~14.2 days/ year during July to September ($P < 0.001$) and the longest persistence of these nodes is an additional ~4.3 consecutive days longer ($P = 0.008$) compared to four decades ago (Fig. 4, orange lines). While the frequency of nodes relates to the frequency of pollutant exposure, the longer persistence of certain nodes can have additional impacts beyond that of single-day node occurrences. For example, previous research has shown that high ozone concentrations are more likely during prolonged, multiday heat conditions than on single hot days (*22*, *45*). Of the 29 remaining widespread co-occurrence days not associated with the high-exposure nodes, 21 occurred in conjunction with atmospheric patterns favorable for widespread smoke transport across the region during periods of high wildfire activity (nodes 1, 7 and 11; see Table 1 and fig. S5). In contrast to the high-exposure nodes, the combined frequency and multiday persistence of low-exposure nodes exhibit negative trends during 1979 to 2020, now occurring on ~12.6 fewer days/year ($P < 0.001$) and the longest consecutive-day occurrence of these nodes persisting for ~4.3 fewer days ($P = 0.002$) compared to four decades ago (Fig. 4, blue lines).

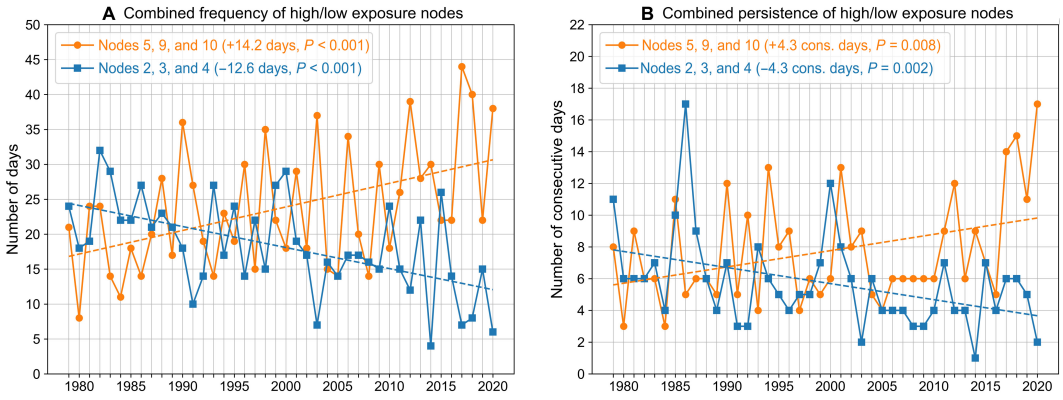


FIG. 4. Frequency and persistence of high/low exposure nodes. Time series of combined (**A**) total number of days and (**B**) longest multiday persistence for high-exposure SOM nodes 5, 9, and 10 (orange lines) and low-exposure SOM nodes 2, 3, and 4 (blue lines), during July to September, 1979 to 2020. In both plots, dashed lines show linear trends with numbers indicating corresponding changes over the 42-year period and *P* values of the linear trends based on a permutation test.

Together, these results suggest that atmospheric patterns that are conducive to widespread local $PM_{2.5}$/ozone co-occurrences and larger population exposure across the western US are becoming more frequent and persistent during July to September. Recent active wildfire seasons have occurred in conjunction with record frequency and persistence of the high-exposure nodes (i.e., ridging), with the highest frequency since 1979 of 44 days observed in July to September 2017 and longest persistence of 17 consecutive days observed from 3 to 19 September 2020 occurring simultaneously with historic wildfire activity across several western US states (Fig. 4) (*24*). The observed increase in ridg-

ing has co-occurred with and likely amplified increasing aridity and extent of wildfire burned area over the western US at least partially associated with anthropogenic warming, posing compounding hazards to the region (37–39, 51). Furthermore, increased persistence of ridging during wildfire smoke conditions can exacerbate ground-level pollution in topographically constrained basins, as decreased sunlight and increased atmospheric stability trap smoke and prolong the air pollution conditions (52, 53). Conversely, atmospheric patterns favoring decreased widespread $PM_{2.5}$/ozone co-occurrences across the western US (i.e., negative geopotential height anomalies and onshore airflow) are appearing less often and with shorter duration during the late-summer wildfire season.

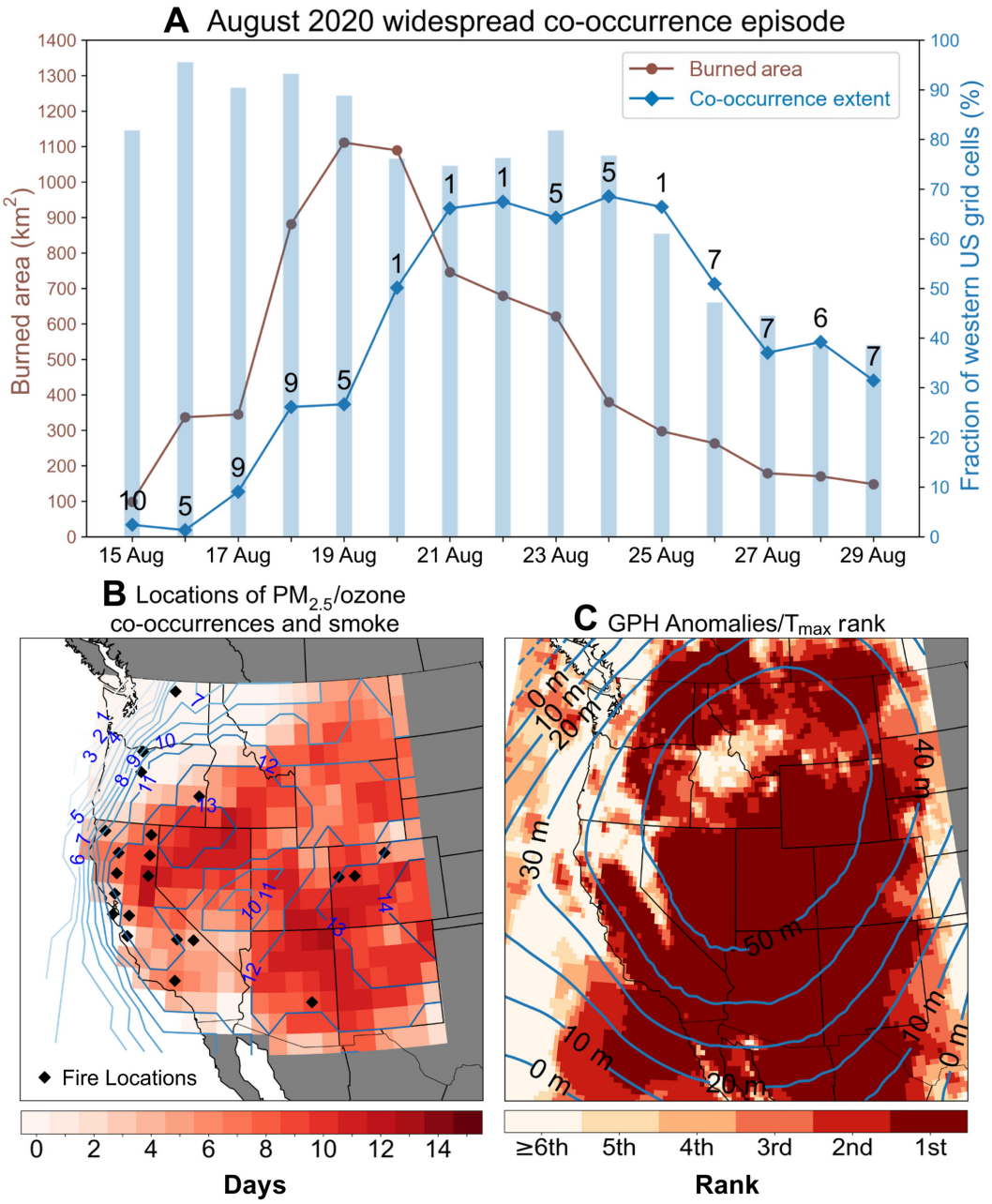
Case study: Widespread co-occurrence episode of August 2020

The "exceptional" 2020 wildfire season featured the second highest number of widespread $PM_{2.5}$/ozone co-occurrence days across the domain, along with the longest consecutive-day persistence of widespread co-occurrence (Fig. 2, A and B), the single most widespread daily co-occurrence extent (~68.5%) across the western US (Fig. 1D) and the highest cumulative seasonal population exposure to all local $PM_{2.5}$/ozone co-occurrences of nearly 1 billion person-days (Fig. 1E) in the 20-year observed record. Widespread wildfire activity and extreme temperatures associated with atmospheric ridging both contributed to shaping the record multiday co-occurrence episode observed during the second half of August 2020 (Fig. 5).

FIG. 5.

WIDESPREAD CO-OCCURRENCE EPISODE DURING 15 TO 29 AUGUST 2020.

(**A**) Time series of daily burned area from MODIS in the western US and southwest Canada (brown line), fraction of western US grid cells with local $PM_{2.5}$/ozone co-occurrence (blue line), and fraction of western US grid cells with T_{max} anomalies exceeding 1 SD above local daily climatology (blue bars). Numbers on the blue line indicate the best-matching SOM node for that day's atmospheric pattern. Note that widespread co-occurrence conditions begin on 18 August and persist through 29 August. (**B**) Total number of local $PM_{2.5}$/ozone co-occurrence days at each grid cell (shaded) and total number of days with presence of smoke from National Oceanic and Atmospheric Administration's (NOAA's) Hazard Mapping System (HMS) (contours) between 15 and 29 August. Black markers indicate presence of wildfires from MODIS in at least 50 1-km grid cells contained within each of the 1° × 1° grid cells of the $PM_{2.5}$/ozone data. (**C**) Average GPH anomalies (contours every 10 m; as in Fig. 3, top row) and rank of the average T_{max} during 15 to 29 August 2020 compared to all other similar 2-week periods during 1979 to 2019 (shaded). The darkest red shading indicates that in 2020 those grid cells experienced their hottest average T_{max} within the 42-year ERA5 dataset.



To examine their influence in shaping the multiday widespread air pollution episode, we analyze the wildfire and meteorological conditions between 15 and 29 August 2020. We find a sharp increase in the spatial extent of locally defined $PM_{2.5}$/ozone co-occurrences immediately following a peak in daily burned area aggregated over the western US and southwest Canada (Fig. 5A, brown line). This increase in burned area was associated with an extremely anomalous dry lightning outbreak that ignited hundreds of wildfires, leading to multiple large fires that burned for several weeks in central and northern California (Fig. 5B) (*24*). Grid cells in large areas of the interior western US, both near and downwind of fires, observed $PM_{2.5}$/ozone co-occurrences on most of the days (>7) during this 15-day period (Fig. 5B, shading). The grid cells that experienced a high number of co-occurrences are largely colocated with areas where wildfire smoke persisted during

that period, which is identified by the National Oceanic and Atmospheric Administration's (NOAA's) Hazard Mapping System (HMS) smoke product (Fig. 5B, contours). Notably, grid cells in northern Nevada immediately downwind of California fires observed local $PM_{2.5}$/ozone co-occurrences on at least 12 days, and smoke was observed on at least 13 days of the 15-day episode. In addition, many grid cells in the interior western US observed record warmest 15-day average of daily maximum temperatures since 1979, conditions that likely enhanced ozone production and contributed to the widespread extent of $PM_{2.5}$/ozone co-occurrences (Fig. 5C) (*23*).

Large-scale atmospheric patterns shaped multiple aspects of this air pollution episode, including the high temperatures, wildfires, and smoke transport. Atmospheric ridging across the western US resembling the pattern of the high-exposure nodes contributed to the hot, dry, and stagnant air conditions conducive to wildfire ignition and pollutant accumulation from smoke during the first 5 days of the episode (15 to 19 August) (Fig. 5A). More than 75% of the western US experienced daily maximum temperature anomalies exceeding 1 SD (σ) on all 5 days. Following the large increase in burned area during this time, a shift to an atmospheric pattern characterized by ridging centered in the interior West (node 1, see fig. S5A) developed on 20 August and persisted for 3 days, resulting in southwest-to-northeast atmospheric airflow in the western part of the domain (Fig. 5A). This pattern transported smoke from California fires across large areas of the interior western US, contributing to an increase in local $PM_{2.5}$/ozone co-occurrence extent from <30 to ~66% of the western US grid cells by 21 August (Fig. 5A, blue line).

The remote transport of wildfire smoke containing multiple pollutants including $PM_{2.5}$ and ozone to areas experiencing record warm conditions and enhanced photochemical ozone production (Fig. 5C) were critical to the widespread extent of this episode. Closer to active fires, dense smoke blocks solar radiation and mitigates ozone production (*19*). In addition, previous studies have noted that aged smoke is more conducive to downwind ozone production [e.g., (*16*, *20*, *21*)], promoting local $PM_{2.5}$/ozone co-occurrences in remote areas where smoke is transported. However, the contribution of wildfire smoke to increased ozone concentrations and thus increased $PM_{2.5}$/ozone co-occurrences needs to be further understood. Buysse *et al.* (*19*) found that the presence of wildfire smoke enhances ozone concentrations in urban areas of the western US, particularly in smoke plumes away from fire sources with $PM_{2.5}$ concentrations below 50 $\mu g/m^3$. Similarly, Brey and Fischer (*21*) and Gong *et al.* (*20*) noted general enhancement of ozone concentrations on smoke days in the western US. However, they also noted distinct regional variation with some locations not observing increased ozone concentrations during smoke conditions.

Relationships between burned area, heat extremes, and $PM_{2.5}$/ozone co-occurrence

The dynamics of the August 2020 widespread co-occurrence episode highlight the importance of both meteorology and wildfire extent in shaping the extent of $PM_{2.5}$/ozone co-occurrences and, therefore, exposure. We thus further characterize this relationship between wildfire burned area, meteorology, and the peak spatial extent of all temporally

independent widespread co-occurrence periods (n = 21; refer to Materials and Methods) (Fig. 6). Given its relevance for ozone production, we specifically focus on relating daily maximum temperature anomalies to $PM_{2.5}$/ozone co-occurrence extent.

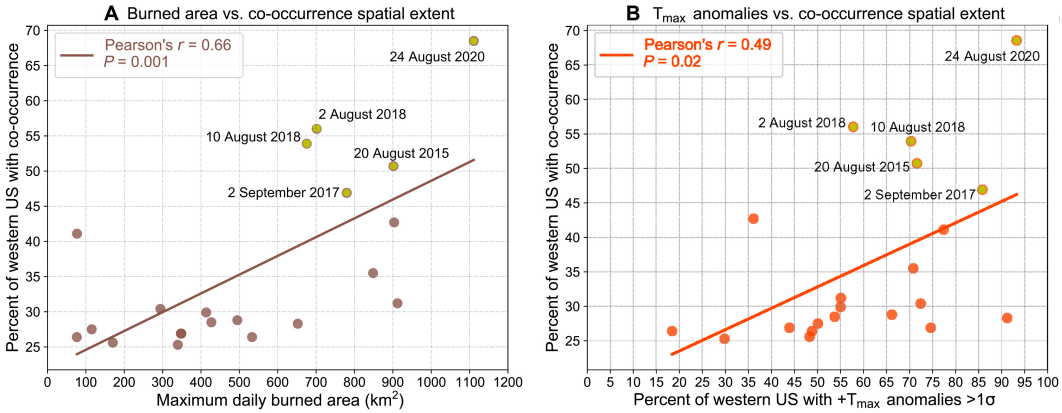


FIG. 6. Relationship between widespread $PM_{2.5}$/ozone co-occurrence extent, wildfire burned area, and daily maximum temperatures. Scatterplots showing the spatial extent of the western US affected by $PM_{2.5}$/ozone co-occurrence with (**A**) 7-day lagged MODIS burned area in the western US and southwest Canada and with (**B**) 7-day lagged spatial extent of positive maximum temperature ($+T_{max}$) anomalies >1 SD above local daily climatologies in the western US during the period of overlap with available burned area data (2003 to 2020). For both burned area and $+T_{max}$, the values represent the maximum daily extent in the 7 days preceding the peak spatial extent of $PM_{2.5}$/ozone co-occurrences. Only temporally independent widespread co-occurrence extent peaks during July to September are included (n = 21; refer to Materials and Methods). Dates for the top five largest extent peaks are shown. Text in panels indicates Pearson correlation coefficients (r) and P values for the pairwise relationships.

Similar to the August 2020 episode, we find that the extent of wildfire activity and heat affect the spatial extent of other $PM_{2.5}$/ozone co-occurrences. The largest extents exceeding 45% of the western US (much larger than the threshold used to define a widespread co-occurrence day) occurred in 2015, 2017, 2018, and 2020 and were associated with extensive wildfire activity in the western US and southwest Canada (maximum daily burned area extent >650 km^2, Fig. 6A) and widespread positive daily maximum temperature anomalies exceeding 1σ (maximum daily extent ≥55% of the western US, Fig. 6B) in the 7 days preceding the peak spatial extent of temporally independent widespread $PM_{2.5}$/ozone co-occurrence periods (refer to Materials and Methods). Analyzing this relationship over these 21 independent co-occurrence spatial extent peaks during 2003 to 2020, we find robust pairwise correlation between the $PM_{2.5}$/ozone co-occurrence extent and lagged burned area (r = 0.66, P = 0.001) as well as co-occurrence extent and 7-day lagged extent of anomalously high (>1σ) maximum temperature anomalies (r = 0.49, P =

combination of contributing factors in four of the six most recent July to September seasons in the western US.

DISCUSSION

Summary

Our analysis demonstrates an increasing risk of exposure of the western US population to more frequent and persistent extreme $PM_{2.5}$/ozone co-occurrences, defined at each grid cell as the simultaneous exceedance of the local annual 90th percentile concentrations of both pollutants, during the late summer wildfire season. These trends are largely driven by $PM_{2.5}$ extremes shifting toward the summer associated with increased wildfire activity in recent years (*24*–*26*, *32*–*39*) and coinciding with the season of high ozone concentrations. $PM_{2.5}$/ozone co-occurrences are also affecting larger areas, with more than a doubling of the maximum daily spatial extent (18.9 to 44.6%) of the western US experiencing simultaneous local co-occurrences over the past two decades. We find that increasing widespread pollutant co-occurrences are associated with increasing wildfire activity and increasing occurrence of conducive atmospheric patterns.

The increase in widespread $PM_{2.5}$/ozone co-occurrences during July to September highlights the role of increasingly severe and larger wildfires in contributing to compounding public health hazards in the western US. Although wildfire smoke can be transported to this region from remote areas including Alaska (*54*) and Siberia (*55*), we find a robust correlation between burned area in the western US and adjacent southwest Canada and extent of local $PM_{2.5}$/ozone co-occurrence across the western US (Fig. 6A). Years with the maximum extent of co-occurrence (Fig. 1D, red line) and greatest frequency of widespread co-occurrence days (Fig. 2A) also experienced the highest mean burned area in the western US [see figure 7 in (*35*)]. The largest spatial extents of co-occurrence in the observed record have all occurred since 2015 during particularly active wildfire seasons, with record co-occurrence extent and persistence in 2020 coinciding with record-breaking wildfire activity in several western US states. Given its ability to produce $PM_{2.5}$ extremes at a time of year when ozone concentrations are seasonally high, our results imply that increasing wildfire activity is a key mechanism by which simultaneous occurrences of local $PM_{2.5}$/ozone extremes are increasing in the western US despite declining background levels of these pollutants in response to the Clean Air Act (*23*, *32*, *56*, *57*).

Our results emphasize that atmospheric ridging patterns can affect widespread $PM_{2.5}$/ozone co-occurrences and associated population exposure by amplifying multiple direct physical drivers and sources of air pollutants. In addition to promoting conditions that are conducive for wildfires that produce multiple harmful air pollutants, persistent ridging results in widespread heat and air stagnation that enhances ozone production. We identify a significant relationship between the extent of heat and local $PM_{2.5}$/ozone co-occurrences. Further emphasizing the importance of meteorology in influencing population exposure to widespread air pollution conditions, large-scale airflow around high pressure ridges can transport smoke and associated pollutants to remote areas. The presence of these favorable meteorological conditions was critical in shaping the 2020 widespread co-occurrence episode via record heat and atmospheric patterns conducive to smoke transport.

The increasing frequency and persistence of ridging during the late-summer wildfire

season (Fig. 4) suggest an increased likelihood of the type of atmospheric conditions that contributed to the August 2020 co-occurrence episode, if these trends continue. While recent studies have shown an intensification of western US summer ridging since the 1980s using atmospheric reanalysis (58) and tree-ring records (59), identification of trends in ridging frequency and persistence over the western US before the present analysis had been restricted to other seasons (60–62). Our findings of changing late-summer atmospheric patterns agree with recent studies that have highlighted the role of increasingly warmer and drier summer seasons, which are strongly favored by atmospheric ridging, across the western US in driving increased wildfire burned area extent and severity (38, 39). Furthermore, drought and extreme heat events associated with persistent ridging can produce widespread dust and photochemical pollution-related health impacts across the western US (63, 64), increasing the likelihood of compound stressors on human health.

Limitations

We note multiple caveats to our findings. First, the derived gridded datasets of $PM_{2.5}$ and ozone used in this study are based on a relatively sparse observational network in some parts of the western US, which might result in uncertainties in identified trends in these areas. Enhancing spatial coverage of the monitoring network is critical to get more accurate and finer-scale air quality information, particularly over rural areas of the western US. While the PurpleAir network is rapidly enhancing the $PM_{2.5}$ observational coverage (65), it has notable measurement biases, and a similar low-cost network is not currently available for ozone. Second, we mainly focus on identifying proximal relationships, do not directly link wildfire emissions with local $PM_{2.5}$/ozone co-occurrences, and do not examine the dependence of pollutant and precursor concentrations on burn severity or types of fuel burned in different landscapes. Although we explicitly link the presence of wildfire smoke to local $PM_{2.5}$/ozone co-occurrences during the widespread episode of August 2020 using the NOAA HMS product, we do not systematically quantify the climatology of pollutant co-occurrences with or without presence of wildfire smoke due to the limited record and do not link all individual fires to pollutant co-occurrences. Last, we investigate the relationship between the extent of $PM_{2.5}$/ozone co-occurrences and two main drivers—widespread heat and wildfire burned area—without explicitly accounting for hot, dry weather promoting further wildfires, leading to enhanced co-occurrence extent. Hot temperatures are a common underlying driver of both wildfire activity and ozone production across the western US on different time scales (23), and high-resolution modeling would be required to disentangle the individual contributions of heat and wildfire smoke to local $PM_{2.5}$/ozone co-occurrences across this region.

Implications

In recent years, millions of people across the western US have been affected by hazardous air quality conditions caused by wildfire smoke. Although $PM_{2.5}$ concentrations are greatest in dense smoke plumes near wildfires, we find an increase in local $PM_{2.5}$/ozone co-occurrences over widespread areas of the western US not limited to the immediate proximity of active fires. These results highlight the potential for increasing

population exposure to compounding human health stressors in fire-prone and remote regions, with projected increases in wildfire activity, smoke, and conducive meteorological conditions (*51*, *66*, *67*). Although more research is needed to assess the cumulative health outcomes of co-occurrences of $PM_{2.5}$/ozone extremes and other pollutants in wildfire smoke, it is very likely that these co-occurring air pollution extremes have compounding public health impacts (*29*). Their impacts are not only limited to the direct cardiovascular and pulmonary effects but also extend indirectly to physical and mental health consequences arising from disruptions to outdoor activity, exercise, and normal social activities. Vulnerable communities in the western US that have limited access to health care or other resources needed to cope with poor air quality, have livelihoods that involve higher occupational exposure to polluted outdoor air, or have high rates of prevalence of medical conditions that can exacerbate the effects of air pollution exposure are likely to face increasing threats from such co-stressors. Understanding the likelihood and drivers of these co-occurring hazards is, therefore, critical for protecting communities through improved planning and management of human health impacts from projected warming, drying, and increasing wildfire activity in the western US.

MATERIALS AND METHODS

Datasets

We use 1° × 1° gridded $PM_{2.5}$ and ozone datasets spanning 2000 to 2020 for the United States developed using the methods of Schnell *et al.* (*46*) and subset to the western US domain (125°W to 103°W, 31°N to 49°N). These gridded datasets are derived from surface monitoring station data provided by the U.S. EPA's Air Quality System [AQS (www.epa.gov/aqs); for $PM_{2.5}$ and ozone], Canada's National Air Pollution Surveillance Program (https://open.canada.ca/data/en/dataset/1b36a356-defd-4813-acea-47bc3abd859b; for $PM_{2.5}$ and ozone), and the Clean Air Status and Trends Network (www.epa.gov/castnet; for ozone). Validated AQS data are used for $PM_{2.5}$/ozone spanning October 2000 to July 2019, with preliminary data sourced from the AirNow online portal (www.airnow.gov) for August 2019 to September 2020. We use daily averages for $PM_{2.5}$ and the maximum daily 8-hour average (MDA8) for ozone, reflecting the measures typically used for regulatory purposes and health impacts. For ozone, the hourly measurements are interpolated and MDA8 is calculated. For $PM_{2.5}$, daily averages are constructed before interpolation from any hourly reporting stations, and the daily average values are interpolated. The interpolation procedure is a hybrid inverse distance-weighted method that includes a declustering component designed to limit the influence of multiple clustered, typically urban observations. Parameters for the interpolation were optimized with a leave *N*-out cross-validation procedure. These gridded datasets were originally developed for the purpose of evaluating global chemistry models for their ability to simulate large-scale, multiday air pollution episodes. They have also been used to analyze large-scale $PM_{2.5}$, ozone, and extreme temperature co-occurrences in the eastern US (*45*); thus, they are well-suited for similar analysis of $PM_{2.5}$/ozone co-occurrences across a large geographic region here. $PM_{2.5}$/ozone data are analyzed over two seasons—July to September of the given year and October of the previous calendar year through June of

the given year.

Meteorological data, consisting of 500-hPa geopotential heights and 2-m air temperature, were obtained from the ECMWF ERA5 reanalysis (www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5) on the native 0.25° × 0.25° resolution (*68*, *69*). For analyzing the colocation of wildfire smoke and $PM_{2.5}$/ozone co-occurrence during the August 2020 case study, daily wildfire smoke polygons for 15 to 29 August 2020 were obtained from NOAA's National Environmental Satellite, Data, and Information Service HMS smoke product (www.ospo.noaa.gov/Products/land/hms.html#data) (*19*, *54*). For each day, all polygons representing smoke of any density were merged into a single polygon representing total smoke coverage for that day (*19*) and were overlaid with the 1° × 1° grid of the $PM_{2.5}$ and ozone datasets. Any grid cell spatially colocated with any portion of a smoke polygon is categorized as experiencing a "smoke-day," enabling the computation of the total number of smoke-days during the 15-day episode in each grid cell. For visualization in Fig. 5B, the gridded values of smoke-day frequencies were interpolated to contours and smoothed with a Gaussian filter ($\sigma = 0.2$), allowing for the preservation of large-scale spatial features of smoke-day counts while minimizing visual noise induced by local-scale variation.

The Moderate Resolution Imaging Spectroradiometer (MODIS) Aqua+Terra Thermal Anomalies/Fire Locations 1-km dataset (MCD14DL) was retrieved from NASA's Fire Information for Resource Management System archive download portal (https://firms.modaps.eosdis.nasa.gov/download/). The MCD14DL product is used to identify the presence of wildfires (>95% confidence) in at least 50 1-km grid cells contained within each of the larger 1° × 1° grid cells during the August 2020 widespread co-occurrence episode. The 50-km^2 threshold was chosen to isolate large fire occurrences (*70*), as these fires are presumed to impact air quality on regional scales. To quantify the spatial extent of burned area in the western US and adjacent southwest Canada (Canadian data subset to <60°N, >115°W), we use the MODIS burned area product (2003 to 2020) (*71*).

We quantify population exposure to $PM_{2.5}$/ozone co-occurrences using estimated 2020 population counts from the Gridded Population of the World version 4 dataset, obtained on a 1° × 1° grid from Columbia University's Socioeconomic Data and Applications Center (https://sedac.ciesin.columbia.edu) (*72*). Western US population is defined as the total population contained in all grid cells ($n = 375$) within the study domain, which includes adjacent parts of the Great Plains and Mexico. We use person-days as a metric to quantify population exposure to local $PM_{2.5}$/ozone co-occurrence. It is obtained by multiplying the estimated 2020 population in each grid cell by the number of co-occurrences in that grid cell and then aggregating it across the domain. We consider a fixed population to isolate the influence of changing physical hazards on changing exposure.

Defining $PM_{2.5}$/ozone co-occurrences

We seek to understand changes in simultaneous occurrence of extreme $PM_{2.5}$ and ozone concentrations, as co-occurrences of both pollutants have the potential to induce co-

stressor effects on human and environmental health. We therefore define extremes for $PM_{2.5}$ and ozone at each grid cell individually as the exceedances of the local 90th percentiles of their daily concentrations (average daily value for $PM_{2.5}$ and MDA8 for ozone) within each individual year. Therefore, we examine the co-occurrence of the top ~37 $PM_{2.5}$ and ozone extremes in each grid cell for each year. Instead of a fixed threshold to define extremes over the study period, this time-varying definition allows us to identify extremes relative to the overall improving air pollution due to emission reductions and stricter national air quality standards. Furthermore, having a fixed number of individual occurrences of both pollutants in each year enables us to identify years with anomalous temporal co-occurrences driven by factors other than their climatology. Assuming independent distributions, in a given grid cell the joint probability of $PM_{2.5}$/ozone co-occurrence each with a 10% chance of occurrence is 3.65 days/year, if co-occurrences are truly random. However, nearly 86% of western US grid cells have a higher likelihood of co-occurrence relative to random chance alone (fig. S6), suggesting the role of common physical drivers of such co-occurrences.

Characterizing large-scale atmospheric patterns

To investigate the influence of large-scale atmospheric patterns on local $PM_{2.5}$/ozone co-occurrences, we use SOMs to cluster daily geopotential height anomalies during July to September, 1979 to 2020, and identify typical atmospheric circulation patterns. SOMs are a type of artificial neural network commonly used in the climate sciences for spatial clustering of large-scale meteorological variables based on their similarity (*48*). The number and arrangement of SOM nodes are subjective choices and depend on the application (*49*, *60*). We test three SOM node configurations comprising 6 (2 × 3), 12 (3 × 4), and 20 (4 × 5) nodes to identify a configuration that minimizes similarity between clusters while also capturing the range of patterns that occur in this region.

To help inform our SOM configuration selection, we examined two sets of spatial correlation coefficients following Gibson *et al.* (*73*): (i) between each SOM node pattern and the individual constituent patterns in that node ("node-field" correlation, higher values are optimal) and (ii) between every unique combination of node pairs ("node-node" correlation, lower values are optimal). See fig. S7 for the distribution of both sets of correlation coefficients. We selected the 12-node (3 × 4) SOM configuration as the median node-field correlation is higher than in the 6-node configuration, and the node-node correlation interquartile range is lower than in the 20-node configuration. The improvement in node-field correlation in the 20-node configuration is small (fig. S7A), and this configuration qualitatively exhibits overlapping patterns due to the larger number of nodes. While the six-node configuration does have a larger distinction among nodes (based on lower median; see fig. S7B), it does not adequately represent the range of geopotential height patterns seen in the 12-node configuration. For SOM training, we use 200 initial iterations and 800 final iterations and set the initial neighborhood radius to 3 with a final neighborhood radius of 1. SOM computation was performed using the MATLAB "SOM Toolbox."

Examining relationships between wildfires, extreme heat, and co-occurrence extent

Local co-occurrences of $PM_{2.5}$ and ozone extremes are a result of complex interactions between meteorology and wildfire smoke operating on multiple timescales. Our a priori assumption is that long-range transport of wildfire smoke can take several days to cover a large geographic extent of the western US. Furthermore, our hypothesis is that multi-day heat waves can influence co-occurrence extent through both promoting wildfire activity that can produce air pollutants in following days and through widespread photochemical production and accumulation of ozone. To account for these interactions, we examine the relationship between antecedent fire and heat conditions in the preceding week (7-day window) with local $PM_{2.5}$/ozone co-occurrence extent on a given day. We estimate the correlation between wildfire burned areas preceding peak co-occurrence extent and between the spatial extents of positive daily maximum temperature anomalies preceding peak co-occurrence extent.

To isolate conditions antecedent to peaks in the spatial extent of widespread co-occurrence, we extract the largest co-occurrence spatial extent in nonoverlapping 15-day windows. This is done iteratively in descending order of co-occurrence extent for all July to September days during the period of overlap with burned area data (2003 to 2020). Starting with the largest spatial extent (68.5% of the western US on 24 August 2020), a 15-day window, centered on that day, is used to exclude all other days in this window, and this process is repeated for each successive lower extent provided it is outside of all previous 15-day windows. This process yields 21 widespread co-occurrence extent peaks (of 72 total widespread co-occurrence days; see fig. S2) during July to September, 2003 to 2020, that we define as temporally independent and use in the correlation analyses to examine the relationship between the extent of burned area, heat and local $PM_{2.5}$/ozone co-occurrences.

The highest correlation between burned area and local $PM_{2.5}$/ozone co-occurrence extent ($r > 0.65$) for these 21 peak spatial extents occurs for lags of −3 to −7 days (fig. S8, blue line), with peak correlation at −4 days ($r = 0.74$). The highest correlation between the extent of heat and co-occurrence ($r > 0.49$) occurs for lags of −6 to −13 days (fig. S8, orange line), with peak correlation at −11 days ($r = 0.53$). We note that these lags are based on a relatively small number of peak dates, and the time of peak extent of local $PM_{2.5}$/ozone co-occurrences following heat and fire conditions can vary for individual dates. Therefore, our use of the 7-day lagged window in this analysis captures the overlapping period of high correlation of co-occurrence extent with antecedent widespread heat conditions and burned area extent while accounting for differences in the timing of individual extent peaks.

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Author contributions: All authors contributed to designing the research. D.A.K. conducted the analyses. D.A.K. and D.S. drafted the paper with feedback from all coauthors.

Competing interests: The authors declare that they have no competing interests.

Data and materials availability: Gridded $PM_{2.5}$ and ozone data used in this study and all other datasets used to perform analyses here are available for download at the Zenodo open-access repository (https://zenodo.org/record/5174547#.YRK28O1lB0t). All source code used to perform the analyses and create publication figures can be accessed at a dedicated GitHub repository maintained by the corresponding author (https://github.com/dmitri1357/pm25_o3_paper). All data needed to evaluate the conclusions in the paper are present in the paper and/or the Supplementary Materials.

Supplementary Materials

This PDF file includes:

Figs. S1 to S8

Table S1

DOWNLOAD (2.26 MB)

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March 30, 2022

To: Members of the Nevada County Planning Commission, Nevada County Board of Supervisors, and Nevada County Planning Department Staff

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Comments on the Draft Environmental Impact Report for the Idaho-Maryland Mine Project

To All Concerned:

This letter is written on behalf of Community Environmental Advocates Foundation, The Sierra Fund, South Yuba River Citizens League, Wolf Creek Community Alliance, the state office and the Redbud Chapter of the California Native Plant Society, Sierra Foothills Audubon Society, Sierra Nevada Group Sierra Club, Friends of Bear River, Nevada County Climate Action Now, Brunswick Manor HOA, San Juan Ridge Taxpayers Association, Earth Justice Ministries, Elders Action Network, Patagonia, Friends of Banner Mountain, the Wells Coalition, Sierra Streams Institute, Brunswick Pines Road Association, Wawona Madrono Homeowners Association, the Center for Biological Diversity, and members of the Nevada County community at large who have identified many issues of concern regarding the potential reopening of the Idaho-Maryland Mine (Mine, Mine Project, or Project) Grass Valley.

As a coalition of community and environmental organizations in Nevada County, we appreciate the opportunity to provide public comment on the Draft Environmental Impact Report (DEIR) released by Nevada County for public review on January 4, 2022, addressing the environmental impacts of re-opening and operating the Mine for the next 80 years.

We are concerned about the long-lasting environmental impacts that the Mine Project would cause and the inadequacy of the environmental analysis of the DEIR. A number of key points are provided here. More detailed and complete comments from individuals and organizations are being submitted separately.

Note documents cited and submitted under separate cover:

- Baseline Environmental Consultant Report, Feb 15, 2022 (Baseline).
- Salter Report, March 9, 2022 (Salter).
- Comments on the Idaho-Maryland Draft EIR - 16Mar22, Center for Science in Public Participation (CSP2).

PROJECT DESCRIPTION

1 The DEIR does not adequately define the Mine Project to include the Centennial site and accordingly, fails to identify all potential impacts.

The DEIR fails to adequately address impacts associated with the Centennial Industrial Site (Centennial). This site is the location of hazardous waste left over from past Idaho Maryland Mine operations. The DEIR assumes that the Centennial site will be cleaned up before the use of the site for deposition of new mine waste. Yet the significant work which is needed to accomplish this clean-up is not disclosed nor evaluated in the DEIR. Rather, the DEIR assumes that the clean-up has already been accomplished, and uses the post clean-up conditions as the baseline for some of its environmental impact assessments.

The DEIR does not describe the current physical conditions of the Centennial site or include the necessary clean up of the existing contamination at that site as part of the Project because it assumes that Centennial will be cleaned up prior to the start of construction. As discussed above, the clean up for Centennial has not been approved by Department of Toxic Substances Control (DTSC) and it is unclear when DTSC might approve the clean up. Consequently, it cannot be excluded from this DEIR. As a result, any assumptions about baseline conditions for purposes of assessing impacts to the Mine Project are speculative at best, and at worst, significantly underestimate the actual impacts of the Project.

The current conditions of the Centennial site must be used as the DEIR baseline in order to meet the CEQA requirements for a full analysis of the impacts of the Mine Project. Moreover, the Centennial clean up should be included as part of the Project to address the whole of the action under CEQA. In order to accurately assess impacts, the existing conditions, or baseline, of the Project must be the current state of the Centennial site, not a speculative future condition.

2 Construction time estimates are inadequate and affect noise, traffic, air, and other impact areas.

Construction time estimates in the DEIR are contradictory and inadequate. For example, the DEIR states in several instances that the Project is estimated to have a twelve month construction phase, but also states that the construction of the water treatment facility alone would take eighteen months.

Furthermore, neither of these estimates - twelve or eighteen months - is sufficient to capture all phases of construction. As just one example, the applicant would have to complete significant grading and underground development before initiating the eighteen month construction of the water treatment facility. Similarly, the water treatment facility would have to be completed before dewatering of the mine could begin. Dewatering is a six month process. After dewatering has been completed, the new shaft for ventilation and emergency access would have to be constructed to the 1000' depth by working upwards from below. Then, before beginning any actual new mining, the tunnels would need to be restored sufficiently to allow for construction of the underground rock crushing facility. All of these activities must happen sequentially, not in parallel. Therefore, a more reasonable estimate of construction length for the Project would be four to six years, clearly resulting in significantly different annual and cumulative impacts than the ones identified in the DEIR.

The DEIR should be revised to provide an accurate description of each construction project, including its intended duration. This revised description must also include the sequencing of construction projects. Until this information is provided, the DEIR preparers will be unable to properly assess the annual and cumulative impacts on air, noise, traffic, aesthetics, and other resource areas.

3 The DEIR has not demonstrated that mine waste disposal by off site sales would be viable.

The DEIR indicates that the applicant (Rise) plans to sell waste rock on the open market if it is still being produced after the two proposed waste rock piles reach capacity (DEIR Project Description). The Regional Water Board has jurisdiction over the disposal location requirements for mine waste rock. Although the DEIR does not disclose this, the concept of selling waste rock is an unrealistic and infeasible proposal unless the Water Board has determined that such discharges would not pose a threat to water quality. Accordingly, the Project should not rely on this concept and the DEIR should identify all impacts associated with alternative disposal methods.

Even if the mine waste can be sold, the market for aggregates varies significantly by season. During rainy seasons, it may be necessary to stockpile the aggregate onsite, but there are no provisions for onsite storage in the DEIR or an assessment of impacts related to such storage. As reported by the Center for Science in Public Participation (CSP2), dispersing waste rock and other mine waste over large areas without containment often results in contamination (e.g., Calcine mercury mine tailings used for road construction in San Luis Obispo County). (CSP2)

The absence of provisions for temporary waste rock storage (and the associated analysis of its impact) creates strict operational constraints and potential impacts on all phases of processing have not been addressed in the DEIR. The DEIR should be revised to include an analysis of these impacts.

4 Mine waste and ore processing stockpiling: proposed processes may not be viable due to the necessary safeguard controls for asbestos.

(See "ASUR Plan Analysis.pdf", attached as a reference to this letter. Portions of that document are summarized here.)

The plan described in the DEIR for managing asbestos-laden mined materials is inadequate. Asbestos is likely to be released during underground blasting, crushing, and ore processing. It also is released during material handling, on-road transport, placement grading and compaction. The DEIR states that the Asbestos Management Plan would ensure that average mined material and engineered fill contains less than 0.01% asbestos. (DEIR 3-20) Testing the asbestos content, however, does not control the amount of asbestos in the actual material mined. To control the average amount of asbestos in output materials (and to avoid significant impacts related to asbestos exposure), the DEIR must ensure that asbestos levels do not exceed this threshold. Currently, the DEIR does not include any evidence that asbestos levels will not exceed this threshold.

The testing process may require up to two weeks before the results are known, yet the Project calls for daily mining activity to continue during this time. This daily mined material would have to be stockpiled while awaiting the test results, which could expose workers to dangerous levels of asbestos. The DEIR does not disclose this fact nor does it analyze the associated impacts.

In addition, if the running average of asbestos in the daily mined material exceeds the required threshold, batches containing higher asbestos levels would have to be stockpiled in order to be later mixed with batches having lower asbestos levels. The DEIR does not disclose this fact nor does it analyze the associated impacts.

The mineral processing described in the DEIR does not address the need for stockpiling materials or address the likely impacts of such efforts. The Asbestos Management Plan provided in the revised DEIR must detail all of the steps necessary to carry out the correct management of this hazardous waste, including the location and organization of stockpiled materials, and adequate safeguards to avoid fugitive dust emissions and potentially hazardous conditions.

HAZARDS AND HAZARDOUS MATERIALS

5 The DEIR inadequately describes potentially hazardous waste rock and mine tailings management.

As pointed out by Baseline Engineering Consultants (Baseline), the legacy contamination from prior mining indicates that the types of rock historically mined at the site contain heavy metals and, when excavated, these waste rock and mine tailings have been found to contain contaminants that pose a potential risk to people and the environment.

*"Neither the DEIR Project Description nor the Hazards and Hazardous Materials section adequately describes how future waste rock and mine tailings generated by the proposed project would be managed to ensure that they do not pose a health hazard to people or the environment **(**as the placement of similar waste materials from the same mine did in the past**)"** (Baseline).*

The revised DEIR must provide adequate information about the potential risks of the waste rock tailings and all potential impacts.

WATER QUALITY

6 Drill core testing for water quality impacts is inadequate.

Given the size and scope of the proposed Project, there was an insufficient quantity of drill core rock analyzed to determine the mine's true impact on water quality.

By way of illustration, between 2017 and 2019, the applicant drilled for, and extracted, a total of 67,500 feet of rock core. But of these 67,500 feet of drill core, only 0.68% were submitted for analysis. And of the few samples that were submitted for analyses, a dearth of information is provided regarding the sample materials' true weight, volume, particle size, and sampling technique. Nor are the drill logs for these core samples available for review, so the actual dates, precise locations, drift angles, widths, final depths, etc. are unknown. Several times the DEIR refers the reader to a "separate report" which will explain some of these omissions, but no such report is found in the document or its appendices.

In addition to the limited sample size and the inadequate sampling details, four different labs were employed to carry out the analyses of the submitted samples, but the samples did not have a proper chain of custodies (COC) processes. The COC is a process that tracks the movement of samples through their collection, safeguarding, and analysis lifecycle between the mine applicant and the labs, but the COCs do not reflect the written account found in the DEIR.

The revised DEIR must provide an explanation for the discrepancies in the chains of custodies for the samples submitted to labs and provide evidence that the samples are scientifically reliable.

This insufficient and unreliable data affects the accuracy of any analysis based on this data, such as an analysis of the metal leachate content of rock. Since metal leachate from mine rock affects water quality, analyzing metal leachate is one of the key concerns regarding the rock tailings produced by the Project. The limited amount of core material sampled and the imprecise manner in which the details of the core samples are reported makes the metal leachate analysis unreliable and leads the DEIR to underestimate potential impacts.

The revised DEIR should include a full set of data and drill logs that can be reliably analyzed by the public.

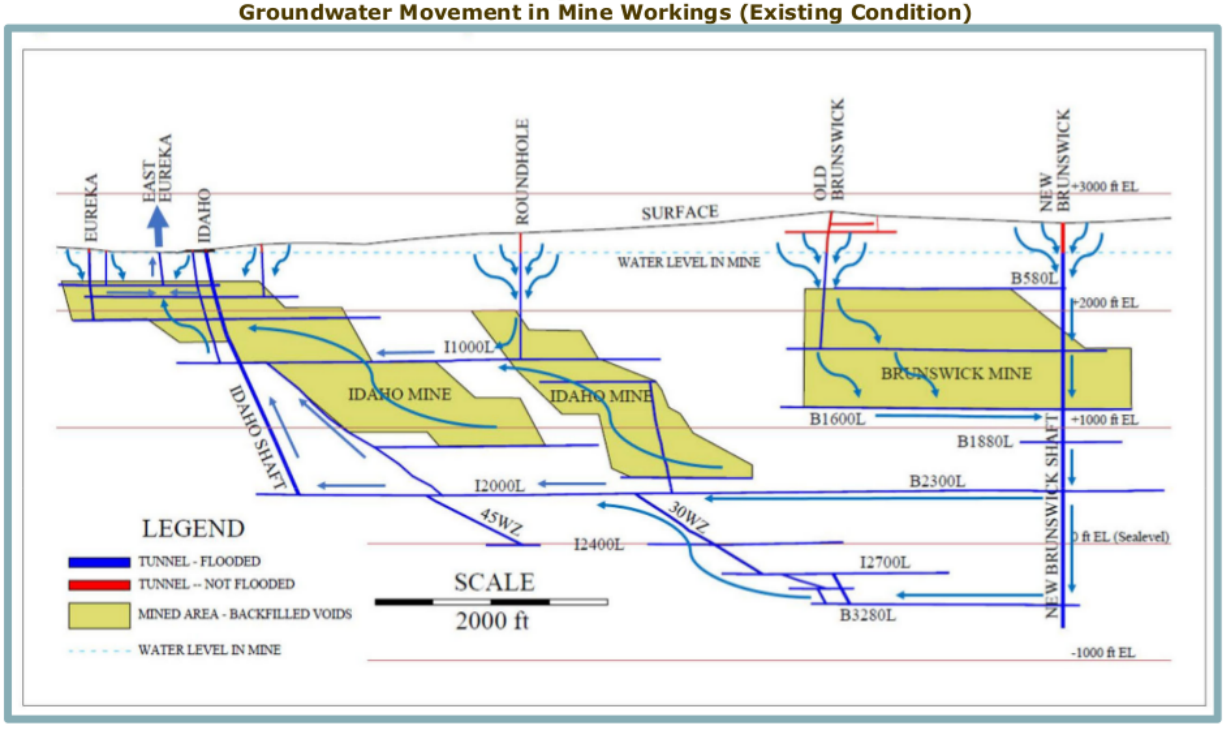
7 Assessments of the current mine water chemistry are inadequate.

The Hydrology Report (DEIR Appendix K.2, Table 4-10, p120) uses discharge screening limits and data from the New Brunswick shaft to define water treatment criteria. However, a more accurate sampling of mine water would be from the drains located along Wolf Creek rather than from the New Brunswick shaft, as described in the analysis of mine water flow (see DEIR Figure

4.8-7), which shows water entering the New Brunswick shaft then flowing downward through the extant mineworks to exit the drains at Wolf Creek (Eureka drain, East Eureka drain, etc). Only a few samples taken from the drains were reported, but these samples are much more representative of the mine water chemistry and indicate higher levels of Iron, Manganese, Arsenic, Aluminum, and Zinc than the New Brunswick shaft samples (DEIR K.2 Tables 3-6).

In order to get an accurate assessment of the contaminants flowing out of the mine under varying conditions, regular testing must be conducted over time at the Mine drains. The testing must also be conducted seasonally during differing rates of outflow. Moreover, in order to provide the public with a conservative estimate of potential impacts, the DEIR should use the results from the drain samples rather than the New Brunswick shaft, which would show potential water quality impacts from higher level of metals, arsenic and zinc.

Figure 4.8-7
Groundwater Movement in Mine Workings (Existing Condition)



8 The hydrology study incorrectly assesses the potential for long term acid mine type drainage.

The Empire Mine, adjacent to the Idaho-Maryland Mine, provides clear evidence of the potential for contaminants that could be discharged from the Mine and from tailings and mine waste intended to be deposited on the surface or back within the Mine as backfill. Mine water discharged from the Empire Mine has excessive levels of arsenic, iron, and manganese.

The EMKO hydrology study used in the DEIR dismisses the potential for acid drainage which could affect water quality in Wolf Creek. Instead, the DEIR claims "Any acid generated during the oxidation would be quickly neutralized by the carbonate minerals in the host rock" and cites neutral or high (non acid) pH values. (DEIR 4.8-49, 50) However, the short term method used by EMKO is not a reliable method for predicting the long term potential for contaminants to be discharged from mine waste. Results would be more reliable using long term tests, on the order of months rather than hours or days.

The waste rock's potential to produce poor quality effluent should be thoroughly characterized using appropriate tests to the satisfaction of the Water Board (e.g., ASTM D 5744) over a sufficient period, also to the satisfaction of the Water Board (e.g., 40 weeks).

Accordingly, more extensive testing of mine waste rock and tailings must be conducted to assess the potential for contaminant leaching from mine waste. Long term dynamic testing must be conducted to accurately identify potential impacts to water quality. Due to variations in geology as mining progresses, repeated testing of the mine waste must be done.

The revised DEIR must specify how long-term monitoring of acid mine type drainage would be accomplished and identify mitigation measures capable of ensuring that any unanticipated contaminants do not adversely affect water quality. Without providing such testing and identifying feasible and effective mitigation measures, the impact must be identified as significant and unavoidable.

9 It is not adequate to defer analysis of mine waste, a potential hazard, to some future date without providing substantial evidence that the proposed actions will not result in environmental impacts.

The mine waste has not been adequately tested and one must conservatively conclude that it has a high potential for causing water quality impacts, given that similar local historic mining activities resulted in the detrimental environmental impacts that persist today. The DEIR fails to conduct the necessary impact analysis. Instead the document asserts that impacts will be remedied by obtaining an expedited General Order permit from the Water Board (DEIR section 4.8 page 50). As Baseline points out, this process is insufficient:

"*It is not adequate to state that the project will get permits without providing substantial evidence that the proposed action will not result in environmental impacts, particularly when very similar historic actions have been demonstrated to result in environmental impacts that have persisted for decades."* (Baseline)

The revised DEIR must provide a valid and reliable analysis of the mine's waste products and identify specific and achievable mitigation measures to assure these water quality impacts are reduced to less than significant levels. Alternatively the revised DEIR must identify such impacts as significant and unavoidable.

HAZARDS - AIR QUALITY

10 The DEIR provides no evidence that the project's long-term NOx, ROG, and PM10 emissions will be mitigated to a less-than-significant level.

The DEIR fails to adequately mitigate the Project's air quality impacts. It relies on a bare minimum of mitigation measures recommended by the Northern Sierra Air Quality Management District (NSAQMD) to address air quality impacts, and these measures only address emissions during a one year period of construction. As we explain above, construction will certainly last longer than one year. In addition, the mitigation measures do not address the long-term emissions that will result from 80-years of mining operations associated with the Project. As a result, there is no evidence that the Project's long term emissions have been mitigated to a less-than-significant level, as concluded by Baseline Engineering Consultants (Baseline).

The revised DEIR must identify feasible and effective mitigation measures that address emissions from 80-years of mining to ensure that emissions are kept at less-than-significant levels. Otherwise, the EIR must identify these long term impacts as significant and unavoidable.

11 The DEIR Health Risk Assessment uses invalid meteorological data to characterize emissions.

Toxic Air Contaminants (TAC) are toxins which may cause or contribute to an increase in death or serious illness from cancer and other acute or long-term diseases. (See Health Risk Assessment Critique (HRA Critique), attached as a reference to this letter.) TACs may cause health damage even at extremely low levels, and are generated by, among other sources, vehicles, off-road equipment, blasting emissions, and fugitive dust. TAC ingredients include particulate matter from diesel emissions, asbestos dust, silica dust, heavy metals, ammonium nitrate fuel oil, hexavalent chromium, and radon – all of which would be produced by mining activity, and which can become airborne, traveling on wind currents toward population centers around Nevada County.

The data used for the Health Risk Assessment model in the DEIR that relies on meteorologic information about the quality, quantity, speed, and direction of travel of air toxins is not appropriate for the Grass Valley area. The DEIR model relies on data from the Blue Canyon site, an area with a significantly different meteorological profile than that of Grass Valley. Blue Canyon, located on Highway 80, bears little meteorologic resemblance to Grass Valley: it deviates from Grass Valley in elevation, temperature, rainfall, snowfall, wind speed, and wind direction. Using Blue Canyon's meteorologic data does not correlate with Grass Valley meteorologic data under most circumstances, and makes any TAC statistic derived from the model unreliable.

The DEIR's Health Risk Assessment must be revised using meteorological data applicable to Grass Valley in order to accurately assess the potential health impacts of the mine's toxic air.

12 Drill core testing for airborne contaminants is inadequate.

As documented in “Sampling Procedures” (Sampling) (attached as a reference to this letter), TACs silica and asbestos are insufficiently described in the DEIR. Even though several hundred tons of rock would be mined and surface-stored each day, none of the core samples taken from the exploratory drill cores were tested for the contaminant silica. It also appears that when the original core samples were taken, drilling was stopped when serpentinite, an asbestos bearing rock, was encountered and, since drill logs are not available for review, the depth and width of the asbestos-containing serpentinite deposits encountered cannot be determined.

The rock types identified in the mineralized zone contain substantial amounts of silica (silicon dioxide, quartz), and the tailings would contain fine particles of respirable crystalline silica, a TAC. The laboratory that the applicant used for all metals analyses, ACZ Laboratories, is certified to perform both silica and silicon dioxide tests yet not a single sample was analyzed for these parameters (Sampling).

The revised DEIR should provide a full set of data about the samples analyzed for silica and asbestos. To the extent this data set fails to analyze silica and asbestos, further analysis and revisions of the DEIR are required to adequately identify impacts.

13 The management of fugitive dust after it leaves the mining facilities is inadequate.

In 1986, asbestos was identified by the California Air Resources Board (CARB) as a TAC. CARB also determined that there is not enough scientific evidence to identify an asbestos threshold level below which no significant adverse health effects are anticipated (17 CCR 93000, Implementation Guidance Document 2017, CARB pg 1), (HRACritique),

As a TAC, asbestos, as well as respirable crystalline silica, fall under the non-criteria air pollutant category because they lack an identified safe “threshold level below which no significant adverse health effects are anticipated.” There are no established limits for monitoring emissions of non-criteria air pollutants, silica and asbestos, into the ambient environment. The Health Risk Assessment is based on 30 years of exposure, so the cumulative effects from 80 years have not been addressed. Both silica and asbestos are inert substances not subject to environmental degradation that will have potential impacts beyond the 80-year project permit. (HRACritique)

The revised DEIR should establish asbestos mitigation protocols and robust monitoring systems of waste rock during transport and disposal to ensure the protection of workers and the public from the adverse health effects associated with the TACs, asbestos, and respirable crystalline silica. Without identifying clear and achievable mitigation measures, the DEIR must identify this as a significant and unavoidable impact.

HYDROLOGY AND WATER QUALITY

14 The proposed project would intentionally affect local groundwater resources.

The proposed Project would significantly affect local groundwater resources by dewatering the mine, lowering groundwater levels. The dewatered groundwater resources would be converted to surface water that is discharged into existing creek channels and quickly conveyed out of the area. The applicant's consultants have prepared a numerical groundwater model to attempt to predict how this proposed long term dewatering effort would affect overlying and surrounding groundwater levels.

An incorrect assumption was made in the groundwater model used to predict dewatering impacts, which led the DEIR to significantly underestimate groundwater drawdown, both in magnitude and areal extent. The groundwater model was calibrated based on pumping rates from the historical Idaho Brunswick Mine and only one water level measurement collected from the flooded (i.e., inactive) Union Hill shaft in 1956. Using only one water level measurement from 64 years ago to calibrate a complex bedrock aquifer system over a large region is inappropriate and introduces a significant amount of uncertainty to the model. (Baseline)

The revised DEIR must rely on a corrected groundwater model in order to accurately predict the extent of the well drawdown caused by the predicted 80 years of mine-dewatering and dewatered maintenance. Based on existing reports, the Project is likely to impact significantly more wells than the number of wells identified in the DEIR.(see "Safeguards for Well Owners and the Idaho-Maryland Mine", CEA Foundation) This is a significant impact that will affect hundreds of Grass Valley residents and must be addressed in a revised DEIR.

15 The basic constructs of the DEIR's groundwater model have significant errors and omissions making them unreliable.

The basic data needed to build a valid groundwater hydrological model are missing. The document "Review of the Idaho-Maryland Mine DEIR Groundwater Model" (Model Review) by Silberstein examines deficiencies in the model, as summarized here.

The mine water drains from several locations along Wolf Creek near Centennial Drive, and the DEIR provides only rough approximations of the mine water outflow rates from these areas. What's more, these outflow data are contradicted by more reliable records from previous studies which indicate ten times more outflow than the amount the DEIR discloses. (Model Review) Similarly, mine water inflow analysis is based on sparse mine water level data from the New Brunswick shaft. Only 12 water level measurements were taken at random times of the year between 2003-2007, and just 3 measurements in 2018-19). In addition, the utility of these measurements is incorrectly interpreted. The water level reaches a limit when it exceeds the level of the drains from which the mine water flows and doesn't reflect what could be substantial

inflow. Without a measurement of the outflow, the amount of inflow cannot be determined by the water level in the New Brunswick shaft. Essentially, no water balance assessment is provided.

Furthermore, data from private wells within the area is old and limited to just a few years. No usage data is provided, so seasonal variations in water levels are of limited use.

Critical data such as reduction in groundwater recharge from precipitation are also incorrectly calculated, failing to include the 75 acres of low-permeable mine waste to be dumped on the two sites.

Moreover, the groundwater model does not include the new access shaft, which would create a local area of groundwater drawdown. In fact, it appears that numerous existing mine features that are within a few hundred feet of the surface were also not evaluated in the ground water model. These mine features would contribute to the downward transmission of ground water from the near surface fractured rock areas.

These are all elements that are critical for constructing a reliable groundwater model to identify dewatering impacts.

In addition, there are three major faults and numerous minor faults in the mineral rights area. These impact the transmission of water and introduce a high level of uncertainty in the accuracy of a model which, as stated in the Groundwater Model report (DEIR Appendix K.3), assumes the geology is homogeneous. Common assumptions such as the correct anisotropic ratio for the groundwater transmission calculations may not be accurate.(Model Review, 3.g.)

Taken together, the groundwater model is seriously deficient with respect to data reliability, initial conditions, and modeling assumptions, calling into question its ability to accurately depict the Project's impacts.

Finally, use of modeling in a fractured rock system has limited value. Modeling that relies upon uniform rock, which is consistent from place to place, behaves in a more predictable fashion than rock that is in bedrock systems having multiple faults and irregularities. It is critical to provide for long term monitoring and extended protections due to the challenges inherent in modeling groundwater in this complex hydrogeologic setting.

The revised DEIR must provide accurate and adequate information and comprehensive analysis to determine the extent and the severity of the impacts upon groundwater resources and wells. Without this analysis, the revised DEIR must identify such impacts as significant and unavoidable.

WELLS AND WATER MONITORING

16 The DEIR inappropriately defers the collection of additional water monitoring data to the future.

The DEIR acknowledges that more groundwater level data is needed to assess the potential impacts of the proposed Project on groundwater levels. Mitigation Measure 4.8-2(a)(4) (DEIR section 4.8 pg 67) states that this needed water assessment be conducted "once dewatering of

the underground mine workings commences." This is internally inconsistent and would not be achievable. Once dewatering begins, it will be impossible to measure baseline levels. Consequently, this mitigation measure is impossible to implement. Mitigation measures under CEQA must be achievable, enforceable, and must be capable of actually reducing the Project's impacts.

The DEIR inappropriately defers the collection of additional data (via a Groundwater Monitoring Plan) to the future. CEQA does not allow the deferral of important studies necessary to characterize impacts because it denies decision-makers the information they need to make well-reasoned decisions regarding the viability and impacts of a Project.

Groundwater monitoring networks will need to be established in advance of the Project, and the resulting data will need to be included in the revised DEIR. The consequences of not committing to full compliance with General Plan Policy 2.17 are dire for local property owners who rely on groundwater. (Baseline)

17 Relying on fifteen monitoring wells to estimate the impacts on all water supply wells around the mine area is inadequate.

The DEIR relies on fifteen monitoring wells to estimate impacts on water supply wells but it does not explain how it arrived at this number of wells or their location. In complex fractured bedrock spread out over thousands of acres, monitoring water levels at fifteen locations could not possibly provide the needed data to ensure that groundwater impacts to hundreds of existing water supply wells in the Project vicinity are immediately identified and mitigated (Baseline,p12).

The revised DEIR must provide reliable data regarding the Project's monitoring regime in order to provide an accurate accounting of groundwater impacts.

18 Potential impacts to wells are underestimated and the proposed mitigations are inadequate.

The DEIR relies on a Well Mitigation Plan to allegedly protect wells from mining impacts. The Nevada County General Plan (Policy 17.12, item 1) states that:

*"In approving mining projects which **according to expert opinion** may threaten the existing quality or quantity of surface or subsurface water which supply adjacent homes and businesses:*

1) The County shall require the operator to guarantee a comparable supply of water to such homes or businesses through accessible forms of security or alternate sources of water. "

In contrast to the opinion of the DEIR consultant EMKO (DEIR Appendix K.9, p1), numerous experts have stated that there is the potential for a significant threat to water supply for wells in the area beyond those identified in the DEIR. Notably, Baseline Engineering unambiguously states that, *"...it is Baseline's expert opinion that the project may threaten the existing quality or quantity of surface or subsurface water which supply adjacent homes and businesses in a much wider area than is indicated in the DEIR."* (Baseline)

The DEIR relies on a Well Mitigation Plan to purportedly protect wells from potential mining impacts. Yet, the Well Monitoring Plan does not demonstrate that impacts would be mitigated.

BIOLOGICAL RESOURCES

19 Proposed mine dewatering activities have the potential to have a significant impact on dependent biological resources.

The DEIR fails to adequately address biological and aquatic resources, and hydrological impacts to those resources.

The DEIR's biological surveys exclude an entire reach of South Fork Wolf Creek (SFWC). Species of special concern are inadequately considered and qualitative data for benthic macro-invertebrates (BMI) is missing. (Wolf Creek Community Alliance (WCCA), Benthic Macroinvertebrate Analysis, 2007)

Aquatic resources are excluded through an inaccurate hydrological assessment of the full length of SFWC, ignoring the connectivity of the creek upstream and downstream of the culvert on the Mine property, thus failing to consider the movement of trout and other aquatic species.

Hydrological impacts due to mine dewatering into SFWC are inadequately studied, mischaracterized, or not considered. The initial dewatering rate of 2500 gallons per minute (gpm) would be followed by 80 years of subsequent operational dewatering at 850 gpm and as much as 2500 gpm. The DEIR fails to adequately consider this long-term higher rate of discharge. Nor does the DEIR consider the seasonality of stream flow, loss of streambed or streambank habitat, changes in temperature, differences in Specific Conductance (EC), and habitat for BMI. Drawdown of the water table due to dewatering is also underestimated and its impacts to meadow, wetland, and forest habitats are not considered. Further, the DEIR fails to consider chronic and cumulative impacts to BMI, trout, and other aquatic species, including special concern amphibians. (WCCA)

Overall, because the DEIR does not adequately address biological and aquatic resources or sufficiently analyze hydrological impacts, this document must be revised.

20 Mine water discharges would overheat South Fork Wolf Creek.

Mine water temperature ranges between 14 and 15 degrees Celsius. The Project must not change the temperature of water discharged into the South Fork of Wolf Creek by more than 5 degrees Fahrenheit (2.8C) per NPDES requirements.(DEIR Appendix K.2, p108) Water from the mine will be pumped into the seven acre treatment pond. From there it will be run through the treatment facility and discharged into the creek. The DEIR's Hydrology study provides only a few data points (April and August of 2019 and Jan 2020) to determine the range of values for the creek flow and temp. However, over 15 years of monitoring by WCCA provides data

indicating that the temperature of the creek often falls substantially below 10C, and that these temperatures commonly occur during low flow times.

The revised DEIR must include studies that reliably predict the mine water's outflow temperatures from the treatment pond into SFWC. To do this, the EIR must include thermal modeling of the treatment pond, including the temperature impacts due to the treatment processing plant, flow through rates, cooling under different weather conditions, solar gain, evaporation, precipitation, etc. In order to avoid impacts to the SFWC and the species that inhabit the Creek, the revised DEIR must demonstrate that the discharge temperature and flow rates, combined with the temperature and flow rates of the stream over a range of conditions would not result in temperature changes in the stream in excess of 2.8C (5F) degrees.

GREENHOUSE GAS EMISSIONS AND ENERGY

21 The DEIR relies on an arbitrary threshold for greenhouse gas emissions.

The DEIR states greenhouse gas (GHG) emissions from mine operations would be just under 10,000 metric tons (MT) of GHG carbon dioxide equivalent (CO2e) per year. This number was chosen as a bright-line threshold based on other air districts in California that included Placer County, Sacramento Metropolitan Area, the Bay Area and Southern California. Neither the Northern Sierra Air Quality Management District (NSAQMD) nor the County have adopted numerical thresholds of significance for GHG emissions that would apply to the Project. The DEIR does not discuss the justification provided by each air district for adopting the 10,000 MT CO2e per year threshold, nor does it provide substantial evidence for applying this threshold to the project to demonstrate how it will achieve a fair share of the statewide GHG reductions goals for 2030 and beyond.

The DEIR must be revised to identify and provide justification for a GHG threshold of significance that will achieve the statewide GHG reductions goals for 2030 and beyond over the proposed 80 year lifetime of the mining permit. (Baseline)

22 The DEIR underestimates GHG emissions from haul trucks.

The DEIR states that the Centennial Industrial Site will be used for mine waste dumping to form "engineered fill" during the first 5 years of mine operations. The DEIR's analysis assumes that the Centennial Site remediation to remove toxic mine waste would be completed before the mine opens. However, since the remediation of the Centennial Site is not included in the DEIR analysis and, as indicated in the Project Description, may not be completed in any specified timeframe, "...it is speculative at best to assume that the Centennial Industrial Site will be available for fill placement." (Baseline)

To accurately account for the Project's GHG emissions, the DEIR should have assumed an additional five years of offsite hauling at the beginning of operations. This additional hauling would generate significantly more emissions than disclosed in the DEIR. This also holds true for criteria air pollutants as well.

The GHG emission should be updated in the revised DEIR to include the prospect of the Centennial Site being unavailable for mine waste dumping.

23 Mining energy requirements would eliminate gains attained through the Nevada County Energy Action Plan.

The Nevada County Energy Action Plan calls for a 51% reduction in GHG emissions for electricity use by 2035, which is in close alignment with state goals. The Plan calls for residential energy reduction savings from building efficiency of 42 million kilowatt hours per year (kWh/Yr).

The DEIR states the amount of electricity required to operate the mine would be approximately 49 million kWh/Yr (DEIR p. 4.3-59), which would erase any residential electricity savings attained by the Plan.

The total non-residential electricity use of the county in 2017 was 53 million kWh/Yr. So, GHG emissions from this this one mining project alone would almost equal all other non-residential electricity use in the County and wipe out the projected 9 million kWhYr non-residential building efficiency savings.

Asking residents and business owners to cut down on their use of electricity while allowing the GHG emissions from the mine would be highly counter-productive and unfair. The DEIR must explain how the project intends to comply with the emission goals of the Nevada County Climate Action Plan.

The California Air Resources Board 2017 Climate Change Scoping Plan stated: "Achieving no net additional increase in GHG emissions, resulting in no contribution to GHG impacts, is an appropriate overall objective for new development." Given these facts, the DEIR must establish a net zero threshold for new GHG emissions from the Project and declare the project has significant and unavoidable impacts.

NOISE AND VIBRATION

24 Nighttime Noise Impact is Not Adequately Addressed.

The analysis "Acoustical Comments on Draft Environmental Impact Report, Salter Project 22-0039" (Salter) provides comments on the DEIR's analysis of the noise and vibrations for the Project.

Salter determined that nighttime noise is not adequately addressed in the DEIR. The DEIR outright dismisses the potential for noise impacts due to sleep disturbance and inappropriately excludes this consideration from the DEIR analysis. The combination of nighttime industrial activities amongst a community that currently enjoys low ambient noise levels represents a significant risk for Project noise to impact the community, annoy residents, and cause sleep disturbance.

A revised DEIR should provide a comprehensive analysis of nighttime noise impacts, identify these as potentially significant impacts, and identify appropriate mitigation, including limitations on nighttime noise, to protect nearby residents. (Salter)

25 Engineered Fill Operation Noise is Underestimated.

The DEIR underestimates operational noise from the Project's engineered fill operations (Impact 4.10-2). This 5 to 6-year long activity could generate noise levels at least 10 to 18 dB higher than predicted in the DEIR. This is a significant deficiency in the impact analysis. As such, the project's noise levels could be 20 to 35 dB louder than current median/background ambient noise levels, causing a severe impact. In addition, in several instances, the DEIR fails to adequately address impacts to sensitive receptors located farther away from existing roadways that currently have a lower background noise (Salter). The DEIR must be revised to correct these deficiencies and omissions.

26 Blasting Vibration Impact is Not Adequately Addressed.

The DEIR fails to adequately evaluate blasting vibration impacts (see Impact 4.10-4). Blasting operations have the potential to subject nearby residents to "strongly perceptible" and borderline "unpleasant" vibration on a regular basis for the rest of their lives. These perceptible and unpleasant vibrations must be considered a significant impact in the DEIR.

In particular, the DEIR fails to include crucial guidance from the U.S. Office of Surface Mining Reclamation and Enforcement Blasting Guidance Manual restricting blasting vibration during evening and nighttime hours. If blasting must be allowed at these sensitive times, the DEIR must incorporate adequate mitigation with a notably stricter limit at all sensitive receptors (Salter).

HAZARDS

27 Potential mine flooding and worker safety from groundwater occurrence in mine workings.

In the DEIR's discussion of the Union Hill Mine, it is noted, "The Union Hill Mine workings are within 95 feet to 180 feet of workings of the Brunswick Mine at three to four different levels. During the post WWII period, the combined Idaho-Maryland Mine workings were completely dewatered. In 1956, the water level at the Union Hill Mine was reported to be within 20 feet of

the top of the shaft, suggesting that the complete dewatering of the adjacent mine workings resulted in no more than 10 to 20 feet of water level decline in the Union Hill Mine."

There are two important points to note in this discussion, (1) the Union Hill Mine is very close to the Idaho-Maryland at several levels; and, (2) there has been a possible weak hydraulic connection between the two mines, which is only logical.

There is no discussion in the DEIR of the potential impacts for the Idaho-Maryland Mine if flooding were to occur during mining. According to ITASCA's report (DEIR Appendix K.3, Figure 2-3), there are extensive abandoned mine workings above and adjacent to the Idaho-Maryland Mine that would remain flooded after the Idaho-Maryland is dewatered. If a conduit between these two mines were to open, for instance due to the widening of a fracture related to blasting vibrations or a seismic event, the flood of water into the Idaho-Maryland could be rapid and catastrophic for anyone working in the mine.

The DEIR must be revised to evaluate the potential risks of flooding during mining operations, including potential risks to mine workers. (CSP2)

28 Voluminous updraft from Mine ventilation air discharge may condense to form a water vapor cloud or fog resulting in a potential air traffic hazard.

The mine ventilation system would discharge 200,000 cfm of saturated air at 68F degrees from the top of the headframe with an upward velocity of 7.7 ft/sec. The headframe is located within the airport safety zone. Under some weather conditions, this large volume of air exhaust may form a persistent cloud plume, or fog, which could be a potential visibility hazard for aircraft. Also, the large mass of air moving upwards may create turbulence. In addition to aesthetic impacts, the DEIR should assess the potential hazards to aircraft of this large volume of saturated air (see MineExhaustMoisture report, attached as a reference to this letter).

29 The DEIR's evaluation of seismic hazards due to faults and mining is inadequate.

The mine project would target potential ore bodies that are more or less bounded by the Morehouse fault, the 6-3 fault (Weimar), and the Idaho fault, as well as numerous lesser faults. While the faults in this area are designated as being in a type C fault zone, with low seismicity and a low rate of recurrence, the DEIR does not analyze the effect that a seismic event would have on the mine or workers in the mine. (For further details, see FaultingHazards, attached as a reference to this letter) .

Throughout the 80 year life of the proposed project, expansion of mine works will remove 30 million tons of rock mass, and change the overall competency of the surrounding bedrock. In addition, several million tons of mine waste will be positioned over or near the faults. Finally, at

the end of mine operations, the mine will re-flood, leading to an additional potential increase in seismic activity due to the re-introduction of hydrostatic pressures. (FaultingHazards)

The seismic reports discussed in the Geology section of the DEIR are not up to date and, even if updated, would not meet the requirements for a probabilistic seismic site analysis. (CSP2, p7)

The revised DEIR must include a complete and comprehensive analysis of the potential hazards due to seismic activity as a result of the Mine Project.

Conclusion

The DEIR lacks critical information necessary to identify all potentially significant impacts associated with a large underground mining project close to a populated area with complex groundwater and geologic conditions, and accordingly, fails to comply with CEQA requirements. As detailed above:

- The toxic legacy of the Idaho Maryland Mine at the Centennial site is incorrectly assumed to be already remediated in the DEIR for five resource areas, which leads to an underestimation of impacts, particularly in biology and hazards impacts;
- Health issues due to air quality and noise impacts are vastly underestimated;
- There is no proposal for managing the stockpiling and containment of waste and related runoff on site;
- The DEIR defers analysis of mine waste analysis;
- Asbestos and silica release are not evaluated;
- The groundwater model has significant errors, omissions, and is unreliable leading to a gross underestimation of groundwater and well impacts to nearby residents;
- Well monitoring is inadequate to evaluate impacts to the hundreds of existing wells in the project vicinity.

The DEIR lacks an accurate project description, lacks data and analyses needed to make informed determinations, and fails to provide effective and feasible mitigation measures. For these reasons, the document is inadequate under CEQA. The DEIR should be revised and recirculated to comply with CEQA.

(Signatories below)

Sincerely,

Community Environmental Advocates FOUNDATION

Ralph Silberstein
President, CEA Foundation

EARTH JUSTICE MINISTRIES

SIERRA CLUB
FOUNDED 1892

Richard Thomas
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CALIFORNIA NATIVE PLANT SOCIETY

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Ross Middlemiss, Staff Attorney

***** References*****

Documents attached as a reference to this letter:

- Review of the Idaho-Maryland Mine DEIR Groundwater Model.pdf
- MineExhaustMoisture.pdf
- FaultingHazards.pdf
- ASUR Plan Analysis.pdf
- Health Risk Assessment Critique.pdf
- Sampling Procedures.pdf

Documents cited and submitted under separate cover:

- Baseline Environmental Consultant Report, Feb 15, 2022 (Baseline).
- Salter Report, March 9, 2022 (Salter).
- Comments on the Idaho-Maryland Draft EIR - 16Mar22, Center for Science in Public Participation (CSP2).