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Sent via email

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Re: Comments on the draft Program Environmental Impact Report (PEIR) and Water Supply Assessment for the proposed Lithium Valley Specific Plan (LVSP) project (SCH No. 2023120104).

Dear Mr. Minnick,

We respectfully submit this letter, attached technical expert memo, and the accompanying references on behalf of Earthworks, Imperial Valley Equity & Justice (IVEJ), and the Center for Biological Diversity, regarding the draft Program Environmental Impact Report (PEIR) and Water Supply Assessment (WSA) for the proposed Lithium Valley Specific Plan (LVSP) project.

Earthworks is a nonprofit organization that protects communities and the environment from the adverse impacts of mineral and energy development while promoting sustainable solutions. We're driven by our commitment to collaborate with communities on the frontline, using science in innovative ways, and building people power to ensure a more just and livable future. Earthworks fights for clean air, water and land, healthy communities, and corporate accountability. We work for solutions that protect the Earth's resources, our climate, and our communities. Earthworks has been working in Imperial County since 2022, providing comments to the Lithium Valley Commission, supporting grassroots environmental justice organizations with independent research to be informed about the impacts of lithium extraction, and providing detailed scoping comments on the LVSP in 2024. Earthworks supports a just transition to renewable energy, where lithium mining operations adhere to legally binding regulations that protect communities and the environment.

Imperial Valley Equity & Justice (IVEJ) is a grassroots, intergenerational nonprofit organization powered by love and action that was founded at the height of Imperial County's earliest COVID-19 surge—one of the state's hardest-hit regions. IVEJ unites local residents around civic power, social and environmental justice, and health equity. IVEJ is building a movement for the people, by the people of Imperial County. By lifting community voices, grounding our work in culture, creating space to heal, and inspiring youth action - we are demanding real change for our neighborhoods and families. Together, we're building an Imperial Valley where families can live, work, dream, and thrive. With offices in both the Southend of the Imperial County in Calexico and in the Northend in Calipatria, we are committed to addressing Environmental Justice, Racial & Economic, Public Health issues, and their intersectionalities with other local residents and partners. Since 2020, IVEJ has been a consistent voice elevating community concerns and areas of inquiry as it relates to lithium development at key stakeholder engagements with local, state and federal agency representatives. Our contribution to these shared comments are informed by our experiences engaging with communities that will be directly impacted by these projects in Imperial County and the greater Salton Sea region.

The Center for Biological Diversity (the "Center") is a non-profit conservation organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. The Center has more than 1.8 million members and on-line advocates throughout California and the United States, including many members who reside and recreate in California including in Imperial County. The Center has worked for many years to protect imperiled plants and wildlife, open space, air and water quality, and water resources in this area. The Center actively participated in the Lithium Valley Commission process. The Center strongly supports efforts to shift our energy needs away from fossil fuels to renewable resources including geothermal resources, and supports the exploration of new lithium extraction technologies from brines that could avoid the need for large open pit mines and large evaporation ponds associated with other lithium extraction domestically, and issues with relying on imported lithium which may also have significant environmental and human rights impacts. The California deserts, including Imperial County and Eastern Riverside, are rich in biodiversity, and cultural resources and already have highly impaired air quality that impacts human health as well as the health of the environment—much of this is caused by the drying of the Salton Sea, but that is not the only source of air quality impacts, activities that disturb intact soils, vegetation, such as grading can significantly increase air quality impacts—and these impacts are disproportionately fall on disadvantaged communities which is an environmental justice concern.

We understand that the Draft PEIR was created with partial funding from SB 125, chaptered into law in 2022, that appropriated at least $5,000,000 from the State's General Fund to the County of Imperial for specified purposes related to geothermal energy development and lithium extraction. We are in full support of California's goal that aims for 100% clean energy by 2045 that would require that all electricity sold to customers be from renewable and zero-carbon emission. We are not against building Direct Lithium Extraction facilities in the project area with adequate environmental study and mitigation. However, as currently written, the PEIR fails to adequately disclose and analyze environmental impacts of the wide range of industrial activities permitted by the project and fails to provide the public and decision makers with a sufficient basis for informed decision making. The PEIR is largely speculative and undefined in critical aspects, relying on analysis of a conceptual project that is not yet fully understood. In its current form, the LVSP will create unacceptable harm to Imperial Valley's environment and communities. **The LVSP and PEIR must be revised and recirculated.**

1) Background on Imperial Valley

Imperial Valley is a vibrant bi-national community with a rich culture and strong community resilience. Due to years of economic hardship, public disinvestment, low health access, environmental pollution and heat risk, Imperial County tops state lists with the worst statistics. From some of the highest asthma emergency room visit and hospitalization rates in the state (California Health and Human Services Agency 2024) to California's highest COVID mortality rate, (Flores 2021), there is an intersection of racial, social justice, and environmental justice issues in this community.

With the highest unemployment rate in the state, Imperial County's median household income is 41.5% lower than the State of California's median household income ($54,847 compared to $91,905) (USA Facts 2025). Low household income is exacerbated by the fact that Imperial County has larger than average multi-generational households (Murphy 2023). Employment is concentrated in the seasonal, part-time, and low-benefit sectors of agriculture, health and social assistance, and commercial retail (Imperial County Workforce Development Office 2025). Economic hardship in employment is reflected in housing too. A full 45 percent of county households are rent-burdened, meaning that they spend over 30 percent of their monthly income on rent (California Jobs First 2024).

Longstanding environmental injustices contribute to chronic public health inequities in Imperial County. The New River is among the most polluted waterways in North America, contributing to above average cancer rates in its surrounding neighborhoods (James 2018). The rapid evaporation of the Salton Sea and resulting airborne particulate matter contribute to the state's highest childhood asthma rates and chronic respiratory illness that resulted in the state's highest COVID-19 mortality rate (Friedman 2020).

In addition, recent research found that high use of fertilizers in Imperial County's farming contributes "ten times more smog-forming pollution than California air regulators currently estimate" (Briscoe 2024). The medical infrastructure is unequipped to mitigate consequent health disparities. Imperial County has only one primary-care physician for every 4,360 residents, compared to one for every 1,200 residents statewide (County Health Rankings 2025), and lack of affordable transit options within the valley and to specialist care in San Diego contributes to public health inequity. Meanwhile, this desert community increasingly finds itself at the front lines of the climate crisis with a dramatic increase in extreme heat. By 2053, Imperial County is predicted to have 116 days of extreme heat over 100 degrees (First Street Foundation 2022). The county has limited public shade and water infrastructure, leading to a rise of extreme heat-related illnesses and deaths (Imperial County Public Health Department 2025).

Imperial Valley also has major assets. Imperial Irrigation District holds senior Colorado River water rights, and Imperial Valley is the largest user of water in the lower basin, placing it at the center of ongoing negotiations over cuts to Colorado River use (Ward 2026). The fertile soil and hardworking labor have fed the nation as one of the country's largest producers of winter vegetables (Philpott 2015). Imperial Valley also has one of the largest deposits of lithium in the United States, dissolved in underground geothermal brine near the Salton Sea, with an estimated resource of 4.1 million metric tons of lithium carbonate equivalent (Dobson et al. 2023) that is now being targeted for possible extraction.

This community has already been subject to a long history of extractivism. For example, industrial agriculture has contributed to high asthma rates and normalized temporary, low benefit labor in the valley. Furthermore, the solar industry promised high-road jobs, but Imperial Valley has seen energy exported and jobs continue to leave the valley. With the Lithium Valley Specific Plan and PEIR, Imperial County is at a critical junction. We urge Imperial County not to repeat past mistakes and instead commit to adequate environmental study and mitigation to protect the health of the environment and community. The County must revise the LVSP and PEIR, listen to the concerns of impacted communities, address historic inequities, and propose a plan that ensures equitable benefits from the lithium industry while also protecting the environment and public health.

2) Project Summary

The LVSP will guide development of 51,622 acres in the north end of Imperial County adjacent to the Salton Sea (the Plan Area), introducing changes in land use and zoning regulations. The stated goal is to "facilitate the transition to renewable energy and low-impact mineral recovery industries, while supporting sustainable development and healthy communities" (PEIR at 3-1). More specifically: "The fundamental purpose of the project is to approve and implement land use regulations that provide a streamlined permitting and approval process for geothermal energy production and lithium extraction, processing, production, and manufacturing within Imperial County that will assist in the Country's need to quickly transition to renewable energy and improve domestic supply of Applicable Critical Materials and create new economic opportunities for historically underinvested and disadvantaged communities" (PEIR at 3-4).

The primary mechanism by which the LVSP aims to achieve the above goal is by creating 10 new land use designations (zones) for the Plan Area (PEIR at 3-9 - 3-10):

- **Green Industrial (18,950 acres):** Promotes industrial operations that decarbonize the energy and mineral recovery industries, with a focus on geothermal energy production and environmentally responsible mineral recovery operations.

- **Manufacturing (5,817 acres):** Supports the assembly of clean energy products and accommodates industrial, office, and warehouse space for manufacturers, including geothermal energy and mineral recovery operations.

- **Logistics (7,355 acres):** Facilitates the efficient movement of goods, accommodating warehousing, management, distribution activities, geothermal energy, and mineral recovery operations.

- **Playas Renewables (6,657 acres):** Promotes uses similar to Green Industrial, with restrictions to ensure compatibility with the environmental conditions of the Salton Sea and the exposed playas, requiring dust suppression measures.

- **Community Opportunity Areas (1,643 acres):** Addresses community needs of nearby residential areas, allowing for commercial hubs, social gathering areas, recreational uses, healthcare services, and childcare services, planned in collaboration with neighboring communities.

- **Interim Agriculture:** Retains large agricultural areas until they are needed for industry-driven uses, including existing agricultural lands and other agriculture-related uses, transitioning to industrial uses in later phases.

- **Solar (1,768 acres):** Supports the development of large-scale solar power generation facilities, transitioning to other uses like Logistics or Manufacturing after their lifespans end.

- **Playas Restoration (2,017 acres):** Supports Salton Sea restoration, habitat creation, and dust suppression while allowing subsurface geothermal i.e. well drilling, focusing on environmental restoration and mitigation activities.

- **River Corridor:** Maintains and enhances the Alamo River and New River drainage basins, including a buffer zone to improve water quality and environmental health while reducing flooding impacts.

- **Conservation (8,140 acres):** Protects areas of environmental, cultural, and tribal significance, retaining areas for restoration and mitigation projects, including those under contract for restoration efforts and new areas for Salton Sea rehabilitation projects.

Each of these land use designations includes a number of land uses that will be permitted "by-right" within that zone, meaning that approving future projects of that type will be considered ministerial actions and "there is no additional discretionary action required" (PEIR at 3-12). Because the California Environmental Quality Act (CEQA) only applies to discretionary and not ministerial actions, future projects listed as "permitted" within each land use designation will not need to undergo an environmental study. Besides this PEIR, the public will not receive any information about the environmental impacts of future projects, or have the ability to comment. Among the projects that will be permitted by-right include many that could have significant negative environmental impacts (PEIR table 3-3):

- *Anaerobic Digesting Facility (Dry System)* in the Green Industrial, Playas Renewables, Manufacturing, and Logistics zones.

- *Battery Energy Storage Systems* in the Green Industrial, Manufacturing, and Logistics zones.
- *Business Industrial Parks* in the Green Industrial, Manufacturing, and Logistics Zones.
- *Commercial-scale solar* in the Solar zone.
- *Data centers 1.3 million square feet and under* in the Green Industrial, Manufacturing, and Logistics zones.
- *Floatovoltaics or waterway-covering solar* in the Green Industrial, Manufacturing, Logistics, and Interim agriculture zones.
- *Geothermal Energy Operations* in the Green Industrial, Playas Renewables, Manufacturing, Logistics, and Solar zones.
- *Geothermal Pipelines and Wells* in the Green Industrial, Playas Renewables, Manufacturing, Logistics, Playas Renewables, and Solar zones.
- *Green Hydrogen* in the Green Industrial, Manufacturing, and Logistics Zones
- *Hydrogen Fuel* Stations in the Green Industrial, Manufacturing, and Logistics Zones.
- *Intermodal Rail Hub* in the Logistics Zone.
- *Logistics and Wholesale Distribution* in the Logistics Zone.
- *Manufacturing and Assembly* in the Green Industrial and Manufacturing Zone.
- *Mineral Recovery, Conversion, Processing, and Production* in the Green Industrial, Playas Renewables, Manufacturing, and Logistics Zones.
- *Rail* in the Green Industrial, Manufacturing, Logistics, and Solar Zones.
- *Recycling Centers* in the Green Industrial Zone.
- *Subsurface Geothermal Directional Drilling* in the Green Industrial, Playas Renewables, Manufacturing, Logistics, Playas Restoration, and Conservation Zones.

3) The PEIR Fails to Comply With CEQA

a) Program EIR Standards

All EIRs, including Program EIRs must cover the same elements, and the level of specificity is determined by the nature of the underlying activity covered by the EIR. 14 Cal. Code Regs. ("CEQA Guidelines") §15146; *see Friends of Mammoth v. Town of Mammoth Lakes Redevelopment Agency* (2000) 82 Cal.App.4th 511, 535 (program EIR found inadequate for a redevelopment plan containing detailed descriptions of 72 different projects, where the EIR did not review potential impacts from any of the 72 projects to the extent information was known or could reasonably be known); *San Franciscans for Livable Neighborhoods v. City & County of San Francisco* (2018) 26 Cal. App. 5th 596, 608; *North Coast Rivers Alliance v. Kawamura* (2015) 243 Cal. App. 4th 647, 679. Simply designating the EIR as a "program" EIR does not limit the detail analysis required. *See Cleveland Nat'l Forest Found. v. San Diego Ass'n of Gov'ts* (2017) 17 Cal. App. 5th 413, 426, 440 (rejecting air quality baseline discussion and impact analysis because substantial evidence did not support agency decision to omit more detailed analysis); *Center for Biological Diversity v. Department of Conserv.* (2019) 36 Cal. App. 5th 210, 231(a program EIR must include enough detail "to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project," citing *Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, 516).

As Public Resources Code section 21093 explains, the use of programmatic EIRs is intended "to exclude duplicative analysis of environmental effects examined in previous environmental impact reports." Put another way, the purpose of a Program EIR is to *front-load* the environmental analysis. The Supreme Court affirmed in *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 429, that the use of programmatic EIRs and tiering "is not a device for deferring the identification of significant environmental impacts."

Program EIRs, therefore should provide "for a more exhaustive consideration of effects and alternatives than would be practical in an EIR on an individual action" (14 Cal. Code Regs. § 15168(b)(1)), and also "[e]nsure consideration of cumulative impacts that might be slighted in a case-by-case analysis," (*id.* at § 15168(b)(2)), and "[a]llow the Lead Agency to consider broad policy alternatives and programwide mitigation measures at an early time when the agency has greater flexibility to deal with basic problems or cumulative impacts" (*id.* at § 15168 (b)(4)).

While the County has structured this Specific Plan and PEIR with the intent to cover many later projects without additional CEQA review, the PEIR falls short of the needed CEQA standards to accomplish that goal.

Where, as here, a PEIR is intended to be used to allow later ministerial approval of a large variety and number of activities within the Specific Plan area without any further CEQA review, the PEIR must provide detailed descriptions of all program activities and specific and comprehensive evaluations of all of the program's foreseeable environmental impacts, 14 Cal Code Regs §15168(c)(1)–(2), (5); *Center for Biological Diversity v. Department of Fish & Wildlife* (2015) 234 Cal. App. 4th 214, 237.

It's clear that the PEIR falls short of this requirement. For example, for Air Quality and Greenhouse Gas impacts which are significant, the PEIR states regarding impact analysis: "this Draft PEIR does not assess the site-specific construction and operational details of each future development within the LVSP area." (PEIR at 4.8-25, 4.3-37). This underscores a significant gap in review, one that does not provide the level of clarity, accountability, and environmental protection conducive to informed decision-making.

i) The PEIR fails to provide adequate description or analysis of lithium extraction

One of the main goals of the PEIR is to streamline permitting of lithium extraction within the Plan Area. These would be permitted by-right under the "Mineral Recovery, Conversion, Processing, and Production" land use in the Green Industrial, Playas Renewables, Manufacturing, and Logistics Zones, on a total of 38,000 acres. Lithium extraction facilities would use a new technique, direct lithium extraction (DLE), in combination with geothermal energy plants. Combined DLE with geothermal has never been used at commercial scale. Like any mineral extraction, DLE has potentially serious impacts related to waste, water use, and air quality (Earthworks 2023). The PEIR claims to analyze the impact of 17 combined geothermal/DLE facilities in the Plan Area, generating up to 2,550 MW of energy and 450,800 metric tons of lithium per year (PEIR at 3-7). However, the PEIR does not provide enough information on DLE to adequately analyze the impacts of building 17 facilities in the Plan Area.

Earthworks contracted mining technical expert Steven H. Emerman Ph.D. (Malach Consulting) to review and provide comments on the PEIR, that are included here in Appendix A. Emerman's review states: "the Draft PEIR is shockingly devoid of any information on the DLE technology that would be implemented in Imperial Valley" (Appendix A, p.4). Emerman emphasizes that without more detail on the type of DLE technology to be used within the plan area, there are considerable uncertainties related to water and energy consumption, greenhouse gas emissions, and hazardous waste generation – none of which are discussed in the PEIR (Appendix A, p.5). The PEIR must be revised to provide more detailed information about lithium extraction technologies. Without more detail on the type of DLE technology to be used, and without adequate analysis on the environmental impacts of building 17 combined DLE/geothermal facilities, these facilities cannot be permitted "by-right" without further environmental review.

ii) The PEIR fails to provide adequate description or analysis of data centers

Despite being unrelated to lithium extraction, under the LVSP, data centers under 1.3 Million Square Feet are permitted by right in the green industrial, manufacturing and logistics zones. If permitting data centers will become a ministerial action, without further environmental study, the PEIR first must analyze their environmental impacts. However, no description of data centers is provided in the PEIR, nor any attempt to analyze the specific environmental impacts of data centers.

Data centers built within the Plan Area will likely cause significant environmental impacts that must be analyzed in the PEIR. Data centers are projected to generate significant greenhouse gas emissions, particularly where facilities are powered by fossil fuel–based electricity or methane-derived hydrogen (Net Zero Insights 2025). The LVSP requires that to be permitted by right, data centers must be powered on average by 30% or more from renewable energy sources (LVSP at 66). This requirement is insufficient to meaningfully mitigate climate and air quality impacts; facilities of this scale should be powered by 100% zero-emission sources to prevent additional burden on a region already experiencing high rates of respiratory illness and extreme heat vulnerability. Data centers also commonly rely on backup diesel generators during power outages (Martin 2025). These generators emit particulate matter and nitrogen oxides, which can exacerbate asthma and other respiratory conditions, and must be analyzed in the PEIR (Liu et al. 2025).

Because diesel backup generators for such facilities can be quite large, they may be subject to additional permitting under Public Resources Code section 25517 which provides that "no construction of any thermal powerplant or electric transmission line shall be commenced by any electric utility without first obtaining certification [from the California Energy Commission] as prescribed in this division." (Pub. Resources Code, § 25517.) "Thermal powerplant" is defined as "any stationary or floating electrical generating facility using any source of thermal energy, with a generating capacity of 50 megawatts or more, and any facilities appurtenant thereto." (*Id*. § 25120.) For example, a recent data center proposal estimated it would need 24 generators (each capable of 2.75 MW) for a generating capacity of 66 MW. For any data center with backup generators that burn diesel to convert heat into electrical energy of more than 50 MW taken together, the California Energy Commission ("CEC") will have jurisdiction over those projects.

While under Public Resources Code Section 25541, the CEC may exempt thermal powerplants with a generating capacity of 50 to 100 MW, from its exclusive permitting authority under the Warren-Alquist State Energy Resources Conservation and Development Act when it determines that they will not result in substantial adverse impacts on the environment or energy resource, such an outcome would not be possible here where any increase in toxic air pollutants must be found to be a substantial adverse impact.

Beyond emissions, research consistently shows that large-scale data centers contribute to water scarcity through intensive cooling demands (Yañez-Barnuevo 2025). According to the LVSP, "Data centers must adopt water-free cooling technology such as air cooling, or cooling technologies or systems that minimize water consumption such as closed-loop, zero-water evaporation cooling systems" (LVSP at 66). This language in the LVSP does not prevent data centers from using water—but rather provides only a limit on the types of cooling technology. However, it is unclear whether water-free cooling technology is commercially available for data centers at this scale. Water free cooling may also require higher electricity demand, leading to greater greenhouse gas and air quality impacts which are not addressed.

The EIR should at minimum have analyzed the water needs for data centers by quantifying the amount of water that would be used in "systems that minimize water consumption" as well as other cooling systems. Although the LVSP assumes no data centers will be approved by right or with a CUP that use water for cooling, it is important for the EIR to disclose that data centers generally rank among the top 10 water-consuming commercial industries in the United States (Siddik et al. 2021), and California is number two on the list of states with the most data centers in highly water-stressed areas. (Campbell 2025.) More than seventy data centers in Los Angeles County are placing a strain on water supplies, cumulatively impacting the county. Researchers at UC Riverside determined that between 2019 and 2023 on-site water consumption in California data centers slightly more than doubled. (Lazo, 2025; Liu et al. 2025.) The researchers also assess off-site indirect water use. (*Id*.)

Data centers can also demand extremely high amounts of electricity (Leppert 2025). Depending on how many data centers are built out within the Plan Area, there may not be enough electricity available for other land uses. If they are powered directly by geothermal plants, it is unclear how much geothermal power will be left to power DLE or provide baseload power to the grid. The PEIR must be revised to analyze different electricity demand scenarios depending on probable buildouts of data centers alongside other industries in the LVSP area.

The February 2025 Draft LVSP allowed data centers of any size to be permitted by right under the green industrial, manufacturing, and logistics zones. The December 2025 Draft LVSP included a revision, which now requires data centers exceeding 1.3 million square feet to obtain a special use permit, meaning they will be subject to discretionary review and CEQA analysis. While this is a step in the right direction, it does not do nearly enough to adequately analyze and mitigate the impacts of data center development. Neither the PEIR nor the LVSP places a cap on the *total* number of data centers allowed within industrially zoned areas, creating the potential for cumulative impacts of multiple data centers (each individually permitted under 1.3 Million SF) that have not been fully evaluated. Data center developer CalEthos has stated it plans to build four million square feet of data centers in the LVSP area (Wilson 2025). Controlled Thermal Resources (CTR) announced it is developing its 4,000-acre American Data Energy Complex within the Plan Area (Controlled Thermal Resources 2026). The PEIR fails to analyze the cumulative impacts of these projects, plus the buildout of multiple additional data centers, on water, energy, and air quality within the Plan Area, and so data centers cannot be permitted by right.

Data centers also produce a disproportionately small number of permanent jobs relative to their environmental footprint. Even the largest facilities in California generate roughly 100 permanent positions (Black 2026). The PEIR states that the LVSP "is estimated to generate approximately 40,000 jobs inclusive of 10,000 construction jobs" (PEIR at 3-5), without providing any evidence or methodology. It remains unclear what assumptions the LVSP is making about how many jobs will be created by which of the many permitted industries. The number of jobs that will be created by DLE is relatively modest, but many more jobs could be created further along the lithium-ion battery value chain, from cathode manufacturing, battery cell and pack manufacturing, and electric vehicle manufacturing (Benner et al. 2024). Thus, if the LVSP buildout prioritizes many data centers in the Plan Area (which could use up available land, energy, and water), instead of building geothermal/DLE and co-located battery manufacturing plants, the LVSP would likely create far fewer jobs than a buildout scenario that prioritizes lithium battery manufacturing.

In summary, data centers are unrelated to the goals of the LVSP, not described or analyzed in the PEIR, and so must be removed from the list of permitted projects.

b) **Project Description is Overbroad**

i) *Project description should have been focused on the key elements of the Lithium Valley Development Contemplated by the Blue Ribbon Commission and SB 125*

The Specific Plan and PEIR go far beyond the development contemplated by the Lithium Valley Blue Ribbon Commission. As stated in the Report of the Blue Ribbon Commission on Lithium Extraction in California Pursuant to Assembly Bill 1657 (E. Garcia, Chapter 271, Statutes of 2020): "The state sees potential for "Lithium Valley" to be an economic hub (economic ecosystem) *centered by geothermal power and lithium recovered from geothermal brine, and a lithium battery supply chain*" (Paz et al. 2022, at 13). The Commission also emphasized the need for "clean transportation" in development associated with Lithium Valley given the impaired air quality currently in this basin. *See Id.* at 13, Figure 2: Key Elements of Lithium Valley Development (showing the key elements as Geothermal Power, Geothermal Lithium, and Clean Transportation). Moreover, the Specific Plan has little or no requirements that would support clean transportation as a centerpiece of development or otherwise meaningfully address air quality impacts from transportation. In fact, logistics, intermodal rail yards, and rail will be permitted by right without any requirements for clean transportation technology that could have been included in the LVSP policies or development standards.

Similarly, the "Green Industrial" designation has too few sideboards to ensure that the projects in these areas would be any different than other industrial development in terms of GHG emissions, land use impacts, water use, air and water quality impacts, or otherwise. For example, while the specific plan definition of "green hydrogen" is limited to facilities "powered by renewable energy sources like solar or geothermal," (Specific Plan at 57), nothing in the definition addresses the freshwater scarcity in the area and the potential for additional water-dependent industries to further deplete freshwater flows to the Salton Sea. Without addressing this key issue and limiting buildout to protect water resources, neither so-called "green hydrogen" nor many of the other allowed uses within the "Green Industrial" designation (including data centers) can be considered truly "green."

The Commission anticipated some *related* development to support the geothermal, lithium production, and battery manufacturing. *see id.* at 75 (Recommendation 1: "Establish a Lithium Valley priority permitting process that includes additional resources for agency action on applications for *geothermal, DLE, and related manufacturing, production, or assembly projects* identified by the state as essential to the development and growth of Lithium Valley.")

Furthermore, California passed Senate Bill 125 (Public resources: geothermal resources: lithium) in 2022 to guide the development of Imperial County's lithium industry. Among other provisions, Section 8 of SB 125 grants Imperial County $3.85 million to prepare a PEIR for "geothermal energy development and lithium extraction, processing, production, and related manufacturing activities" (SB 125 2022).

However, ignoring both the requirements of SB 125, and the recommendations of the Commission, the Specific Plan goes far beyond that framework, adding other types of development including massive data centers and logistics hubs that could be used for any purpose and are not necessarily related to the key elements of Lithium Valley Development.

As a result, the Project Description is misleading. A project description violates CEQA when it "gives conflicting signals to decision makers and the public about the nature and scope of the project." (*Citizens for a Sustainable Treasure Island v. City & County of San Francisco* (2014) 227 Cal.App.4th 1036, 1052.) This is because an "unstable project description draws a red herring across the path of public input." (*South of Market Community Action Network v. City and County of San Francisco* (2019) 33 Cal.App.5th 321, 332, internal quotation omitted.)

Because the project description does not include all of the effects associated with ministerial projects (e.g. traffic and air quality impacts associated with logistics hubs, air impacts associated with data center backup generators, freshwater consumption from data centers, greenhouse gas emissions from anaerobic digesters,) it precludes *informed* decision-making about the Project's effects and thus consideration of mitigation measures and alternatives. (*See Cleveland National Forest Found. v. San Diego Assn. of Governments* (2017) 3 Cal.5th 497, 515) ["An adequate description of adverse environmental effects is necessary to inform the critical discussion of mitigation measures and project alternatives at the core of the EIR."].)

Notably, the Project Objectives appear to track more closely with the Lithium Valley Commission's vision. PEIR at 3-4 to 3-5 (3.2.2 Fundamental Purpose and Project Objectives). Data centers were not mentioned in the 2023 Notice of Preparation and Initial Study, meaning that the public had no opportunity to comment on the scope of analysis for data centers, and was not expecting data centers to be included, until it was announced in the February 2025 draft of the LVSP. How and why the Specific Plan came to expand beyond these fundamental purposes to include large-scale data centers and logistics hubs is unclear. Imperial County residents commented at a February 26, 2025 Imperial County public meeting on the draft LVSP that data centers should not be included because they would create few employment opportunities while consuming significant amounts of water. In response, the county's consultant stated: "Data centers don't really have a lot of employment opportunities … at the same time, it's very important to have a project like this to get something built" (Everwine 2025). Getting something built is not a sufficient reason for why an industry unrelated to the stated goals of the project should be included.

ii) The Proposed Planning and Zoning Approvals Leaves Too Little Discretion To Assess Future Site-Specific Proposals and Protect Environmental Values and Human Health

The Specific Plan as presented would amend both planning and zoning over 51,000 acres to allow a large number of industrial-scale projects of various types to be "permitted uses" which means that the approval by the County would not require discretionary decision-making but would rather require only "ministerial" future approvals. *See* Specific Plan at 59-64; PEIR at 3-11 to 3-16 (Table 3.3). Because CEQA review is only required for discretionary approvals, "[m]inisterial projects are exempt from the requirements of CEQA." (14 Cal. Code Regs., § 15268(a).) Put another way, "If the lead agency concludes a project is exempt . . . the agency may thereafter proceed without further consideration of CEQA." (*Union Med. M. v. City San Diego* (2019), 7 Cal. 5th 1171, 1186). History has shown that the public is often surprised by the extent of projects that may be permitted without any discretionary public process or involvement when Specific Plans are adopted, particularly when development takes years or decades to occur after the change in planning and zoning when local circumstances and land use patterns may have changed.

A project description violates CEQA when it "gives conflicting signals to decision makers and the public about the nature and scope of the project." (*Citizens for a Sustainable Treasure Island v. City & County of San Francisco* (2014) 227 Cal.App.4th 1036, 1052.) This is because an "unstable project description draws a red herring across the path of public input." (*South of Market Community Action Network v. City and County of San Francisco* (2019) 33 Cal.App.5th 321, 332, internal quotation omitted.)

This proposed Specific Plan is so overly broad and goes so far beyond the key elements and core impetus for the planning that such future conflict is nearly certain to occur here. Moreover, the failure to address key public health concerns with air quality *in detail* in the PEIR undermines public safety and public participation in violation of CEQA's core principles.

As detailed below, because the PEIR fails to identify and analyze all foreseeable impacts from the overbroad project proposed in the Specific Plan, provide analysis of reasonable alternatives to avoid impacts, and to address all feasible minimization and mitigation measures, it fails to comply with CEQA.

c) **The PEIR fails to meet CEQA's requirements for meaningful participation**

The timing and structure of the Draft PEIR release raise serious concerns regarding meaningful public participation. The County of Imperial made the decision to publish the Draft PEIR on December 30, 2025, after months of delay, during a period when many residents are engaged in holiday observance and end of year commitments. Releasing a document of this magnitude and scope during a time of celebration makes it significantly more likely that the general public would miss the release altogether, which undermines transparency and accessible governance.

Moreover, the 60 day public comment period the County originally allocated was not sufficient to analyze and educate the public on the content of the report given the complexity. The Draft PEIR itself exceeds 1,000 pages and when its related appendices are integrated, the total length surpasses well over 7,000 pages. The volume of this material requires substantial time for review, especially for community members who do not have access to technical consultants. As courts have stressed:

> The data in an EIR must not only be sufficient in quantity, it must be presented in a manner calculated to adequately inform the public and decision makers, who may not be previously familiar with the details of the project. "[I]nformation 'scattered here and there in EIR appendices,' or a report 'buried in an appendix,' is not a substitute for 'a good faith reasoned analysis … .' " (*California Oak [Found. v. City of Santa Clarita], supra,* 133 Cal.App.4th [1219] at p. 1239 [(2005)], quoting *Santa Clarita [Org. for Planning v. Cty. of L.A.], supra*, 106 Cal.App.4th [715] at pp. 722–723 [(2003)].)

Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova, 40 Cal. 4th 412, 442 (2007)

Earthworks, in coalition with local and national partners, formally requested that the County extend the public comment period from 60 to 90 days to allow for more meaningful review and engagement on January 22, 2026. We received no response until four weeks later, on February 18, denying the extension. This delayed response and initial denial of the extension request reflects an absence of responsiveness to community concerns. It was not until the last minute, on Friday February 27 at 4:30 p.m., only 72 hours before the comment deadline that Imperial County announced an extension of the comment period until April 17.

Accessibility barriers have also further limited meaningful participation. Technical issues were identified surrounding the downloading and accessing of large appendices, particularly those with large data sets (these have now been split into multiple files to download more easily).

The County also only provided one printed copy of the PEIR to the community of Calipatria. This restricts access for residents with limited transportation and internet.

The Imperial Valley is a predominantly Hispanic and Spanish speaking community, with a reported 74% of residents speaking Spanish in their homes. This makes language access concerns especially significant. A fully translated Spanish version of the PEIR was not made available to the public at the time of release. An executive summary in Spanish was provided, however, months later after the initial release of the report. These actions do not provide equitable access to the full contents of the report to the residents. Providing only partial or delayed translation undermines equitable participation from all members of the community in the environmental review process. Furthermore, at an unknown date partway through the comment period, Imperial County uploaded additional documents to the project website under the heading: "Requested Draft PEIR Reference Materials." The public was not notified that new materials were available for review, again undermining the public's ability to be fully informed about the PEIR.

The County's broader community outreach efforts prove to be further insufficient in proportion to the scale of the proposed development. Although SB 125 grants funds for meaningful community engagement, the County's request for proposals process was marked by limited responsiveness to clarifying questions. Effective outreach requires proactive engagement, with transparent communication and adequate time for public review. These elements were not fully present in the process undertaken for the Draft PEIR.

d) The PEIR is inconsistent with the LVSP phasing as revised in December 2025

In February 2025, Imperial County released a draft of the LVSP for public comment. The February draft outlined three phases of development (February 2025 Draft Specific Plan p. 49):

- Phase 1 for initial development stemming from existing infrastructure and geothermal powerplants (first ten years, starting in 2025).
- Phase 2 for development in areas with less established infrastructure (15 years, from 2035-2050)
- Phase 3 for development of the Playas Restoration and Interim Agriculture zones (beyond 2050).

This draft included specific estimates for acres developed, energy demand, water supply demand in each phase.

On December 30, 2025 Imperial County released the December 2025 Draft of the Lithium Valley Specific Plan. There was no way for the public to track changes that were made to the plan, besides comparing the text line by line. One major change is to the phasing (December 2025 Draft Specific Plan p.53):

- Phase 1 was expanded from 10 to 20 years, now covering 2026-2046
- Phase 2 was shortened from 15 to 10 years, now covering 2046-2056
- Phase 3 was limited to 10 years from 2056-2066

The PEIR, meanwhile, lists phasing as (PEIR at 3-27):

- Phase 1: 2026 - 2035
- Phase 2: 2036 - 2045
- Phase 3: 2046 - 2055

The PEIR notes in footnote 5: "The LVSP includes an extended phasing with a Phase 1A and Phase 1B; however, for the purposes of analyses this EIR conservatively assumes the abbreviated schedule." (PEIR at 3-27). This is confusing because there is no mention of Phase 1A and 1B in the December LVSP. The result is the public has no way of understanding how the phasing will actually play out. Furthermore, areas of analysis in the PEIR estimate water demand, GHG emissions, and other impacts by phase – and it's not clear what assumptions they are making about phase length. As a result, the project description is unstable and the PEIR fails as an informative document.

e) The PEIR Fails to Disclose and Analyze Significant Foreseeable Impacts of Development and Full Build-Out of the Specific Plan Area

CEQA requires that an EIR "identify the significant effects on the environment of a project." (Pub. Resources Code § 21002.1(a).) All significant effects of a project during its lifetime, or for a plan, full build-out, must be identified and disclosed. CEQA Guidelines section 15126 mandates that "All phases of a project must be considered when evaluating its impact on the environment," thus, full build-out of the Specific Plan must be considered and disclosed in the PEIR, but it was not.

By omitting to disclose and analyze in detail the foreseeable future consequences of build-out of the Specific Plan, the County has failed to disclose the Project's true scope and environmental footprint, undermining CEQA's core informational purpose.

To adequately disclose and evaluate the Specific Plan's traffic-related impacts on air quality, traffic, water resources and wildlife, for example, the PEIR must provide specific information for each resource and the likely impacts from the project activities. For example, the PEIR must explicitly quantify the number of additional local truck trips generated by all the "ministerial projects" including the logistics centers, identify the specific routes the trucks would use, and analyze the resulting increase in traffic, air quality, and the wildlife-vehicle collision risk.

Absent this information, the PEIR cannot assess the extent to which increased local truck traffic would substantially impact traffic, air quality, and mortality risks for sensitive species on affected roadways or fully address avoidance through alternatives, minimization and mitigation measures as required by CEQA.

f) Air Quality

i) The PEIR fails to consider the cumulative effects of the LVSP on already hazardous air quality in Imperial Valley

The Draft PEIR air quality analysis further reflects a failure to center the health of Imperial Valley residents and strongly fails to consider environmental justice principles. This document does not confront the region's vulnerabilities and cumulative pollution burden, the scope remains too narrow, relies on speculative modeling tools, and proposes mitigation measures that are unenforceable or insufficient to reduce health risks. The county readily admits that the air quality in the region will bear significant and unavoidable impacts even without considering the full scope of developments that will take place in the area.

Furthermore, the PEIR relies on CalEEMod to make generalized assumptions for air quality impacts rather than using actual project-specific operational data. Limitations in quantifying precise project-level impacts and, the inability to model with precision, does not relieve the County of its duty to disclose uncertainty, apply precautionary mitigation, and commit to monitoring and adaptive enforcement. Here, we incorporate by reference expert comments on air quality by Dr. Ranajit Sahu, submitted with PEIR comments from United Autoworkers Region 6. Dr. Sahu finds that actual projects used within the broad land uses used by CalEEMod do not have the same air quality emissions profiles, and so the PEIR fails to provide a realistic estimate of actual air pollutant emissions from the project.

Further, the PEIR uses inappropriately narrow geographic boundaries when it comes to air pollutants; this does not align with reason and the movement of air. The PEIR wrongly classifies the Salton Sea Air Basin as in attainment for $PM_{2.5}$, stating that the portion in nonattainment is outside the plan area (PEIR at 4.3-25). While a portion of Imperial County within the Salton Sea Air Basin is designated nonattainment for $PM_{2.5}$ and the plan area is technically outside that boundary, air pollution can reasonably be understood to not adhere to geographic lines. Communities will experience project emissions regardless of mapped demarcations.

ii) The PEIR fails to analyze indirect impacts of exposed Salton Sea playa on air quality

The PEIR finds that the combined construction and operational activities of the LVSP will result in emissions of criteria pollutants (VOCs, NOx, CO, PM_{10}, and $PM_{2.5}$) that will exceed Imperial County Air Pollution Control District (ICAPCD) thresholds and therefore result in a "significant impact" (PEIR at 4.3-65). The PEIR proposes mitigation measures to reduce emissions, but admits that these "are not readily quantifiable" and are not expected to reduce project emissions below ICAPCD significance thresholds (PEIR at 4.3-66). The PEIR thus finds that the LVSP would have a significant and unavoidable impact on air quality (PEIR at 4.3-66).

The PEIR finds that "potential reduced inflows to the Salton Sea resulting from the proposed land use changes in the Plan Area has the potential to contribute to accelerated receding of the Salton Sea open water area" (PEIR at 4.4-27). Currently, an estimated 40,000 AFY drains from IID irrigated agricultural fields within the plan area and discharges into the Salton Sea (PEIR at 4.4-27). Because under the LVSP, all of this irrigated agricultural land will eventually be converted to industrial use, the result of implementing the LVSP will be 40,000

AFY less to the Salton Sea. The PEIR finds that this reduced inflow has "the potential to contribute to expansion of the Salton Sea playa area" (PEIR at 4.4-28). The PEIR also finds that "as the Sea continues to evaporate and recede, an increasing area of its shores, or playas, are exposed to the open air" … leading to "considerable air quality issues when strong winds pick up the exposed lakebed, creating dust storms carrying PM_{10} into the air" (PEIR at 4.3-2).

Despite this finding, there is no analysis, or attempt to quantify, how much additional PM_{10} will result from the project speeding up exposure of playa. PM_{10} is only analyzed from direct emissions from construction and operation of industrial land uses within the LVSP. By ignoring the indirect effect on increasing PM_{10} emissions from exposed playa, the PEIR fails to adequately analyze impacts to air quality, and vastly underestimates PM_{10} pollution from the project. This gap in analysis is especially concerning given Imperial County residents already suffer high rates of asthma, which are likely to increase as the Salton Sea shrinks and air quality worsens (Farzan et al. 2019). The PEIR must consider recent research that has shown children living closest to the Salton Sea are more likely to experience adverse health impacts from PM_{10} exposure than those living further away (Johnston et al. 2024).

iii) The PEIR fails to adequately analyze the impacts of Hydrogen Sulfide emissions

Hydrogen sulfide (H_2S) exposure presents a significant and under-analyzed public health concern in the project area, particularly when viewed through the lens of cumulative exposure (Centeno et al. 2025). The PEIR acknowledges that H_2S is released during geothermal energy production as a "non-condensable gas" naturally occurring in geothermal brine and emitted from cooling towers during the flashing process. It also recognizes that local H_2S formation is driven by organic decay at the bottom of the Salton Sea (PEIR at 4.3-6). However, the PEIR does not include any analysis of how H_2S emissions from the LVSP will impact air quality.

This lack of analysis is concerning because even so-called "low-level" exposure to H_2S, defined as concentrations below 0.1 ppm, can produce measurable health effects (Batterman et al. 2023). Communities near the LVSP area frequently experience H_2S within this range. The California Ambient Air Quality Standard (CAAQS), which the PEIR relies upon, sets a 1-hour average threshold at 0.03 ppm (30 ppb). Yet evidence cited by Batterman et al. shows that increments as small as 0.001 ppm (1 ppb) are associated with ocular, nasal, and respiratory irritation. Chronic exposure below 0.03 ppm (30 ppb) has been linked to increased prevalence of neurological symptoms. Short-term exposures above 0.03 ppm for as little as 30 minutes have been associated with increased unscheduled hospital visits among individuals with asthma, a population already overrepresented in Imperial Valley (Batterman et al. 2023).

Local monitoring data referenced in the PEIR report maximum 1-hour concentrations in nearby Mecca ranging from 0.073 to 0.131 ppm, between two and four times the state standard (PEIR at 4.3-34). According to the health literature, these levels fall squarely within the concentration range associated with neurological effects, respiratory morbidity, and ocular irritation. Importantly, there is no uniform hydrogen sulfide standard across state and federal agencies, and California's existing standard has not been substantively updated in more than fifty years. It does not incorporate modern epidemiological findings, cumulative exposure modeling, synergistic pollutant effects, or heightened vulnerability among children, the elderly, and individuals with chronic respiratory disease (Marquez et al. 2025). Credible scientific literature indicates adverse health outcomes below existing standards, the County must take into consideration this evidence and implement mitigation enforcement efforts from this.

iv) The PEIR fails to identify mitigation measures to reduce health risk

The PEIR also includes a health risk assessment (HRA) to evaluate potential health risks of the LVSP, and finds that health effects of criteria air pollutants emitted by the LVSP would be significant and unavoidable (4.3-70). Furthermore, the HRA analyzes cancer risk from Toxic Air Contaminants (TACs). The HRA finds the Maximum Individual Cancer Risk will be 24.4 per million for off-site residents, 37.3 per million for on-site residents, and 49.8 per million for on-site workers, well above the CEQA threshold of 10 per million (PEIR at 4.3-72). The PEIR is unable to quantify how mitigation measures would reduce TAC emissions, and so finds cancer risk to be significant and unavoidable (PEIR at 4.3-72). The PEIR thus falls short of CEQA's requirement to identify mitigation measures to reduce health impacts.

Furthermore, the Lithium Valley Commission, in its final report, found that "health impact assessments provide a deeper evaluation of a project's impact on the community" (Paz et al. 2022 at 65) and recommended that the state fund a health impact analysis related to increased development in the Salton Sea Known Geothermal Resource Area (item 8, p. 78). Indeed, SB 125 provides $3.85M for the PEIR *and* a health impact assessment. In December 2022, Imperial County published a $400,000 RFP for the Salton Sea Renewable Resource Health Impact Assessment (HIA), stating:

> *The expectation is that this HIA will a) provide an in-depth, comprehensive analysis of the potential health impacts of lithium extraction of all projects being evaluated under the Imperial County Lithium Valley Specific Plan and Programmatic Environmental Impact Report, b) address social determinants of health, c) explore, collect, analyze baseline data and conditions, and d) identify findings that will be used to inform decisions, influence policy development, support decision-making, as well as offer practical and evidence-based recommendations for ways to minimize risks and support opportunities to maintain and/or improve health in all Lithium focused plans and programmatic Environmental Impact Reports (EIRs).* (Imperial County Public Health Department, 2023).

According to the RFP timeline, the HIA project was supposed to commence in January 2023 and was expected to run for 12-15 months. San Diego State University was selected for the proposal in March 2023, but to date, nothing has been published and no update on the HIA has been made available to the public. The HIA should have been published before the PEIR so that its results could inform the analysis and the public. As a result, the health risk assessment in the PEIR is missing detailed information needed for adequate analysis and mitigation of health impacts.

g) Biological Resources

i) The PEIR Fails to Adequately Disclose and Evaluate the Traffic Impacts on Wildlife.

The PEIR finds 13 special status wildlife species occur or have high potential to occur within the Plan Area, and 23 special-status wildlife species have moderate potential to occur in the Plan Area (PEIR at 4.4-8). These include California fully protected bird species of California Black Rail, Yuma Ridgway's Rail, White-Tailed Kite, Bald Eagle, and California Brown Pelican (PEIR at 4.4-9). Direct and indirect impacts to individuals and suitable habitat are expected to have adverse impact on 27 special status species. The PEIR finds, without sufficient disclosure and analysis, that impacts to terrestrial special status species of the LVSP will be less than significant with mitigation incorporated (PEIR at 4.4-23). The PEIR finds the LVSP may contribute to reduced waterflows, increased salinity, reduced food sources, and accelerating receding of the Salton Sea (impacting aquatic habitat), and so impacts to special status species that depend on the Salton Sea are significant and unavoidable (PEIR at 4.4-23).

The PEIR's Biological Resources disclosure and analysis does not adequately address how the Project's operations will increase train and truck traffic and potentially impact biological resources. Increased train and local truck traffic can harm wildlife directly by increasing mortalities, and indirectly by exacerbating habitat fragmentation, and introducing local noise and air pollution.

Construction and operation of the buildout of the Specific Plan will increase employee traffic, local truck traffic, and long-distance truck traffic to the industrial sites and logistics hubs. To adequately disclose and evaluate the Specific Plan's traffic-related impacts on wildlife (and air quality and other issues), the PEIR must quantify the number of additional car and truck trips generated by buildout of the Specific Plan, identify the specific routes the trucks would use, and analyze the resulting increase in wildlife-vehicle collision risk and other impacts.

According to Figure 3-1, the LVSP Proposed Land Use Map (PEIR at 3-33), the IID Managed Marsh Complex, between Schrimpf Road and Hazard road and between English Road and Highway 111, is designated as a conservation zone. The Marsh complex is part of the required mitigation under the Quantification Settlement Agreement and Water Transfer, and supports bird populations including the fully protected Yuma's Ridgway Rail (Imperial Irrigation District, n.d.). With the buildout of the LVSP, the Marsh will now be surrounded to the South and West by the logistics zone, including a proposed intermodal rail yard at English and Hazard Roads. Similarly, the units of the Sonny Bono National Wildlife Refuge designated as conservation zone, will be surrounded by green industrial zone, which will likely require increased truck traffic to/from the wide range of industrial projects permitted within that zone. No attempt has been made in the PEIR to quantify and analyze the impact of increased truck and rail traffic on the bird populations supported by the Marsh and Refuge conservation zones.

Without clear disclosure of truck traffic, route patterns and destinations, the PEIR cannot meaningfully analyze the impacts or identify feasible and effective mitigation, violating CEQA's informational and disclosure requirements.

h) Tribal Cultural Resources

i) The PEIR must analyze impacts to the entire Southeast Lake Southeast Lake Cahuilla Active Volcanic Cultural District

The PEIR states that through tribal consultation, the County is aware that the Southeast Lake Cahuilla Active Volcanic Cultural District (SELCAVCD) has been nominated by Native American tribes to the National Register of Historic Places (4.5-18). The proposed 11,162-acre district includes Obsidian Butte, Rock Hill, Red Island, Mullet Island, mudpots, steam vents, and other important tribal cultural features within the Plan Area (PEIR at 4.5-20). According to the PEIR, the Kwaaymii Laguna Band of Indians expressed in consultation the "importance of the physical and visual interconnection" of the SELCAVCD features, as well as its physical and spiritual connection to landscapes and viewsheds around it (PEIR at 4.18-18).

Although the Department of Parks and Recreation (DPR) form nominating the SELCAVCD remains confidential, the Cultural District has previously been described by California Energy Commission (CEC) staff based on tribal consultation for the preliminary staff assessment for the Black Rock Elmore North, Morton Bay geothermal projects proposed within the Plan Area. According to CEC staff:

> *The SELCAVCD is part of a larger cultural landscape in and around ancient Lake Cahuilla, including the area in and around its modern expression as The Salton Sea that contains tangible and intangible natural and cultural resources of significant value to Kamia, Cahuilla, and Quechan people. The SELCAVCD is centered upon the surficial expression of the Salton Sea Shallow Geothermal Anomaly and consists of culturally important volcanic and hydrological features, mineral deposits, biotic resources, and places of sacred and ritual importance.* (California Energy Commission 2024 at 5.4-51).

CEC staff find that not only is the Cultural District a place where materials such as obsidian, plants, and medicine were gathered and traded, but that it is also a place for ongoing transmission of cultural knowledge (California Energy Commission 2024 5.4-52). Furthermore, the CEC staff recommended that the SELCAVCD is eligible for the California Register of Historic Resources, and should be treated as a Tribal Cultural Resource for the purposes of CEQA. (California Energy Commission 2024 at 5.4-58). The CEC included a 2023 working draft boundary (5.4-50), which shows the district would likely be impacted by development in the LVSP's green industrial and playa renewable zones.

The PEIR notes that according to the DPR form, the SELCAVCD landscape is important in part because it is related to the legend of the great snake as told by Quechan and Kamia elder Preston Arrow-Weed (PEIR at 4.5-20). The legend as told by Arrow-Weed is summarized here:

> *There is a legend, not well-told, when the [Kamia] people lived there, there was a giant snake that came from the ocean and went into the Salton Sea—a big white snake and it had spots all over it—a repository of knowledge. He surfaced at Obsidian Butte with a boom from the volcanic power from below the Earth. The people saw this happen and knew this was not just a snake... In a ceremony, the [Kamia People] had to destroy the giant snake who had exploded into the world*

at Obsidian Butte. They cut off His head and cremated Him. The burning created the Smoke of Knowledge, and that wisdom spread over the lands and the mountains. It is there at Obsidian Butte, there must have been a big giant volcano, that displayed the power of that explosion. (Eidt and Refetoff 2024).

Furthermore, Preston Arrow-Weed had previously testified to the Lithium Valley Blue Ribbon Commission that Obsidian Butte is a sacred place that should be left undisturbed (Arrow-Weed 2022). Yet, the PEIR argues that according to a 1931 ethnography by Edward Gifford, the Kamia legend says the snake was actually burned at Avi Kwa Ame or Spirit Mountain in Nevada, not Obsidian Butte (PEIR at 4.5-20). The PEIR claims that because there is contradictory information about the location of the great snake, there is not enough evidence to associate the SELCAVCD with the Great Snake, and so, among other reasons, the district is not eligible for listing on the National Register of Historic Places (PEIR at 4.5-21).

It is inappropriate for the County to use a nearly 100-year old ethnography to dispute the oral tradition and traditional ecological knowledge of a tribal elder and knowledge holder. The "black and white serpent" creation story stands as vital anthropological evidence of this landscape's enduring cultural and spiritual significance. Oral histories and traditional knowledge systems are legitimate forms of evidence and should not be dismissed because they do not conform to academic frameworks. The County does not possess the anthropological or archaeological authority to unilaterally discount Indigenous knowledge or redefine sacred landscapes through a narrow land-use lens as done so in the PEIR. It is not for the county to designate whether the SELCAVCD is eligible as a historical district, that decision should remain entirely with the authorizing body. The PEIR does not present enough evidence to justify its conclusion that the district is not eligible for listing.

Although the PEIR goes on to state that it recognizes the district as a Tribal Cultural Resource (TCR), the County does *not* agree with its draft boundaries (4.8-19). As such, the PEIR only analyzes impacts to discrete features of the TCR, rather than analyzing impacts to the entire proposed boundary of the district or landscape as a whole. Impacts to Obsidian Butte, Rock Hill, Red Island, Mullet Island, Mudpots, Mud Volcanoes, Vents, Lithic Scatter, Trails and Trail Segments, and the Natural Setting and Feeling Associated with the Landscape are all found to be significant and unavoidable (PEIR at 4.18-25 – 4.18 – 30). However, it is unclear whether the county considered alternatives that would avoid impacting these TCRs. The PEIR must be revised to disclose and analyze all potential impacts to the *entire* district as a TCR, and evaluate alternatives that would avoid significant impacts, and measures to minimize and mitigate remaining impacts to the entire district.

i) Energy

i) The PEIR Vastly Underestimates Energy Consumption of the LVSP

The PEIR finds that the LVSP will not have a significant impact on energy resources because although energy consumption will increase, the project would allow development of renewable energy (4.6-23). The February 2025 Draft LVSP estimated energy produced by the LVSP at full buildout would be 519 Megawatts per hour (p. 131), and this was revised to 2,679 megawatts per hour in the December 2025 draft (p. 141) with no explanation of what accounts for the drastic increase in power produced. The methodology for estimating how much renewable energy will be produced by the LVSP must be consistent and fully disclosed in the PEIR.

Furthermore, Emerman's expert analysis finds that the PEIR vastly underestimates energy consumption by the LVSP (Appendix A, p. 10). Based on the literature, Emerman estimates that the full buildout of DLE facilities in the Plan Area will consume 33,326,165,550 kilowatt-hours per year, roughly three times the estimated total energy consumption in the PEIR (Appendix A, p. 10). Even if all the geothermal energy produced (2550 MW) goes to DLE, that is still only 67% of the total energy required for the LVSP's stated lithium extraction goals (Appendix A, p. 11). And providing all the geothermal power to DLE would contradict other goals of the LVSP to provide baseload renewable energy to the grid. Since DLE is just one of many permitted energy-intensive land uses, we can expect actual energy consumption to be much higher. Based on this, the LVSP and PEIR's conclusion that enough energy will be produced within the LVSP to meet demand is incorrect, and energy will have to be provided by other sources.

Companies seeking to build DLE/geothermal projects in the plan area have announced new plans to provide electricity to data centers, raising further questions about how much will be available for DLE and the grid (Controlled Thermal Resources 2026). Given the severe under-estimation of energy consumption, and the inclusion of industries unrelated to renewable energy in the LVSP, the PEIR's finding that the LVSP will not have a significant impact on energy resources is not based on substantial evidence and must be revised.

j) Geology and Soils

i) The PEIR fails to adequately analyze the impact of brine re-injection on induced seismicity

The PEIR finds that geothermal/DLE operations may lead to ground shaking through induced seismicity, but that with mitigation, these impacts are less than significant (PEIR at 4.7-25). However, Emerman finds that the PEIR fails to analyze the impact of post-DLE brine re-injection on seismic activity, which has been well documented in the literature (Appendix A, p. 18). The PEIR must be revised to consider the impact of brine re-injection on induced seismicity.

Furthermore, Emerman finds that the proposed mitigation measures reliant on a "traffic light" system for induced seismicity are entirely inadequate, in part because there is no standard proposed for determining if a particular well caused a particular earthquake, no clarity on who will evaluate the wells, and no consideration of cumulative impacts (Appendix A, p.21). The mitigation measures to monitor and prevent seismic impacts but be revised.

k) Greenhouse Gas Emissions

i) The PEIR's claim that it will reduce global greenhouse gas emissions is unfounded

The LVSP will result in a drastic increase in local GHG emissions in Imperial County, found to be a significant and unavoidable impact (PEIR at 5-9). According to Emerman, by 2035, the annual operational greenhouse gas emissions (including the amortized construction total) of the LVSP will be 868,715.29 metric tons of carbon dioxide equivalent which would correspond to the annual emissions from 188,851 US passenger cars, more than the entire population of Imperial County, and a 31% increase in Imperial County's total GHG emissions (Appendix A, p. 6). This translates into intensified heat exposure, worsened air quality formation, and heightened vulnerability for residents with asthma, cardiovascular disease, and limited access to cooling infrastructure as previously discussed.

However, the PEIR justifies this by stating the project will also result in global GHG reductions from developing a domestic lithium supply (5-9). As Emerman highlights, no attempt has been made to quantify this speculative claim (Appendix A, p.5). While lithium batteries play an important role in decarbonization, there is no guarantee that lithium produced in Imperial County will be used in batteries that displace fossil fuel use.

ii) The PEIR Underestimates GHG emissions and includes inconsistent information

The PEIR vastly underestimates GHG emissions from the LVSP. While the PEIR estimates emissions from DLE at roughly 25,000 MT CO_2e annually at full buildout, Emerman estimates, based on projected lithium production, that DLE operations will emit a minimum of 5,998,706 MT CO_2e per year. Given that DLE is just one of many GHG emitting land uses in the LVSP, this discrepancy means that the PEIR has likely underestimated GHG emissions by at least four orders of magnitude (Appendix A p.8-9). If emissions are understated at this scale, the downstream implications for regional climate modeling, mitigation planning, and health risk assessment become unavoidable. Even when powered by geothermal, DLE will emit far more GHGs than included in the analysis (Appendix A, 8). The total estimate of GHG emissions in the PEIR also does not match that Appendix C, GHG Technical report (Appendix A, p. 8), violating CEQA's requirement for an informative document. The PEIR must be revised for data reconciliation, update its analysis to properly estimate GHG emissions, and identify alternatives and mitigation measures to reduce impacts.

iii) The PEIR Fails to Fully Account for the Greenhouse Gas Impacts including the Loss of Carbon Sequestration and Storage from intact desert soils, wetland associated vegetation communities and habitats.

California is at the forefront of the climate crisis. Poor land-use planning and extreme weather events have led to an onslaught of disasters harming communities and threatening the state's ecosystems and people's livelihoods. Climate change increasingly places stress on species and ecosystems—causing changes in distribution, phenology, physiology, vital rates, genetics, ecosystem structure, and processes—in addition to increasing species' extinction risk. Climate-change-related local extinctions are already widespread and have occurred in hundreds of species. Catastrophic levels of species extinctions are projected throughout this century if climate change continues unabated. Climate change is a problem with cumulative impacts and effects. (*Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin*. (9th Cir. 2008) 538 F.3d 1172, 1217 ("[T]he impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis" that agencies must conduct).) Because the combined impacts of many GHG emission sources can drastically damage California's climate, Project-specific GHG emission disclosure, analysis, and mitigation remain vital to maintaining California's climate.

To adequately assess and mitigate the Project's GHG impacts, the PEIR must include the carbon storage and sequestration potential of these habitats in the analysis as well as for agricultural lands. As detailed in a 2024 report, "The California Desert's Role in 30x30: Carbon Sequestration and Biodiversity," California deserts are significant carbon sinks that should be included in carbon calculations. (Allen et al., 2024; *see also* Yap et al., 2023.) In California, desert landscapes consist of dunes, desert scrub, sandy soil grasslands, juniper-pinyon woodlands and rock formations. The Mojave Desert is dominated by deep-rooted shrub species, including creosote bush and white bursage, as well as many forbs, trees, grasses, and dunes. Although the carbon storage and sequestration potential of such habitats are often overlooked, carbon in these systems is stored in the form of soil organic carbon (e.g., extensive root networks, soil microbial communities, mycorrhizae), soil inorganic carbon (e.g., calcite/caliche), and above-ground vegetation (Allen et al., 2024; Janzen, 2004; Meyer, 2012; Mi et al., 2008; Thomey et al., 2014; Wang et al., 2010; Zamanian et al., 2016.) Agricultural lands also act as carbon sinks, absorbing carbon on a cyclical basis and providing a critical off-set to annual emissions. (*See, e.g.,* U.S. EPA 2014)

The Specific Plan area of over 51,000 acres, includes over 21,000 acres of natural vegetation communities including Freshwater Emergent Wetland, Freshwater Forested/Shrub Wetland, Freshwater Pond, Open Water/Lake, Riparian Communities, and nearly 1,300 acres of Desert Scrub Communities. *See* PEIR at 4.4-3 (Table 4.4-1). The Specific Plan area also contains a large extent of agricultural lands, 21,868 acres, which also sequester carbon and whose loss should be addressed.

Any loss of nature-based carbon storage or agricultural carbon sinks must be accounted for when assessing a Project's GHG impacts. When calculating carbon loss from habitats, it is important to consider the types of habitats. Although more research is needed to understand the carbon storage and sequestration potential for all desert systems, various desert habitats store and sequester different amounts of carbon. For example, Evans et al. (2014) found that areas of the northern Mojave Desert in Nevada store an average of approximately 4.17 metric tons of carbon per acre, and these areas were found to sequester 0.4 to 0.51 metric tons of carbon per acre per year (Jasoni et al., 2005; Wohlfahrt et al., 2008.) However, desert ceanothus (*Ceanothus greggii*) was found to store up to 41 metric tons of carbon per acre in their aboveground biomass and up to 5.8 metric tons of carbon per acre in their belowground biomass while accumulating 2.4 metric tons of carbon per acre per year (this does not include organic or inorganic soil carbon). (Bohlman et al., 2018.) And experts estimate that the combined vegetation types, creosote bajada scrub and microphyll woodland, could sequester an average of 1.5 million tons of carbon per year across California's Inland Desert Area. (Allen et al., 2024.)

California's wetland and grassland ecosystems serve as significant carbon sinks (Bohlman et al., 2018; Dass et al., 2018; Janzen, 2004; Wohlfahrt et al., 2008), and ecosystem removal and degradation result in the loss of both above- and below-ground carbon storage. (*e.g.* Austreng 2012.) With much of the stored carbon located in their roots and soils, these ecosystems allow for long-term storage, resilient to changing environmental conditions. (Aranjuelo et al., 2011; Booker et al., 2013; Evans et al., 2014; Vicente-Serrano et al., 2013.)

The County failed to consider this issue although there are well established methods for making these estimates. For example, CalEEMod, utilized elsewhere in the PEIR (PEIR at 4.8-31), provides a module to estimate the changes in carbon sequestration capacity resulting from changes in vegetation on-site. The County thus has no excuse for entirely overlooking emissions associated with the loss of native desert habitats, vegetation, intact soils, agricultural lands and wetlands, all of which sequester carbon.

Given that the Specific Plan area includes over 21,284 acres of natural lands and vegetation communities, and another 21,868 acres of agricultural lands, that currently store and sequester a significant amount of carbon. Destroying or degrading even a portion of these riparian and desert habitats will release significant amounts of carbon and destroy the habitat's ability to sequester carbon independently and indefinitely (in addition to creating soil disturbance that will contribute to the already impaired air quality regarding particulate matter). Yet, the PEIR's assessment or quantification of these GHG impacts is devoid of discussion of the loss of existing natural carbon sequestration, the Strategy and Measures that mention carbon sequestration also fail to address preservation of intact desert soils and habitats focusing instead on tree planting in urban areas and restoration of riparian habitats (*see* PEIR at 4.8-22, 4.8-37). While such strategies may be important as mitigation measures, it cannot cure the PEIR's failure to provide an accurate baseline accounting or assessment of the Specific Plan's environmental impacts related to the loss of carbon sequestration. Similarly, the PEIR fails to address the loss of carbon storage from converting up to 21,868 acres of agricultural lands.

The PEIR must be revised to disclose and analyze the GHG impacts of disturbing soils and removing habitat, alternatives to avoid these losses, minimization and feasible, mitigation measures.

l) **Hydrology**

i) The PEIR fails to adequately analyze the impacts of brine consumption to hydrology

The PEIR finds that because industries built in the Plan Area would source water from Imperial Irrigation District, and would not use groundwater, that potential impact to groundwater would be less than significant (PEIR at 4.10-19). However, Direct Lithium Extraction involves re-injecting cooled brine into the geothermal reservoir, some of which will be lost to evaporation when stored in brine ponds. The PEIR failed to estimate brine consumption or analyze the impacts of brine consumption on local hydrology. Emerman finds that if the same volume of brine that was extracted for geothermal/DLE operations is not re-injected, it may lead to a decrease in water pressure, which could draw down groundwater, and deplete streams, springs, mud pots, or mud volcanoes – potentially impacting ecosystems and tribal cultural resources (Appendix A, p.12). Thus, the PEIR has failed to adequately analyze impacts to hydrology from brine consumption, and must be revised.

m) **Hazards and Hazardous Materials**

i) The PEIR fails to analyze the impacts hazardous metal sludge from geothermal brine ponds

The PEIR acknowledges toxic metals are present in the brine that will be pumped and processed for geothermal/DLE (though the PEIR misquotes Earthworks 2023 and confuses heavy metals with radioactive minerals). Even so, the PEIR finds that impacts related to generation, transport and disposal of hazardous waste from geothermal/DLE will be insignificant after mitigation (PEIR at 4.9-23), and similarly for accidental release of hazardous materials (PEIR at 4.9-24). However, Emerman finds that toxic metal sludge is likely to precipitate out of the brine storage ponds, but the PEIR contains no analysis on this subject (Appendix A, p. 13). This sludge may contain toxic constituents such as arsenic, lead, and cadmium; metals associated with cancer risk, neurotoxicity, kidney damage, and developmental harm. The PEIR must be revised to analyze hazards from brine ponds and identify alternatives and mitigation measures to avoid or reduce impacts.

ii) The PEIR fails to disclose and analyze the volume and disposal plans of hazardous waste from the geothermal/DLE industry.

The County must increase transparency regarding hazardous waste disposal. The PEIR needs to disclose the off-site disposal location and current compliance status of current waste streams. At present, hazardous waste generated from geothermal operations is reportedly transported to a hazardous waste landfill in Arizona. Confirming adherence to Department of Toxic Substances Control (DTSC) and Certified Unified Program Agency (CUPA) requirements is essential to ensure regulatory oversight and prevent cross-jurisdictional risk transfer. The PEIR should be revised to estimate, in tons and percentage increase, of how much Direct Lithium Extraction (DLE) would add to existing waste volumes. This is essential to critically analyze the effects on hazardous waste and byproducts. Without this information, it is impossible to assess whether current disposal pathways remain adequate or whether new procedures, expanded transport routes, or additional landfill capacity would be required. In fact, Lawrence Berkeley Lab research found that full development of the lithium and geothermal resource would require planning for additional landfill capacity (Dobson et al. 2023), but this has not been analyzed in the PEIR. Increased hauling of hazardous materials also introduces transportation risk, including spills or accidents affecting communities along transit corridors. Without a quantified estimate of waste generation or a detailed management plan, it becomes difficult to evaluate long-term exposure pathways, including leaching into groundwater, wind dispersal of dried particulates, or accidental releases during transport.

Furthermore, there is no discussion in the PEIR of other specific hazardous waste or materials that may be generated from permitted land uses, such as battery manufacturing, anaerobic digesters, and recycling centers. As a result, the PEIR does not provide a complete picture of the impacts at full buildout. The PEIR must be revised to adequately analyze the hazards and hazardous materials impact of brine ponds, DLE waste, and all permitted land uses.

n) Utilities and Service Systems

i) The PEIR vastly underestimates freshwater consumption

The PEIR estimates operational water demand for full buildout of the LVSP at 97,496 AFY (including water for biological mitigation for pupfish) after 30 years (4.19-29). Although this exceeds the 18,620 AFY available from IID for non-agricultural projects, the PEIR proposes additional water supply will become available with future changes to IID policy and as agricultural land (which currently uses 126,000 AFY) within the LVSP area is converted to industrial use (PEIR at 4.19-29). Based on this, the PEIR concludes that impacts to water supply will be less than significant (PEIR at 4.19-30). However, Emerman finds that freshwater consumption by the LVSP has been vastly underestimated (Appendix A, p. 6). Based on the literature on BHER and Controlled Thermal Resources, full buildout of geothermal/DLE plants can be expected to consume 6.2-13.5 times the entire estimated water supply (Appendix A, p. 7). Although LVSP policies would enforce water recycling requirements, eventually up to 80%, the PEIR itself notes that such high water recycling rates may not be feasible (Appendix A, p. 8). Given that geothermal/DLE is just one of many land uses permitted under the LVSP, the actual water consumption may be far greater, calling into question the PEIR's finding that water demand can be met through agricultural conversion and future changes to IID policy, and that impacts are less than significant. The PEIR must be revised to adequately analyze impacts of freshwater consumption.

ii) The methodology for the Water Supply Assessment is inadequate

The PEIR's estimates for project water demand are explained in more detail in Appendix L-1, Water Supply Assessment (WSA). The WSA explains the methodology in Attachment C: Water Demand Memorandum. For the Green Industrial Zone, the largest and most permissive zone, it is estimated that projects will use 37,133 AFY in Phase 1, 4,420 AFY in Phase 2, and 9,117 AFY in phase 3, for a total of 50,670 AFY. This is based on the assumption that facilities built in that zone will consume an average 2,800 AFY/facility plus 20% water conservation (Water Demand Memo p. 3). It's entirely unclear how many facilities are expected to be built in each phase or what the average has been multiplied by to reach these estimates.

Furthermore, the average is based on an average of case studies listed in Attachment A – Case Studies and SCAG Modeling Data (Lithium Valley Water Demand Memo p. 9). This table lists a wide variety of land uses and associated water demand, including information from unreliable sources such as "conversation with BHER staff" or news releases from DLE pilot projects. "Anonymous data center" is listed as a case study with a meager 14 AFY of water demand (lowering the average), without even providing a source for that information. This methodology is completely unscientific and leads to an unrealistically low average water use of the green industrial zone. A more realistic and conservative methodology would be to take the estimated water demand of the permitted Hell's Kitchen geothermal/DLE project (6,500 AFY according to the EIR) as the average (Chambers Group 2023). Assuming 17 DLE/Geothermal plants similar to Hell's Kitchen are built in the Green Industrial Zone, that gives us 110,500 AFY just for DLE/geothermal alone, more than twice the estimate stated in the WSA. Furthermore, additional information is required on data center water use which can vary widely. The WSA and Water Demand Memorandum must be revised with more rigorous methodology to adequately estimate freshwater demand of all aspects of the project and properly analyze if there is sufficient water supply.

iii) The WSA inappropriately defers water supply analysis to unspecified future IID policy changes

The IID will provide Colorado River water to the LVSP under its Interim Water Supply Policy (IWSP) for non-agricultural projects, which in January 2025 had a remaining balance of 18,620 AFY out of the original 25,000 AFY designated (WSA at 29). The WSA finds that the project's estimated 20-year water demand (with biological mitigation) is 426% of the IWSP, and 30-year water demand (with biological mitigation) is 524% of the IWSP (WSA at 36). These numbers are likely much higher, because as previously discussed, the WSA vastly underestimates freshwater consumption from the LVSP. Furthermore, these estimates do not include cumulative water demand from other reasonably foreseeable industrial projects outside the Plan Area that will also draw from the IWSP. Still, the WSA states that because LVSP water demand exceeds the IWSP balance, "additional modifications to the IWSP would be requested of IID to implement the project" (WSA at 36). Neither the WSA nor PEIR specify what modifications will be requested, when, or make any attempt to quantify how those modifications will address the water supply shortfall. Thus, the PEIR fails as an informative document, and the WSA's conclusion that the LVSP has sufficient water supply over 20 years is unfounded.

iv) The WSA and PEIR must analyze LVSP water supply under likely cuts to IID's Colorado River water

The entire analysis of water supply for the LVSP is compounded by the WSA's finding that: "The prolonged drought conditions on the Colorado River Basin have made it increasingly likely that the water supply of IID may be disrupted, in dry years or/and under shortage conditions" (WSA at 35). Indeed, as of February 2026, Colorado River negotiations are ongoing, with the states yet to reach an agreement (James 2026). With the potential of federally-mandated cuts to IID's allocation looming (Ward 2026), along with the growing risk of Lake Powell reaching critically low reservoir levels or "Deadpool" (Graham 2026), disruption to IID's water supply may be coming before the LVSP is approved. Yet, the WSA defers analyzing this scenario, instead stating that if IID's water supply is cut, then IID may reduce water delivery to projects developed under the LVSP (36). This leaves far too much uncertainty for the public to be adequately informed about the impacts to water supply from the LVSP. Given the wide range of industries that will now be under ministerial approvals and require no further environmental study, the LVSP thus risks pre-permitting water-intensive industries at a time when their water supply is not at all certain. There is no discussion in the PEIR of the potential impacts of reducing water delivery to operational geothermal/DLE in the Plan Area. For example, will there be unanticipated consequences for waste streams, geothermal reservoir drawdown, or land subsidence should they not receive enough make-up water? The PEIR and WSA must be revised to analyze water supply in the context of likely cuts to IID's water supply.

o) Cumulative Impacts Are Not Adequately Disclosed or Analyzed

As noted above, cumulative impacts analysis is critical for a program EIR for a large area plan such as this one because it allows the County to take into account all of the proposed development in one analysis. The CEQA Guidelines explain that among the advantages of utilizing a Program EIR are to "[e]nsure consideration of cumulative impacts that might be slighted in a case-by-case analysis," (14 Cal. Code Regs. § 15168(b)(2)), and "[a]llow the Lead Agency to consider broad policy alternatives and programwide mitigation measures at an early time when the agency has greater flexibility to deal with basic problems or cumulative impacts" (*id.* at § 15168 (b)(4)).

Thus, even if a project only represents a relatively small contribution to an adverse condition, like greenhouse gas emissions, air quality, seismicity, or water supply, the EIR must still assess the cumulative impacts of Project completion—here full buildout of the ministerial activities—on those unacceptable environmental conditions. (*See Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 693, 728.) The County must fully consider the cumulative impacts of full buildout of the Specific Plan on all environmental resources.

p) The PEIR Alternatives Analysis is Insufficient

i) The PEIR Fails to Consider a Reasonable Range of Alternatives to Avoid Significant Effects

"The core of an EIR is the mitigation and alternatives sections." (*Citizens of Goleta Valley v. Bd. of Supervisors* (1990) 52 Cal.3d 553, 564.) An EIR must describe "a range of reasonable alternatives to the project . . . which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project." (14 Cal. Code Regs § 15126.6(a).) The selection of alternatives is governed by the "rule of reason." (*North Coast Rivers Alliance v. Kawamura* (2015) 243 Cal.App.4th 647, 667.) Critically, "public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects." (Pub. Resources Code, § 21002.) Here, the PEIR violates CEQA by narrowing defining the Specific Plan to include a large number of industrial uses that will be "permitted" or "ministerial" refusing to consider a reasonable range of project alternatives for the Specific Plan that could avoid some of the foreseeable impacts.

CEQA mandates that an EIR "consider a reasonable range of potentially feasible alternatives" that would avoid or substantially lessen significant impacts. (14 Cal. Code Regs § 15126.6(a).) The purpose of an EIR is not to present alternatives that "meet few if any of the project's objectives so that these alleged alternatives may be readily eliminated." (*Watsonville Pilots Assn. v. City of Watsonville* (2010) 183 Cal.App.4th 1059, 1089.) Instead, the alternatives analysis must be structured to "foster meaningful public participation and informed decision making." (*Preservation Action Council v. City of San Jose* (2006) 141 Cal.App.4th 1336, 1354, citing Cal. Code Regs., tit. 14, § 15126.6, subd. (f).) "Meaningful analysis of alternatives in an EIR requires an analysis of *meaningful alternatives*." (*Save Our Capital! v. Dept. of Gen. Services* (2023) 87 Cal.App.5th 655, 704, italics added.)

CEQA further prohibits an agency from approving a "project if feasible alternatives exist that would substantially lessen its significant environmental effects." (*Save Panoche Valley v. San Benito County* (2013) 217 Cal.App.4th 503, 520, citations omitted.) A feasible alternative is one that is "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors." (Pub. Resources Code, § 21061.1.) While alternatives must be capable of achieving most project objectives, they need not achieve all of them. (*Mira Mar Mobile Community v. City of Oceanside* (2004) 119 Cal.App.4th 477, 489.)

Here, the PEIR failed to analyze a reasonable range of alternatives that could substantially lessen the Specific Plan's significant environmental impacts. During scoping, Earthworks proposed a number of alternatives:

- No permitting of hydrogen or biofuel facilities
- An alternative with no reduced inflow to the Salton Sea
- An alternative with no brine ponds
- An alternative that integrates geothermal and solar energy with agriculture
- An alternative that promotes circular management of geothermal waste
- An alternative that protects the Southeast Lake Cahuilla Active Volcanic Cultural District and;
- Alternatives to fossil fuel infrastructure

None of these alternatives suggested in scoping were considered in the PEIR.

Furthermore, the PEIR failed to consider a range of common sense alternatives that would avoid or mitigate significant impacts of the LVSP:

- None of the alternatives in the PEIR would limit the number or size of battery manufacturing projects by, for example, providing limits based on water use and waste streams.
- None of the alternatives would limit the number of data center projects overall, the development of multiple projects by one developer below the 1.3 sq foot limit to avoid discretionary review (thereby skirting the one limit on data centers in the Specific Plan) or by providing limits for data centers based on water use, noise, or other factors. Data centers use large amounts of water for cooling and large amounts of energy—the PEIR does not fully consider either of those impacts nor any alternatives that would require additional review at a later date.
- None of the alternatives would require Special Use Permits (SUP) for data centers of less than 1.3 million square feet (approximately 29 acres) in size.
- None of the alternatives require SUP for logistics centers so that the site-specific impacts of such projects on traffic, air quality, water resources and other resources would be fully considered before they were approved. Logistics centers increase traffic and reduce air quality, they are particularly vulnerable to heat stress and generate large amounts of heat. The PEIR does not even address the prudence of putting data centers which need large amounts of cooling in the hottest part of California, indeed one of the hottest areas of the county.

ii) The Draft EIR's alternatives analysis for the General Plan is not supported by substantial evidence.

CEQA's substantive mandates requires agencies to make specific findings before approving a project with significant environmental effects, including a finding that "[s]pecific economic, legal, social, technological, or other considerations . . . make infeasible the . . . project alternatives." (Pub. Resources Code, § 21081(a)(3); 14 Cal. Code Regs § 15091(a)(3).) Any finding of infeasibility must be supported by substantial evidence. (14 Cal. Code Regs § 15091(b).)

The PEIR does not satisfy this requirement. It fails in the first instance to disclose and analyze many of the significant impacts and fails to consider any alternative that would provide for future discretionary consideration of site-specific projects to ensure that avoidance and mitigation measures would be considered and tailored to the specific projects in the future.

An agency cannot disregard its own evidence and then declare an alternative infeasible. This plainly violates CEQA. Indeed, an alternative need not even achieve all project objectives to be considered feasible. (*See Mira Mar Mobile Community*, *supra*, 119 Cal.App.4th at p. 489.) For example, an alternative that maintained streamlining for geothermal and DLE projects and a limited amount of battery manufacturing sites, but shifted all data center and logistics hub development to require SUPs, could meet all objectives but was not considered. Similarly, no alternative was considered that would cap new development if certain air quality or water availability metrics were triggered. These are both feasible alternatives that would accomplish many of the project objectives but were not considered.

iii) The PEIR inappropriately analyzes the alternatives it does consider

Alternative 1: No Project – No Build, means the LVSP zoning does not occur and no development occurs within the plan area, so it remains predominantly agriculture. The PEIR finds that this alternative would reduce local environmental impacts but increase impacts elsewhere "due to greater reliance on out-of-state and foreign lithium sources with comparatively higher environmental impacts" (PEIR at 6-10).

Alternative 2: No project – Existing General Plan buildout means the LVSP zoning would not occur, but development in the Plan Area would follow the existing zoning of the general plan. It is assumed that some geothermal/DLE facilities would be built, but a reduced development footprint would mean reduced environmental impact. Still, the PEIR finds alternative 2 could "indirectly contribute to significant cumulative impacts at the national and global scale by shifting lithium production to other regions with less sustainable extraction methods and greater environmental footprints." (PEIR at 6-17).

Alternative 3: Reduced Development Density analyzes an alternative where only 50% of the plan area is developed, reducing local environmental impacts.

Alternative 4: Increased Development Alternative would extract 600,000 tons of lithium per year with a 50% increase in development of the Green Industrial Zone. The PEIR states that this alternative would have more significant impacts, but potentially reduce impacts from lithium projects elsewhere (PEIR at 6-30).

Table 6-1 compares alternatives including a measure of how alternatives will either decrease local and increase regional/global impacts or increase local while decreasing regional/global impacts. But these comparisons to regional/global impacts are highly speculative, not related to the project, and not relevant to CEQA's requirements for alternatives analysis. In particular, although Alternatives 1 and 2 are the environmentally superior alternatives, the PEIR makes unsubstantiated claims that Alternatives 1 and 2 would actually increase GHG emissions "due to the need to source lithium from more energy- and carbon-intensive methods" (PEIR at 6-8).

Emerman's expert analysis finds that this claim that Direct Lithium Extraction has less environmental impact than hard-rock mining or brine evaporation ponds is not correct nor supported by academic reviews. In fact, the literature shows that DLE may consume greater volumes of freshwater than other types of lithium extraction, and still require energy-intensive concentration technology or land-intensive evaporation ponds (Appendix A, p. 3). Even if lithium mining elsewhere were lower impact, that does not justify lithium mining in Imperial Valley, or ruling out lower-impact alternatives. Emerman finds:

> *There is no entity that is offering to close or forgo hard-rock mines or brine evaporation ponds elsewhere (such as Australia, Chile, or China) if only DLE projects are opened in Imperial Valley. Without additional information, it should be assumed that any DLE projects in Imperial Valley would simply be an addition to existing and future hard-rock lithium mines and brine evaporation ponds, especially in light of the skyrocketing lithium demand that is also claimed in the draft PEIR.* (Appendix A, p. 4).

The PEIR must be revised to remove unsubstantiated references to lower-impact mining elsewhere, and to revise the alternatives analysis to focus on comparing *local*, rather than speculative regional/global impacts.

q) **The Draft PEIR's measures for mitigating impacts are vague, insufficient, unenforceable, deferred, and ineffective.**

Because the Specific Plan's impacts will be significant, the EIR must propose and describe mitigation measures to minimize the significant environmental effects identified. (Pub. Resources Code, § 21002.1.) Under CEQA, public agencies "should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects." (*Id.*, § 21002.) A mitigation measure is "feasible" if it is "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors." (*Id.*, § 21061.1; *see* 14 Cal. Code Regs. § 15364 (definitions).)

Mitigation must be binding and enforceable to be valid. (Guidelines § 15126.4, subd. (a)(2).) The project proponent therefore cannot defer formulating enforceable mitigation that would reduce impacts until after project approval. CEQA Guidelines § 15126.4, subd. (a)(1)(B); *Ctr. for Biological Diversity v. Dep't of Fish & Wildlife* (2015) 234 Cal. App. 4th 214, 240) ("[A]n agency goes too far when it simply requires a project applicant to obtain a [] report and then comply with any recommendations that may be made in the report."); *Endangered Habitats League, Inc. v. County of Orange* (2005) 131 Cal. App. 4th 777, 793.

Here, the mitigation measures regarding biological resources, hydrology, hazardous waste, tribal cultural resources, and induced seismicity do not provide decision-makers or the public with sufficient concrete information, as required by CEQA. (Guidelines § 15126.4(a)(2); *Federation of Hillside & Canyon Ass'ns v. City of Los Angeles* (2000) 83 Cal. App. 4th 1252, 1261 (mitigation measures must be "fully enforceable through permit conditions, agreements, or other measures" so "that feasible mitigation measures will actually be implemented as a condition of development").

In most instances, CEQA does not allow mitigation to be deferred. *See* CEQA Guidelines § 15126.4 ("Formulation of mitigation measures shall not be deferred until some future time"); *Save Agoura Cornell Knoll v. City of Agoura Hills* (2020) 46 Cal.App.5th 665, 686-89; *Preserve Wild Santee v City of Santee* (2012) 210 Cal.App.4th 260, 280. Even where deferral is permitted, CEQA requires the articulation of specific performance standards, which are missing here. *See Sacramento Old City Ass'n v City Council* (1991) 229 Cal.App.3d 1011, 1029; CEQA Guidelines § 15126.4(a)(1)(d) ("The specific details of a mitigation measure [] may be developed after project approval … provided that the agency … adopts specific performance standards the mitigation will achieve"). CEQA does not allow simply a "generalized list of measures to be undertaken" that "does not set forth any performance standards or guidelines to ensure that these measures will be effective." *Save Agoura Cornell Knoll,* 46 Cal.App.5th at 688.

A potential mitigation measure cannot be properly labeled a mitigation measure unless it is at least partially effective in reducing the significance of the impacts at issue. (*Friant Ranch*, *supra*, 6 Cal.5th at p. 511.) Moreover, when the efficacy of mitigation is not apparent, there must be "evidence in the record showing [it] will be effective in remedying the identified environmental problem" is required. *League to Save Lake Tahoe Mtn. Area Preservation Found. v County of Placer* (2022) 75 Cal.App.5th 63, 121.

Moreover, many of the mitigation measures in the PEIR violate CEQA because they defer formulation, are unenforceable, and or they may be ineffective or otherwise improper. Even though the PEIR finds significant impacts on air quality from both construction and operational emissions, most of the air quality mitigation measures focus on construction emissions (PEIR at 4.3.6). No attempt has been made to include air quality mitigation measures specific to the types of emissions that will be produced from the specific industries permitted by the LVSP, including anaerobic digesters, geothermal/DLE, logistics hubs, data centers, battery manufacturing, and hydrogen plants. Furthermore, no attempt has been made to identify mitigation measures to reduce PM_{10} impacts resulting from the LVSP exposing more Salton Sea playa, for example, by providing additional water sources for inflow to the Salton Sea or supporting wetland restoration or other dust mitigation projects.

Many of the mitigation measures that are provided violate CEQA because they defer formulation to a later date without needed performance standards. For example, MM-BIO-1 requires project proponents to conduct a pre-project assessment for special-status species (PEIR at 4.4-36), even though these projects may already have been permitted as ministerial under the LVSP. Similarly, MM-BIO-3 and MM-BIO-4 require project applicants to prepare a hydrological impact avoidance, minimization, and mitigation plan and a nesting and migratory bird management plan at a later date. Effective biological mitigation under CEQA requires that these assessments and plans be completed *before* approval of the project, rather than deferred to a later date.

"Formulation of mitigation measures should not be deferred until some future time." (CEQA Guidelines § 15126.4(a)(1)(B).) CEQA requires agencies to adopt concrete, specific, and enforceable actions *before* an agency approves a project. (*California Clean Energy Committee v. City of Woodland* (2014) 225 Cal.App.4th 173, 186.) Agencies can only defer the formulation of mitigation measures where they first explain why doing so is necessary and practical under the circumstances. (*POET, LLC v. State Air Resources Bd.* (2013) 218 Cal.App.4th 681, 736-37.) Specific details of a mitigation measure "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.'" (*Golden Door Properties v. County of San Diego* (2020) 50 Cal.App.5th 467, 518.)

"Fundamentally, the development of mitigation measures, as envisioned by CEQA, is not meant to be a bilateral negotiation between a project proponent and the lead agency after project approval, but rather, an open process that also involves other interested agencies and the public." (*Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70, 93; *see also San Joaquin Raptor Rescue Center v. County of Merced* (2007) 149 Cal.App.4th 645, 670 [EIR inadequate where the success or failure of mitigation efforts "may largely depend upon management plans that have not yet been formulated, and have not been subject to analysis and review within the EIR"].)

The PEIR inappropriately identifies no mitigation measures related to energy, claiming no mitigation is required because impacts are not significant (4.6.6). As previously discussed, the PEIR vastly underestimates energy consumption of the LVSP, and so the PEIR must be revised to identify mitigation measures to reduce significant energy use.

Mitigation measures related to geology and soils are also ineffective and unenforceable. MM-GEO-1 Induced Seismicity Avoidance, Monitoring, Evaluation, and Mitigation Plan (PEIR at 4.7-33) develops a traffic light system for monitoring induced seismicity. But Emerman's expert analysis points out that this includes no standard for determining whether a particular geothermal well as caused an earthquake, no clarity on who will conduct an evaluation for seismic events above the yellow and red thresholds, and no provision for monitoring and mitigating cumulative impacts of geothermal wells on seismicity (Appendix A, p. 21). MM-GEO-2 Subsidence Monitoring and Mitigation Plan (PEIR at 4.7-34), outlines only a monitoring plan to track land subsidence resulting from loss of geothermal brine, but does not include any actual measures to mitigate land subsidence should it occur (see Emerman analysis, Appendix A p. 14).

Mitigation measures related to Greenhouse Gas Emissions (4.8.6) are focused on energy efficiency, building materials, and electric vehicle charging infrastructure. No attempt has been made in the PEIR to identify mitigation measures that would reduce the operational greenhouse gas emissions from the specific industries permitted by the LVSP, including anaerobic digesters, geothermal/DLE, logistics hubs, data centers, and battery manufacturing, and hydrogen plants.

Despite known hazards from the geothermal/DLE industry and other industries permitted by the LVSP, the PEIR only identifies mitigation measures related to hazards and hazardous waste relating to existing conditions of soil and groundwater contamination, and demolition (PEIR at 4.9.6). No attempt has been made to identify mitigation measures that would reduce the impact of hazardous waste or emissions from the specific industries permitted by the LVSP or to mitigate the impact of toxic metal sludge that will precipitate out of brine storage ponds.

Mitigation of impacts to tribal cultural resources (TCRs) identified in the PEIR are also inappropriate and ineffective. MM-TCR-1 Tribal Heritage Management Area – Screening and Monitoring, requires tribal monitors for construction within 300 feet of identified TCRs (PEIR at 4.8-13). However, as previously discussed, the PEIR inappropriately only analyzes discrete features as TCRs, refusing to recognize the proposed boundaries of the Southeast Lake Cahuilla Active Volcanic Cultural District. To be effective, the requirement for tribal monitors should apply to any construction within the entire boundaries of the Cultural District.

Finally, the PEIR identifies no mitigation measures related to utilities and service systems, claiming that impacts are less than significant (4.19.6). However, as previously discussed, the PEIR vastly underestimates freshwater consumption of the LVSP and the methodology of the Water Supply Assessment is deeply flawed, and so impacts to water supply are likely to be significant. The PEIR must be revised to include enforceable mitigation measures that reduce freshwater consumption and impacts to water supply.

r) PEIR Fails as an Informational Document

CEQA requires an EIR to inform the public and decision makers of the effects of a project, ways the impacts could be avoided, and feasible mitigation measures *before* any decision is made. Here the PEIR fails as an informational document in myriad ways.

As referenced in the sections above, the PEIR fails to inform the public with a detailed description of lithium extraction or data centers, consistent information about project phasing and greenhouse gas emissions, air quality impacts from playa PM_{10}

emissions, seismic activity from brine re-injection, and hazardous waste produced from brine ponds, among other issues.

Furthermore, the PEIR fails to address the actual amount of fresh water use and the impacts of that use that are foreseeable if maximum allowable data centers and logistics centers are built out under the Specific Plan. This is much like the EIR found wanting in *King & Gardiner Farms, LLC v. Cty. of Kern*:

> "[A]n EIR is required to provide the information needed to alert the public and the decision makers of the significant problems a project would create and *to discuss currently feasible mitigation measures*." (*Sierra Club v. County of Fresno, supra*, 6 Cal.5th [502] at p. 523, italics added.) To fulfill the EIR's informational role, the discussion of the mitigation measures must contain facts and analysis, not bare conclusions and opinions. (*Id.* at p. 522.) The level of detail CEQA requires in the EIR's discussion of facts and analysis of the mitigation measures depends on "whether the EIR includes enough detail 'to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project.'" (*Sierra Club v. County of Fresno, supra,* at p. 516.) Here, the EIR provides no information about what applicants will (or might) do at the site covered by a permit to minimize the use of M&I water and maximize the reuse of produced water. Nothing is said about technologies and techniques for achieving the general goals relating to water use. The gaps in the information provided by the EIR are made more confounding by its statement about the "complex variables that fall outside the scope of the County's jurisdiction or control under CEQA." Even if particular technologies and techniques had been identified and described in the EIR, this statement leaves the reader wondering if an applicant would be required to commit to any measures in its application or, alternatively, whether the applicant could omit those measures from its application because they were beyond the County's authority or control. Accordingly, the level of detail provided in the EIR about mitigation for the significant water supply impacts fails to enable the public and decision makers to understand and consider meaningfully the issues relating to water supply impacts and mitigating those impacts. This "noncompliance with the information disclosure" requirements of CEQA "preclude[d] relevant information from being presented to the public agency" and the public. (§ 21005, subd. (a).) It constitutes a prejudicial violation of CEQA by itself and supports the conclusion that the failure of the mitigation measures to comply with the general rules against deferred formulation was prejudicial.

King & Gardiner Farms, LLC v. Cty. of Kern, 45 Cal. App. 5th 814, 869 (2020).

s) The County's Conclusions Regarding Significant and Unavoidable Impacts Lack Evidentiary Support and Cannot Be Relied on To Adopt a Statement of Overriding Considerations.

The County cannot use Statement of Overriding Considerations to cure its failure to disclose and analyze significant foreseeable impacts in the PEIR, as detailed above. CEQA prohibits approval of projects with significant adverse environmental impacts if there are feasible alternatives or mitigation measures that would reduce or eliminate those impacts. (Pub. Resources Code § 21002; Guidelines § 15021(a)(2).) Thus, a statement of overriding considerations can be properly adopted only *after* identification and analysis of foreseeable impacts, avoidance, minimization and mitigation measures.

> A statement of overriding considerations is not a substitute for the findings required by Public Resources Code section 21081, subdivision (a). 4 (Guidelines, §§ 15091, subd. (f), 15093, subd. (c).) Rather, a statement of overriding considerations supplements those findings and supports an agency's determination to proceed with a project despite adverse environmental effects. (Guidelines, § 15093, subds. (a), (c).)
>
> . . .
>
> The Discussion of Guidelines section 15093 explains that *before adopting a statement of overriding considerations, an agency must show that it has considered the mitigation measures and project alternatives identified in the EIR that would lessen the significant environmental effects*. We agree. The requirement that an agency must make findings concerning the implementation or feasibility of mitigation and alternatives to the project (Pub. Resources Code, § 21081, subd. (a); Guidelines, §§ 15091, subds. (a), (f), 15093, subd. (c)) means that the agency must consider the mitigation measures and project alternatives. (*Mountain Lion Foundation v. Fish & Game Com*., supra, 16 Cal.4th [105], p. 134.)

Fed'n of Hillside & Canyon Ass'ns v. City of L.A., 126 Cal. App. 4th 1180, 1201(2004) (emphasis added). And again *King & Gardiner Farms, LLC v. Cty. of Kern* is instructive:

> The Board's adoption of the statement of overriding considerations was based on the EIR, which omitted information necessary to understanding both the mitigation measures and the water supply impacts being overridden. This deficiency in the information provided prevents the adoption of the statement from curing the defects in the mitigation measures or rendering them nonprejudicial. Instead, *the informational deficiency undermines the foundation upon which the statement of overriding considerations rests.*

King & Gardiner Farms, LLC v. Cty. of Kern, 45 Cal. App. 5th 814, 870, (2020) (emphasis added).

If an agency seeks to approve a project despite its significant unmitigated impacts on the environment, the agency must adopt a statement of overriding considerations. (Pub. Resources Code § 21081.) A statement of overriding considerations must include two specific findings, supported by substantial evidence. The first finding that must be made is that "There is no feasible way to lessen or avoid the significant effect..." of the project. (Guidelines §§ 15043, 15093(b).) The second finding is that the project's benefits outweigh its significant adverse environmental impacts. (Guidelines § 15093(a).) These findings must both be supported by substantial evidence. (Guidelines § 15093(a)-(b).)

"CEQA does not authorize an agency to proceed with a project that will have significant, unmitigated effects on the environment…unless the measures necessary to mitigate those effects are *truly* infeasible." (*City of Marina v. Board of Trustees of the California State University* (2006) 39 Cal. 4th 341, 368 ("*City of Marina*") emphasis added.) "[I]f the project can be economically successful with mitigation, then CEQA requires that mitigation…" (*Uphold our Heritage v. Town of Woodside* (2007) 147 Cal. App. 4th at 600.)

The PEIR at section 5.3 "Significant and Unavoidable Impacts" provides a laundry list of conclusions without full identification and analysis of the impacts, alternatives that would avoid impacts, or feasible mitigation in violation of CEQA's mandates. The lack of detailed analysis in the PEIR undermines the conclusions that the impacts are "unavoidable". For example, impacts to air quality, Section 5.3.3, biological resources, Section 5.3.10, greenhouse gas emissions, Section 5.3.6, and tribal cultural resources, Section 5.3.10 are all listed as unavoidable based on inadequate analysis that we have detailed in our comments above.

For Biological Resources, Section 5.3.4, although the PEIR provides some mitigation measures, it does not address a range of alternatives that would avoid key impacts to biological resources, including limiting water use, avoiding reduced inflow to the Salton Sea, limiting traffic in certain areas, or limiting what types of industries may be permitted by right.

> Although implementation of MM-BIO-1 (Pre-Project Biological Resources Assessment and Report), MM-BIO-2 (General Avoidance and Minimization for Special-Status Biological Resources), MM-BIO-3 (Hydrological Impact Avoidance, Minimization, and Mitigation Plan), MM-BIO-4 (Nesting and Migratory Bird Management Plan), MM-BIO-5 (Bird and Bat Conservation Strategy), MM-BIO-8 (Special-Status Bird Avoidance, Minimization, and Mitigation Plan), MM-BIO-9 (Desert Pupfish Protection and Relocation Plan), MM BIO-13 (Federal and State Incidental Take Permitting), and MM-BIO-15 (Compensatory Mitigation for Special-Status Biological Resources) would reduce the potential impacts to these species, the project has the potential to contribute to reduced waterflows, increased salinity, reduced food sources, and accelerated receding in the Salton Sea and associated aquatic habitats that would result in a substantial adverse effect on special-status bird and fish species primarily associated with the Salton Sea and aquatic habitats surrounding the Salton Sea, and the impact would be **significant and unavoidable**. Furthermore, when considered together with ongoing regional development and the cumulative loss of riparian and sensitive natural communities within the Salton Sea region, the project's contribution would be **cumulatively significant and unavoidable** under CEQA

PEIR at 5-8. While certainly the impacts would be significant, the conclusions that the impacts to biological resources would be unavoidable are unsupported.

For Transportation, Section 5.3.9, the PEIR does not even attempt to address the potential traffic from the buildout of new manufacturing and logistics centers but rather feints towards a suite of "design features" and "mitigation measures" it is unclear that any of these would be *required* of the massive new development that could take place under the Specific Plan without any further review because it is "permitted" or "ministerial" under the Specific Plan.

> Although the project incorporates numerous project design features and mitigation measures aimed at reducing VMT, such as enhancing transit accessibility, implementing transportation demand management strategies, and potentially establishing a VMT impact fee program, some of these measures *cannot be fully quantified or guaranteed* prior to project occupancy or buildout. Therefore, despite these efforts, the project's VMT impacts would remain **significant and unavoidable**.

PEIR at 5-11 (emphasis in italics added). Without analysis of avoidance and mitigation measures the conclusion that the impacts are unavoidable is wholly unsupported.

Because there is no evidence in the PEIR supports the proposed findings regarding significant but unavoidable impacts, the rejection of alternatives and potential mitigation measures is improper, and no statement of overriding considerations could be supported.

One of the stated objectives of the LVSP is to "Create local economic benefits from abundant natural resources, particularly lithium, that levy excise and property taxes that support community benefits and business development. Community benefits include career training, local employment, opportunities for disadvantaged communities, Native Americans, and restoration activities" (PEIR at 1-3). However, it's clear from the PEIR that these purported benefits come at the cost of significant impacts to air quality, water, biological resources, tribal cultural resources, and more."[A]n agency's unsupported claim that the project will confer general benefits" is insufficient to override a project's significant impacts. (*Woodward Park Homeowners Ass'n, Inc. v. City of Fresno* (2007) 149 Cal.App.4th 892, 717.)

Taken as a whole, the PEIR's discussion regarding the rejection of alternatives and mitigation measures and regarding project benefits lack substantial evidence, thereby violating CEQA (Guidelines § 15091(b)) and failing as a basis for any Statement of Overriding Considerations. (Guidelines § 15093(b).)

4) Conclusion

Due to the shortcomings in the PEIR the County cannot lawfully adopt the LVSP as currently written. We urge the County to revise the overbroad LVSP to ensure that future industrial projects will all undergo robust environmental review including consideration of alternatives that will avoid impacts to environmental resources and community health.

Thank you for considering these comments, we urge Imperial County to revise the LVSP and revise and recirculate the PEIR taking into account these and other comments received.

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Appendix A:

Comments on the DRAFT Lithium Valley Specific Plan (LVSP) Program Environmental Impact Report PEIR) prepared for Earthworks by Steven H. Emerman (Malach Consulting)

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Comments on the DRAFT Lithium Valley Specific Plan (LVSP) Program Environmental Impact Report (PEIR)

Dear Jared,

I am writing to respond to your request for my comments on the DRAFT Lithium Valley Specific Plan (LVSP) Program Environmental Impact Report (PEIR) (Dudek, 2025a) in the following areas:

1) direct lithium extraction (DLE) technology
2) water consumption
3) greenhouse gas emissions
4) energy consumption
5) geology
6) mineral resources

Each of my comments is written in bold italics followed by more detailed explanations.

1) ***The claim that direct lithium extraction (DLE) has less environmental impact than hard-rock mining or brine evaporation ponds is not correct and is not supported by recent academic reviews.***

According to the PEIR, "Lithium sourced from geothermal brine has a relatively smaller footprint on the surface of the Earth, and has substantially lower environmental impacts when compared to more traditional forms of lithium extraction, such as open pit hard rock mines and evaporative ponds (i.e. salars) [Dobson et al., 2023]. Governor Newsom has similarly acknowledged that 'California aims to produce lithium in a more sustainable and environmentally safe way than nearly anywhere else in the world, by relying on modern extraction techniques rather than harmful hard rock mining or other traditional tools of extraction' [Office of Governor Gavin Newsom, 2023]. The existing lithium extraction operations around the world are largely intensive traditional surface mining operations in Australia and China, and brine extraction with surface evaporation ponds facilities in Chile and China" (Dudek, 2025a).

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The claim that direct lithium extraction (DLE) has lower environmental impacts than brine evaporation ponds or hard-rock mining is not correct and is not supported by recent academic reviews, especially in terms of fresh water consumption. In fact, the cited study (Dobson et al., 2023) states the opposite of what is said in the preceding quote. Dobson et al. (2023) includes a bar graph that shows that fresh water consumption by three DLE projects under development, including two projects in Imperial Valley, is projected to be greater than is typical for hard-rock mining and far greater than is typical for brine evaporation ponds (see Fig. 1).

It should be noted that the DLE water consumption data in Fig. 1 all come from the companies, which raises the possibility that the estimates are optimistic. According to Dobson et al. (2023), "The values for Vulcan DLE were reported in the company's own marketing materials … Data for the Energy Source Materials (ESM) Hudson Ranch facility and Berkshire Hathaway Energy Renewables (BHER) facilities were provided in the Report of the Blue Ribbon Commission on Lithium Extraction in California (Paz et al., 2022). The ESM data is based on the water allocation requested for its facility from IID [Imperial Irrigation District] and is inclusive of all water needs at the site. In a public meeting in May 2023, ESM indicated that they expect actual water use to be as much as one-third lower than the value shown. Since this claim has not been documented to our knowledge, we have not updated the figure to reflect the lower estimate."

A comprehensive review by Vera et al. (2023) showed that, based largely upon results from pilot projects, DLE consumes more fresh water than brine evaporation ponds, which Vera et al. (2023) regards as the "current practice." According to Vera et al. (2023), "Freshwater consumption with current evaporative technology is 22.5 and 50 m^3 per tonne Li_2CO_3 for Salar de Atacama and Salar de Olaroz, respectively. These numbers should be considered a reference for comparison, as the freshwater consumption of current practice already raises environmental concerns. Freshwater inputs are essential in some DLE technologies … Ion exchange resins, solvent extraction, electromembrane processes and Li^+ insertion electrodes all require fresh water for Li^+ elution from a sorbent phase. We compiled data on the freshwater requirements of ion pumping, solvent extraction and ionic exchange resins from 57 articles in the period 2017–2022 [see Fig. 2a in this memo]. A quarter of these reports do not provide freshwater consumption data, 13 use lower amounts than current practice and 9 require similar amounts. A quarter of the analysed articles report freshwater requirements of over 500 m^3 per tonne Li_2CO_3, over 10 times greater than that used in current practice."

Vera et al. (2023) also showed that, for the single operating DLE facility for which fresh water consumption data were available, the fresh water consumption was considerably greater than what has been reported for brine evaporation ponds. According to Vera et al. (2023), "One mining operation has been active at Salar del Hombre Muerto … since 1996, and this location is a full-scale example of a DLE facility in practice. Li^+ is selectively captured in ion exchange resins and subsequently, a fairly pure LiCl solution is recovered by elution with fresh water

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[Garrett, 2004; Grant, 2020]. Freshwater volumes required for elution have not been disclosed. The overall water use of the entire facility is reported as 71 m^3 per tonne Li_2CO_3, 200% and 50% higher than the volume used at Salar de Atacama and Salar de Olaroz, respectively, highlighting that a given DLE might be more water-intensive than standard evaporitic technology."

An official publication of the International Lithium Association (Razmjou, 2024) drew further attention to the very wide range of fresh water consumption rates for DLE pilot projects [see Fig. 2a in this memo], which introduces an enormous degree of uncertainty into projections of fresh water consumption rates for potential operating DLE projects. According to Razmjou (2024), "Reports on water consumption/footprint of DLE indicate a discrepancy in the literature. An analysis of 57 articles on DLE technology published in 2023 [Vera et al., 2023] revealed a wide range of water consumption rates (not water footprint). Some articles reported substantially lower water consumption rates for DLE compared to brine extraction and hard rock mining (less than one m^3 fresh water per tonne of Li_2CO_3), while others indicated rates exceeding 500 m^3 fresh water per tonne of Li_2CO_3, over 10-12 times greater than current practice [referring to hard-rock mining and brine evaporation ponds]."

Vera et al. (2023) further noted that, under some circumstances, a DLE project might still require evaporation ponds, with their corresponding large land footprint. According to Vera et al. (2023), "Mining in Salar del Hombre Muerto testifies to another often neglected issue with many DLE technologies. The solution eluted from adsorption resins is about 10 g l^{-1} Li^+, which is not considered concentrated enough for crystallization of a pure lithium product. Consequently, the solution is thus sent to evaporation ponds for further concentration [Garrett, 2004; Grant, 2020] … although for shorter intervals than in standard evaporitic technology. For any DLE technology that produces an effluent solution that is not concentrated enough, solutions will need to be concentrated by either time-consuming evaporation ponds, with consequent water loss, or ancillary complementary technologies that require high energy inputs. The latest sustainability report of the company operating in Salar del Hombre Muerto mentions an intention to install a mechanical evaporation unit, which could be seen as an acknowledgement of the high freshwater consumption (mentioned earlier)."

Vera et al. (2023) pointed out that, in fact, it is unusual for DLE pilot projects to produce a eluent that would not require further concentration of the lithium ion through evaporation ponds. According to Vera et al. (2023), "Data on the final Li^+ concentration after elution are shown in Fig. 4e [Fig. 2b in this memo] using the same data compilation sources as Fig. 4d [Fig. 2a in this memo]. Final concentrations are not reported in 20% of the articles, 50% of the articles report elution concentrations that are below the average continental brine concentration (0.5 g l^{-1}) and only 10% report Li^+ concentrations that could be considered sufficient for direct crystallization of Li_2CO_3. Most of those articles highlight the purity of the Li^+ solution in comparison to the

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original solution. However, these pure but dilute Li^+ solutions will require either solar evaporation or energy-consuming evaporators."

To my best knowledge, none of the proposals for Salton Sea lithium projects have included brine evaporation ponds for additional lithium concentration following direct lithium extraction (DLE). At the same time, none of the proposals have stated the lithium concentration of the eluent, which would provide persuasive evidence that no brine evaporation ponds would be necessary for post-DLE processing. There is no information in the Draft PEIR that would indicate that any land has been allocated for brine evaporation ponds for post-DLE processing.

In summary, the claim that DLE has lower environmental impact than either hard-rock mining or brine evaporation ponds is not consistent with current knowledge. In any event, the relevance of the claim in the Draft PEIR is entirely unclear. There is no entity that is offering to close or forgo hard-rock mines or brine evaporation ponds elsewhere (such as Australia, Chile, or China) if only DLE projects are opened in Imperial Valley. Without additional information, it should be assumed that any DLE projects in Imperial Valley would simply be an addition to existing and future hard-rock lithium mines and brine evaporation ponds, especially in light of the skyrocketing lithium demand that is also claimed in the Draft PEIR.

2) ***There is no discussion in the Draft PEIR about the risks and uncertainties involved in an unprecedented technology.***

The Draft PEIR is shockingly devoid of any information on the DLE technology that would be implemented in Imperial Valley. In fact, the only information is a figure with a set of blue silos labeled "Mineral Recovery" (see Fig. 3). The report by Lawrence Berkeley National Laboratory (Dobson et al., 2023) also emphasized the lack of information on the DLE technology and the corresponding difficulties in making any reliable estimations of fresh water consumption. According to Dobson et al. (2023), "Though we obtained facility-wide estimates of water use at lithium facilities near the Salton Sea, we were not able to obtain details about the specific DLE methods they plan to use, or more specific information about how water would be used for lithium extraction in the area. We understand that the proposed lithium extraction method in most area facilities involves or is similar to ion exchange. Figure 7.9 illustrates a proposed DLE process in Arkansas using ion exchange, as well as the water needed for multiple stages (Breuer et al., 2021 [NORAM, 2021]). We expect water use in the area to be similar, but it could vary depending on the design of the process (e.g., whether acid or water is used to regenerate the ion exchange media) … Without more information on the precise processes being used, we were unable to verify projections for water use at future facilities near the Salton Sea or identify opportunities to reduce water consumption through, for example, onsite water recycling."

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According to a publication by the International Lithium Association (Razmjou, 2024), there are only five operating DLE projects in the world, which are the Arcadium Lithium Fénix (Hombre Muerto) project in Argentina, the Jintai Lithium Mahai Lake project in China, the Zangge Lithium Chalkhan Lake project in China, the Lanke Lithium Yiliping Lake project in China, and the EVE Energy project in China (see Figs. 4a-b). Only the EVE Energy project in China uses the solvent extraction method, while the four other projects use the adsorption method (see Fig. 5). Although Dobson et al. (2023) believes that the proposed Salton Sea DLE projects would use the ion exchange method, Razmjou (2024) indicates that the Berkshire Hathaway and Energy Source Minerals projects would use the adsorption method, while the Controlled Thermal Resources project would use the ion exchange method (see Fig. 5). Both Dobson et al. (2023) and Razmjou (2024) were written after Controlled Therman Resources had stated in 2022 that the company was switching from the ion exchange method to the adsorption method. According to Chemical & Engineering News, "In April [2024], Standard Lithium installed an adsorption column from Koch Technology Solutions at a demonstration plant in Arkansas; it plans to use this technology rather than its own ion-exchange process at a commercial-scale facility. That follows decisions by Anson Resources and Controlled Thermal Resources in 2022 to use adsorption technologies over ion exchange" (Blois, 2024). Thus, it is unclear as to whether Dobson et al. (2023) and Razmjou (2024) were out-of-date or whether they had more recent information. In summary, if any of the Salton Sea DLE projects used the ion exchange method, they would be the first examples of operating DLE projects using the ion exchange method anywhere in the world.

The use of an unprecedented technology means that there will be considerable uncertainties involved in the projections of water consumption, energy consumption, greenhouse gas emissions, and hazardous waste generation. An additional uncertainty is the potential need for evaporation ponds to carry out post-DLE processing, as discussed in the previous point, with an unexpected increase in the land footprint. With an unprecedented technology, there is always the possibility that the technology will be unsuccessful or will have delays and cost overruns, with the potential for considerable economic impacts. The important point here is that none of this is discussed in the Draft PEIR.

3) ***The claim that, although the Lithium Valley Specific Plan (LVSP) will generate substantial greenhouse gas emissions, it will result in a decrease in global greenhouse gas emissions is pure speculation and is not quantified in any way.***

According to the Draft PEIR, the total construction greenhouse gas emissions for the Lithium Valley Specific Plan (LVSP) will be 862,795.96 metric tons of carbon dioxide equivalent (see Figs. 6a-b), which would correspond to the annual emissions from 187,564 US passenger cars, assuming emission of 4.6 metric tons of carbon dioxide equivalent per US passenger car per year (EPA, 2026). By 2035, the annual operational greenhouse gas emissions (including the

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amortized construction total) will be 868,715.29 metric tons of carbon dioxide equivalent (see Figs. 7a-b), which would correspond to the annual emissions from 188,851 US passenger cars. In 2045 the annual operational greenhouse gas emissions (including the amortized construction total) will be 573,337.76 metric tons of carbon dioxide equivalent (see Figs. 8a-b), which would correspond to the annual emissions from 124,639 US passenger cars. In 2055 (full buildout), the annual operational greenhouse gas emissions (including the amortized construction total) will be 687,388.55 metric tons of carbon dioxide equivalent (see Figs. 9a-b), which would correspond to the annual emissions from 149,432 US passenger cars. From another perspective, by 2035, the annual operational greenhouse gas emissions from the LVSP will increase the total greenhouse gas emissions from Imperial County by 31% (compare Figs. 7a-b with Fig. 10).

Despite the substantial generation of greenhouse gases, the Draft PEIR states, "Although not quantified herein, the project is anticipated to result in global GHG [Greenhouse Gas] reduction benefits associated with developing a domestic lithium supply" (Dudek, 2025a). The important consideration is that the conclusion that the project would decrease global greenhouse emissions has not been quantified in any way. Therefore, the conclusion should be regarded as pure speculation. The additional consideration is that the Draft PEIR is proposing that Imperial County should be the "sacrifice zone," so that the rest of the world can experience reduced greenhouse gases. Further consideration of social impacts is beyond the scope of this memo. The accuracy of the projected greenhouse gas emissions by the LVSP is considered under Point #5.

4) ***The fresh water consumption by the Lithium Valley Specific Plan (LVSP) has been vastly under-estimated.***

The only estimate of fresh water consumption by the Lithium Valley Specific Plan (LVSP) is stated as "Phase 1 water supply, estimated at approximately 48,023 acre-feet per year, will be secured through negotiations with IID [Imperial Irrigation District]" (RICK, 2025). The document Appendix L-1 Water Supply Assessment adds, "Based on the proposed development square footage in the Plan Area, water demand is anticipated to be approximately 48,023 AFY [acre-feet per year] at the end of Phase 1, with an additional 15,220 AFY at the end of Phase 2 and a further 14,533 AFY in Phase 3, for a 20-year total amount of 63,243 AFY and a total expected water demand of 77,776 AFY at full buildout after 30 years [2055]" (Dudek, 2025b). Dudek (2025b) breaks down the anticipated water consumption into broad categories, including "Green Industrial/Playa Renewables = 2,800 AFY/facility." Dudek (2025b) does not define "Playa Renewables," nor is that expression defined in the Draft PEIR (Dudek, 2025a). Dudek (2025b) does state that "Green Industrial use is the focal use designation allowing development/uses such as geothermal facilities, lithium extraction facilities (and/or combined geothermal and lithium extraction facilities), as well as other energy decarbonization facilities such as green hydrogen manufacturing facilities that refine and/or manufacture products of lithium."

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It can easily be shown that that rate of fresh water consumption would not even begin to supply the needs of the DLE facilities alone. According to the Draft PEIR, "One of the unique development types of the LVSP is the combined Geothermal and Lithium extraction facilities. Figure 3-3 below [see Fig. 3 in this memo] summarizes the geothermal power generation and lithium extraction processes. Up to 17 such facilities are analyzed for the proposed buildout of the LVSP herein, generating up to 2,550 MW and extraction of approximately 450,800 metric tons of lithium per year" (Dudek, 2025a). The annual production of 450,800 metric tons of lithium is equivalent to the annual production of 2,399,482 metric tons of lithium carbonate. According to Dobson et al. (2023), the Berkshire Hathaway Energy Renewables (BHER) project has estimated its fresh water consumption as 65,846 gallons per metric ton of lithium carbonate (see Fig. 1), or 0.20207 acre-feet of fresh water per metric ton of lithium carbonate. Combining the above estimates yields an annual water consumption by the DLE facilities alone as 484,873 acre-feet, which is approximately 6.2 times the total water supply at full buildout that was estimated by Dudek (2025b).

As an alternative fresh water consumption rate, Dudek (2025b) cites the example of the Controlled Thermal Resources (CTR) Hell's Kitchen Powerco 1 and Lithiumco 1 Project with an annual production rate of 25,000 metric tons of lithium and annual water demand of 6500 acre-feet. The Draft EIR for the project clarifies that the water demand is based only on information provided by the company. According to the Draft EIR, "Project operations would generate up to 49.9 MW with lithium mining operations consuming an average of 35 MW with a peak of 40 MW of electricity consumed, 240 AFY of water for construction, and 6,500 AFY of water for operations, as disclosed by the Project Applicant" (Chambers Group, 2023). Other sources clarify that the annual lithium production rate is actually not 25,000 metric tons of lithium, but 25,000 metric tons of lithium hydroxide monohydrate (Stellantis, 2023). An annual production of 25,000 metric tons of lithium hydroxide monohydrate corresponds to 4135 metric tons of lithium or 22,011 metric tons of lithium carbonate. Thus, the consumption of 6500 acre-feet of fresh water per year to produce 22,011 metric tons of lithium carbonate yields 0.29531 acre-feet per metric ton, which is even 46% greater than the estimate provided by BHER, and which corresponds to 13.5 times the total water supply at full buildout that was estimated by Dudek (2025b).

Dudek (2025b) cites the additional example of Berkshire Hathaway Energy Renewables, which would consume only 330 acre-feet per year to produce 90,000 metric tons of lithium (479,045 metric tons of lithium carbonate), corresponding to only 0.0007 acre-feet of fresh water per metric ton of lithium carbonate, which is only 0.34% of the estimate given in Dobson et al. (2023) (see Fig. 1). The evidence for the dramatic reduction in fresh water consumption is "Conversation with BHER staff March 14, 2024" (Dudek, 2025b). Without further information, the preceding estimate cannot be regarded as reliable.

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In summary, the fresh water consumption by the LVSP has been vastly under-estimated and needs to be completely re-considered.

Dudek (2025b) offered the consolation that fresh water consumption could be managed by the maximization of recycling. According to Dudek (2025b), "LVSP policies would also enforce water recycling requirements for individual users and require all mineral recovery operations initially to recycle 20% of their water within the mineral recovery process itself, with the exception of reinjected brine water with a 10% increase every five years until it reaches an 80% water recycling requirement in 2055 (LVSP Policy I-3)." Dudek (2025b) did not offer any plan as to how such high water recycling rates could be achieved. In fact, Dudek (2025b) warned, "It is important to note that these advanced water recycling practices are extremely expensive and can make a project unfeasible" and added the footnote "For example, the Vulcan Energy Zero Carbon Lithium project in Germany reports a very low net water consumption of 359.27 gallons per net ton of Lithium Hydroxide Monohydrate due to the water recycling streams engineered into the process (Vulcan Energy 2023), which is approximately 10 to 100 times less water than reported by other companies (Chambers Group 2021; Dobson et al. 2023; Lake Resources 2023). However, this project is estimated to cost upwards of $1.4B, using substantial public investments and funding."

5) ***The greenhouse gas emissions by the Lithium Valley Specific Plan (LVSP) have been vastly under-estimated.***

Appendix C of the Draft PEIR (Dudek, 2025c) breaks down operating greenhouse gas emissions by land use, in which one of the land uses is "Mineral Recovery, Processing, and Production," corresponding to the DLE facilities (see Figs. 11a-b, 12a-b, and 13a-b). Thus, the annual greenhouse gas emissions for the DLE facilities are projected to be 26,598.37, 20,927.31, and 25,195.61 metric tons of carbon dioxide equivalent in 2035, 2045, and 2055 (full buildout), respectively. The greenhouse gas emissions for the DLE facilities correspond to 3.1%, 3.9%, and 3.9% of the total greenhouse gas emissions for 2035, 2045, and 2055, respectively (see Figs. 11a-b, 12a-b, and 13a-b), based on the totals stated in Appendix C.

It should be noted that the total operating greenhouse gas emissions stated in the Draft PEIR (Dudek, 2025a) do not correspond to the total operating greenhouse gas emissions stated in Appendix C (Dudek, 2025c) (compare Figs. 7a-b with Figs. 11a-b, Figs. 8a-b with Figs, 12a-b, and Figs. 9a-b with Figs. 13a-b). There are, in fact, numerous such contradictions throughout both the Draft PEIR and Appendix C. No attempt has been made in this memo to "proofread" the Draft PEIR or to document all of the contradictions.

Nevertheless, it can be shown that the annual greenhouse gas emissions from the DLE facilities have been vastly under-estimated. The report by the International Lithium Association

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(Razmjou, 2024) drew attention to the great uncertainty in estimating greenhouse gas emissions, but still stated a minimum value of 2.5 metric tons of carbon dioxide equivalent per metric ton of lithium carbonate. According to Razmjou (2024), "Similarly, the carbon footprint/emission of DLE technologies is also unclear in the literature, with several reports presenting a broad range of data. Some studies have reported the energy consumption rate of the extraction part of DLE, which could be used to estimate carbon emissions or footprint. However, this information might not be accurate as the input energy of pretreatment and post-treatment processes of DLE have not been considered. Therefore, the carbon emissions and footprint may not be representative. Also, the source of energy may affect the DLE CO_2 emission. A study by Mousavinezhad et al. [2024] on lithium extraction from brine in Clayton Valley, Nevada, demonstrated distinct emissions profiles when producing one tonne of lithium carbonate using the DLE method. Emissions amounted to approximately 22, 17.3, and 7.6 tonnes of CO_2 per tonne of $Li2CO_3$ when electricity was sourced from a diesel generator, the Nevada grid, or solar panels, respectively. Based on the available data in literature, the direct CO_2 emissions of DLE seem to range between 2.5 and 7 CO_2 per tonne of $LiOH \cdot H_2O$. For example, Arcadium Lithium reported GHG Intensity (tonne CO2/tonne Li product) of 2.5 to 3 for its DLE plant." The Arcadium Lithium (Fénix) project produces lithium carbonate (Rio Tinto, 2026), so that the minimum value of greenhouse gas emissions reported in the literature is 2.5 metric tons of carbon dioxide equivalent per metric ton of lithium carbonate.

Based on the preceding minimum estimate of greenhouse gas emissions and the projected annual production of 2,399,482 metric tons of lithium carbonate (see Point #4), the minimum estimate for greenhouse gas emissions by the DLE facilities at the LVSP site would be 5,998,706 metric tons of carbon dioxide equivalent per year. Thus, the minimum estimate for DLE operations alone is already nearly 240 times the total operating greenhouse gas emissions for all activities at the LVSP site at full buildout (compare with Figs. 13a-b). For comparison, 5,998,706 metric tons of carbon dioxide equivalent would correspond to the annual greenhouse gas emissions by 1,304,066 US passenger cars. Based on the discrepancy between greenhouse gas emissions in the Draft PEIR and the estimates by the International Lithium Association, it should be assumed that total greenhouse gas emissions at the LVSP site have been under-estimated by at least four orders of magnitude, considering that "Mineral Recovery, Processing, and Production" is just one of 30 land uses at the LVSP site (see Figs. 11a-b, 12a-b, 13a-b).

One caveat is that the preceding quote from the report by the International Lithium Association continued, "DLE offers the advantage of modularity, enabling seamless integration with renewable energy sources to completely offset CO_2 emissions. When based on geothermal brine, DLE facilitates a significant reduction in carbon footprint, nearing zero emissions" (Razmjou, 2024). In other words, when the DLE operation is combined with a geothermal energy operation, the DLE operation will not necessarily generate any more greenhouse gas emissions than the geothermal operation alone. In this case, it is useful to compare the GHG emissions assigned to

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the land use "Geothermal" in Dudek (2025c) with typical values in the literature. The estimated GHG emissions from geothermal operations in the Draft PEIR are 91,584.68, 42,099.65, and 71,053.34 metric tons of carbon dioxide equivalent for 2035, 2045, and 2055, corresponding to 7.5%, 3.7%, and 6.7% of the total greenhouse gas emissions, respectively (see Figs. 11a-b, 12a-b, and 13a-b). By contrast, according to a report by the National Renewable Energy Laboratory (NREL), "We found that the median estimate of life cycle GHG emissions (in grams of carbon dioxide equivalent per kilowatt-hour generated [g CO_2eq/kWh]) reported by these studies are 32.0, 47.0, and 11.3 for EGS [Enhanced Geothermal Systems] binary, HT [Hydrothermal] flash, and HT binary, respectively" (Eberle et al., 2017). Thus, the generation of 2550 MW of geothermal power is accompanied by the generation of 714,816, 1,049,886, and 252,419 metric tons of carbon dioxide equivalent based on EGS binary, HT flash, and HT binary technologies, respectively. In summary, GHG emissions from geothermal power generation have also been vastly under-estimated in the Draft PEIR. The implications of combining geothermal and DLE operations are further considered under Point #6.

6) ***The energy consumption by the Lithium Valley Specific Plan (LVSP) has been vastly under-estimated.***

In addition to estimates of water consumption and greenhouse gas generation, the Draft PEIR presents estimates for energy consumption. These estimates are divided into electricity consumption (see Fig. 14), natural gas consumption (see Fig. 15), and petroleum consumption (see Figs. 16a-b). Like the estimate for water consumption, but unlike the estimates for greenhouse gas emissions, there are no separate estimates for energy consumption by the DLE operations, the geothermal operations, or any other land use or industrial activity.

There is a double uncertainty in the projected energy consumption, since the DLE literature is nearly devoid of these data. According to Vera et al. (2023), "Energy requirements are yet to be provided for most DLE technologies. Cost analysis (Supplementary Table 2) and optimization processes are rarely reported [Jiang et al., 2014; Nie et al., 2017; Guo et al., 2018; Niu et al., 2021]. Energy requirements are frequently reported only for the key DLE step, with a complete disregard for that of preprocessing and post-processing steps or ancillary equipment (Fig. 2h). For example, in an electrochemical ion-pumping process, the mechanical energy to pump solutions through the electrochemical cells was calculated to be 300-fold higher than the energy required to drive the electrochemical reactions [Palagonia et al., 2019, 2020]. However, often only the electrical work required for an electrochemical process is calculated [Lee et al., 2017; Nie et al., 2017; Guo et al., 2018; Ji et al., 2018; Díaz Nieto et al., 2019, 2020, 2022; Battistel et al., 2020].The energy value of a single step is relevant but it is only a lower bound. Owing to this frequent partial reporting of energy requirements, it is not possible to make comparisons."

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Vera et al. (2023) continued, "In addition, it is important to consider that pre-processing is a crucial DLE step that must be performed on very large brine volumes (on the order of 21 million litres per day). A thorough study of the efficiency of lithium manganese oxide as a Li^+ absorbent found that heating the brine from 10 to 80 °C increased the Li^+ adsorption efficiency from 15% to 70%, with a consequent increase in separation efficiency from other cations [Marti et al., 2021]. Other ion exchange resins also show improved absorption efficiency at higher brine temperature [Li et al., 2020; Qian et al., 2019, 2020; Taghvaei et al., 2020; Sun et al., 2023]. However, operational costs increase considerably if brine volumes on the order of 21,000 m^3 daily (Box 2) need to be heated to approximately 80 °C. Brine heating is definitely an energy input that should be considered in the overall process analysis (Fig. 2h)."

Following the publication of the review by Vera et al. (2023), Ruberti (2024) estimated an energy consumption for DLE projects of 50 Gigajoules per metric ton of lithium carbonate. In fact, using the values of 35 MW and 22,011 metric tons of lithium carbonate for the Controlled Thermal Resources (CTR) Hell's Kitchen project (see Point #4) yields 50.1 GJ per metric ton of lithium carbonate. Based on the preceding estimate and a production rate of 2,399,482 metric tons of lithium carbonate per year, the estimated energy consumption by the DLE facilities alone will be 33,326,165,550 kilowatt-hours per year, which is over 4.3 times the estimated electricity consumption of 7,701,759,506 kilowatt-hours per year in 2055 (full buildout) by all activities at the LVSP site (see Fig. 14). The natural gas consumption in 2055 (664,727,364 kiloBTU per year) (see Fig. 15) corresponds to 194,812,360 kilowatt-hours, while the petroleum consumption (59,763,920 gallons) (see Figs. 16a-b) corresponds to 2,187,359,472 kilowatt-hours. Thus, the total predicted energy consumption (electricity + natural gas + petroleum) in 2055 would be equal to 10,083,931,338 kilowatt-hours per year, which would still be only 30% of the energy consumed by the DLE facilities alone. Based on the discrepancy between energy consumption in the Draft PEIR and the estimate by Ruberti (2024), it should be assumed that total energy consumption at the LVSP site has been under-estimated by at least two orders of magnitude, considering that "Mineral Recovery, Processing, and Production" is just one of 30 land uses at the LVSP site (see Figs. 11a-b, 12a-b, and 13a-b).

It was mentioned under Point #4 that, according to the Draft PEIR, all of the proposed geothermal facilities on the LVSP site could generate up to 2550 MW, corresponding to 22,338,000,000 kilowatt-hours per year, which is still only 67% of the energy required to produce 2,399,482 metric tons of lithium carbonate per year. It should be noted that the Draft PEIR never actually states the source of energy for the DLE facilities, although the neighboring geothermal energy production is an obvious choice. However, devoting all of the energy produced on the LVSP site to the on-site production of lithium carbonate does not seem like a workable plan. The Draft PEIR states, "Furthermore, the co-development of geothermal power facilities also improves electric grid stability, grid reliability, and grid resiliency because such facilities 'provides a sustainable and stable source of electricity and are characterized as a

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baseload renewable resource' and such power facilities help to restart the grid' (AB1657 Blue Ribbon Commission Report, December 2022.) … The LVSP's integration of renewable energy technologies, in combination with BESS [Battery Energy Storage Systems] facilities, would help reduce regional electricity demand from carbon-intensive sources by supplying the regional grid with more renewably sourced energy, particularly during peak periods" (Dudek, 2025a), but never clarifies how much geothermal energy would contribute to the regional grid and how much would be used to power the DLE facilities.

7) ***There is no estimate of brine consumption nor any consideration of the impacts of brine consumption.***

According to the Draft PEIR, "Following mineral extraction, the cooled brine would be reinjected into the geothermal reservoir through the injection wells. Brine processing may involve pH adjustment or other chemical treatment to prevent scaling and maintain system efficiency … A lined brine pond would provide temporary storage during maintenance, system startup, or upset conditions" (Dudek, 2025a) (see Fig. 3).

Any evaporation of water from the brine pond would constitute consumption of brine, in that less brine would be returned to the reservoir than had been extracted from the reservoir. Although the Draft PEIR refers only to "maintenance, system startup, or upset conditions" (Dudek, 2025a), the Draft PEIR does not provide any assurance that the brine could be re-injected at the same rate at which it is extracted. Re-injection rates are often limited by the need to avoid fracturing or damage to the geothermal reservoir. If there are periods during which the pumping rate exceeds the re-injection rate, the need to store the accumulated spent brine on the surface could result in the need for brine ponds of considerable size. The Draft PEIR does not provide any information on the anticipated sizes of brine ponds or the anticipated loss of brine by evaporation. It should be noted that ponds for storage of spent brine that is awaiting re-injection are a different concept from brine evaporation ponds that are sometimes needed for further concentration of lithium after DLE processing (see discussion under Point #1).

The failure to re-inject the same volume of brine that was extracted could have the following consequences:

1) The decrease in water pressure in the geothermal reservoir could cause groundwater to be drawn into the reservoir from overlying fresh water aquifers with potential impacts on the users of those fresh water aquifers.
2) The decrease in water pressure could result in compaction of the geothermal reservoir and land subsidence.
3) The sites of discharge of the geothermal reservoir (streams, springs, mud pots, or mud volcanoes) could be depleted with potential impacts on ecosystems, tribal cultural resources, and the users of the water that is fed by those discharge sites.

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The potential for land subsidence and loss of geothermal resources is further discussed in Points #9 and #10. At this point, it suffices to say that none of the preceding potential consequences has been considered in the Draft PEIR.

8) ***There is no discussion of the volume or composition of the hazardous metal sludge that will precipitate out of the brine ponds.***

The Draft PEIR acknowledges the toxic metals that will be present in the brine. According to the Draft PEIR, "Geothermal fluids associated with well sites and geothermal facilities are known to contain elevated metals concentrations, often at hazardous levels. Elevated metals often found at the geothermal facilities are arsenic, barium, copper, lead, and zinc. Naturally occurring radioactive minerals, such as arsenic, lead, and cadmium, do exist at low levels in the Salton Sea Known Geothermal Resource Area (KGRA) (Earthworks 2023), which is partially encompassed by the Plan Area" (Dudek, 2025a). The last sentence is incorrect, since arsenic, lead, and cadmium are neither minerals nor radioactive. The actual scientifically correct quote from Earthworks (2023) states, "The concentrations of heavy metals such as arsenic, lead, and cadmium are of particular concern, as well as any naturally occurring radioactive materials. Naturally occurring radioactive minerals do exist at low levels in the SSKGRA [Salton Sea Known Geothermal Resource Area] (Finster et al., 2015)."

The Draft PEIR then denies that the toxic metals and radioactive minerals could be a problem since the spent brine would be re-injected into the geothermal reservoir (see Fig. 3). According to the Draft PEIR, "Waste produced from geothermal power generation and lithium extraction can be minimized by reinjecting spent brine deep underground back into the geothermal reservoir, referred to as a 'closed loop.' In addition, because geothermal brine in the KGRA contains low levels of naturally occurring radioactive materials, including arsenic, lead, and cadmium, any handling, storage, or accidental release of brine or associated solid waste must comply with applicable hazardous materials regulations."

However, the brine ponds are part of the design, they are not accidental. Precipitation of toxic metals and radioactive minerals is likely to occur while the brine is evaporating in the brine ponds. The Draft PEIR contains no estimates of the volume nor composition of this toxic and radioactive sludge, and does not include any plan for the safe handling and disposal of the sludge.

9) ***Despite the land subsidence that will occur due to the inability to re-inject all of the spent brine, there is no plan to mitigate land subsidence.***

It was discussed in Point #5 that failure to re-inject all of the spent brine due to evaporation of the brine ponds could result in land subsidence. This potential consequence is also acknowledged

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in the Draft PEIR. According to the Draft PEIR, "Land subsidence can also occur as a result of geothermal operations that involve large fluid mass changes which decreases pore pressures allowing the overburden pressure to compress the pores, resulting in a drop in the ground surface (Sektiawan, et al. 2016). This land subsidence can be avoided by re-injecting all production water back into the aquifer it was withdrawn from so that pressure changes are minimized."

The Draft PEIR then describes a mitigation plan that would involve monitoring of land subsidence. According to the Draft PEIR, "MM-GEO-2 Subsidence Monitoring and Mitigation Plan … Prior to approval of any geothermal activities or other industrial activities involving the extraction or injection of fluids to the subsurface, a ground survey study shall be completed by California Licensed Surveyor as a baseline condition for comparison with subsequent ground movement (subsidence and/or uplift) monitoring. Ground surveying shall be completed every twelve months in the vicinity of any proposed extraction or injection wells in accordance with a Surveying Plan that is reviewed and approved by County Planning and Development Services Department and California Geologic Energy Management (CalGEM). Surveying for both vertical and horizontal ground movement shall be completed by a California Licensed Surveyor, along the perimeter and throughout the interior of the identified area of interest, utilizing high precision Global Positioning System technology, in combination with a network of ground stations. Surveying shall be used to monitor ground subsidence and aid in balancing any fluid extractions with injection volumes and pressures … The annual monitoring survey results shall be forwarded to the County Public Works and CalGEM … In the event that ground movement monitoring indicates that on-going ground movement, equal to or greater than 0.6 inch at any given location, in an upward or downward direction, is occurring in the vicinity of the subject activities, and it is determined that the Operator's operations are the cause, CalGEM, acting in consultation with the County Public Works, shall determine if damage has occurred and evaluate the Operator's activities to determine where adjustments to operations need to occur to alleviate the ground movement. The Operator shall implement whatever adjustments that CalGEM determines are necessary and appropriate to alleviate any damage" (Dudek, 2025a).

The preceding passage describes a monitoring plan, but not an actual contingency plan that could be carried out in response to excessive land subsidence. Elsewhere, the Draft PEIR does discuss theoretical contingency plans that are taken from a report by the Utah Geological Survey (mistakenly called the U.S. Geological Survey in the Draft PEIR). According to the Draft PEIR, "With monitoring and management of fluid transfers, subsidence can be reduced by ensuring a balanced system of extraction and injection. Management tools include 1) ensuring all water used for geothermal heat extraction is pumped back into the aquifer, 2) replacing water lost from the aquifer by increasing groundwater recharge to the basin-fill aquifer through conjunctive management of groundwater and surface water resources, and importation of water from other basins, 3) dispersing high-discharge wells to reduce localized land subsidence, and 4) reducing overall groundwater withdrawals in the basin (USGS 2012) [UGS, 2012] (Dudek, 2025a). The

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preceding contingency plans are all theoretical and there is no discussion as to how they could be applied in practice in Imperial Valley. For example, there is certainly no discussion in the Draft PEIR regarding the prospects for pumping groundwater from the surrounding area and re-injecting it into the subsurface of the LVSP site. It should also be noted that the Draft PEIR is devoid of predictions of land subsidence, in addition to the lack of any predictions regarding the likely difference between the rate of brine extraction and the rate of brine re-injection.

10) *The claim that there will be no impact on mineral resources does not take into account the potential for compaction of the geothermal reservoir.*

The Draft PEIR includes a section entitled "Mineral Resources." According to the Draft PEIR, "This section describes the existing mineral resources conditions of the Specific Plan Area (Plan Area) and vicinity, identifies associated regulatory requirements, evaluates potential impacts, and identifies proposed mitigation measures related to implementation of the proposed project" (Dudek, 2025a). The section includes a sub-section entitled "Geothermal Energy/Minerals," thus clarifying that the Draft PEIR regards geothermal energy as a mineral resource.

The Draft PEIR does not discuss any potential loss of geothermal energy or geothermal mineral resources. On the contrary, the Draft PEIR views the project as an opportunity to increase geothermal energy and geothermal mineral resources. According to the Draft PEIR, "Activities associated with the proposed project would include increased opportunities to further develop renewable energy projects, including geothermal power plants, lithium battery production, renewable hydrogen production, and recovery of minerals from brine including lithium, within areas, specifically Green Industrial, designated for industrial operations focused on decarbonizing the energy and mineral recovery industries. As these activities would promote access to the underlying mineral resources, there would be no loss in the availability of these locally important mineral resources" (Dudek, 2025a).

The potential loss of geothermal energy or geothermal mineral resources arises from the compaction of the geothermal reservoir and the corresponding land subsidence that could result from the inability to re-inject the same volume of brine that is being extracted. As was mentioned under Point #7, any inability to re-inject the spent brine at the same rate at which brine is bring extracted will require storage of the brine in ponds from which brine will be lost by evaporation. Even if the spent brine could be re-injected at the same rate at which it was extracted, compaction could result from delay in the time required for the re-injected brine to flow from the re-injection point back to the point of extraction.

The purpose of this Point #10 is not to argue that compaction of the geothermal reservoir and the loss of geothermal resources is inevitable, but that the possibility has not even been considered. In particular, none of the following have been considered:

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1) the rate at which spent brine can be re-injected
2) the sizes of the required brine storage ponds
3) the rate of loss of brine by evaporation from the brine storage ponds
4) the movement of the re-injected brine through the geothermal reservoir
5) the compressibility of the geothermal reservoir
6) the degrees of compaction of the geothermal reservoir that will be reversible and irreversible

An additional issue that has not been discussed in the Draft PEIR is the problem of diluting the lithium in the geothermal reservoir with re-injected brine from which the lithium has been removed, especially when the plan is to re-inject such a large volume of spent lithium brine. A perennial problem with DLE projects has been the need to balance the maintenance of water pressure in the reservoir with the need to avoid excessive dilution. According to a White Paper sponsored by the International Lithium Association, "Too close to extraction wells, reinjection wells can threaten the economic upstream extraction process through earlier-than-expected dilution. Too far from extraction wells, and reinjection wells may require more energy to pump depleted brine back into the reservoir as they may not sense the pressure drawdown from extraction wells" (Zelandez and Summit Nanotech, 2024).

11) Despite the induced seismicity that has been known to result from brine re-injection, there is an inadequate plan to mitigate induced seismicity.

The Draft PEIR acknowledges that geothermal energy projects can induce earthquakes in seismically active areas. According to the Draft PEIR, "Geothermal fields tend to be located in seismically active areas with a high subsurface strain-rates, but where elevated rates of deformation and induced seismicity are often linked to these activities that involve substantial changes in fluid masses (Barbour 2021). There is often less fluid volume available for reinjection than the volume of fluids produced and without any rapid groundwater recharge, the underlying reservoir responds to fluid mass and temperature losses with volumetric contraction at depth, thereby creating new faults and fractures and pushing pre-existing faults toward reactivation (Barbour 2021). For the Salton Sea geothermal field, ground deformation has been unmistakenly linked to geothermal energy production, however there is some uncertainty to the amount of natural deformation occurring in the region unrelated to the geothermal energy production activities (Barbour 2021). Part of this ambiguity is due to the location of the Salton Sea area in this transition zone between the San Andreas Fault [to] the north and the Imperial Fault to the south. The influence of injection and production of geothermal fluids is apparent when the total volumes across the field are calculated and compared to seismicity rates which show evidence of swarm-like behavior as opposed to more isolated episodic events" (Dudek, 2025a).

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The Draft PEIR continues to emphasize the complexity and uncertainty involved in predicting induced seismicity from geothermal projects. According to the Draft PEIR, "However, research of the different geothermal fields in Southern California have demonstrated different responses to injection and production activities which highlight the structural complexities involved (Barbour 2021). A study in 2022 researched fluid injection and geothermal energy extraction in the North Brawley Geothermal Field to understand a possible connection to seismic hazards. After a few years of geothermal operations at the North Brawley Geothermal Field, located within the Brawley Seismic Zone, several M 4.0 to M 5.0 earthquakes occurred in 2012, followed by a long period of few earthquakes. Ground deformation was analyzed in the area, combining radar images, GPS, and leveling to reveal how the ground moved before, during, and after the 2012 events, with centimeter-scale accuracy (Materna, et al. 2022). These analyses indicated that aseismic slip (i.e., fault movement not caused by an earthquake) occurred from 2009 to 2013, coinciding with underground pressure changes from 2014 to 2019. The patterns preceding the earthquakes did not continue afterward, suggesting that aseismic slip controlled the timing and location of the 2012 seismic events, and that the seismic and aseismic slip released tectonically accumulated strain. Modeling based on these techniques provided evidence for 80% more pre-swarm aseismic slip than previously recognized from 2009 to 2012, as well as a cessation of fault-related slip during the approximate 7 years after the 2012 earthquake swarm (Materna, et al. 2022)" (Dudek, 2025a).

The Draft PEIR explains that the application of enhanced geothermal systems (EGS), in which pressurized fluids are used to induce fracturing within the geothermal reservoir, can increase the risk of induced seismicity. The Draft PEIR concludes that induced earthquakes with magnitudes up to 5.5 are possible, but also emphasized the lack of research and high degree of uncertainty in this prediction. According to the Draft PEIR, "In addition, as described above, geothermal energy activities have been linked to induced seismic hazards, especially when the process known as enhanced geothermal systems (EGS) are involved (Barbour 2021) … EGS involves the use of pressurized fluids that are injected into the subsurface to create cracks into the rock in order to free up more geothermal resources. Therefore, there is a potential for increased geothermal operations resulting from the proposed project to result in increased seismic activity in and around the Plan Area. Whether this could occur as just increased frequency or potentially increased intensities is not well known due to the complexities of the underlying systems. The relationships between varying fluid mass changes and how that in turn affects the regional strain and seismicity patterns is in need of further study (Barbour et al. 2016). Adding to the complexity are existing geothermal operations occurring in the area that are already part of existing conditions and potentially also inducing seismicity" (Dudek, 2025a).

The Draft PEIR continues, "There is no guarantee that any new geothermal operations associated with the project would not potentially induce some seismicity. While there are research efforts occurring in the area to further inform the relationships and risks of induced seismicity, there is

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still much more to be understood. In addition, it could be difficult to distinguish between seismicity that is induced by other existing geothermal operations or that of geothermal activities associated with the proposed project. Regardless, it is assumed that earthquakes up to or in the range of M 4.0 to 5.5 (based on documented seismicity from existing geothermal operations and reported evidence of EGS-induced earthquakes up to M 5.5) could be induced as a result of the geothermal activities associated with the project" (Dudek, 2025a). Based on the preceding concerns expressed within the Draft PEIR, it is disturbing that the Draft PEIR does not state whether enhanced geothermal systems (EGS) would or would not be used at the LVSP site, nor does this information seem to be forthcoming from the geothermal or DLE companies.

The Draft PEIR does not mention that induced seismicity resulting from the re-injection of spent brine from DLE pilot projects is actually well-known and has even caused the closure of some projects. According to Vera et al. (2023), "A pilot scale DLE process, adapted from the one originally developed for brines in Argentina, successfully extracted lithium from geothermal brines located in north-eastern France that are used for energy production. After extracting the 180 °C geothermal fluid located at a depth of between 2,600 and 5,000 m, 90% of lithium was selectively extracted using patented ion exchange resins [Boualleg and Burdet, 2015; Sanjuan et al., 2022]. The lithium-depleted geothermal fluid is then re-injected underground. This type of lithium production from geothermal brines faces challenges, especially in the case of deep extraction because of the risk of micro-earthquakes [Chen et al., 2020], as occurred during testing in late 2020 near Strasbourg, which halted drilling activities."

California Natural Resources Agency (2024) expressed particular concern regarding the impact of re-injecting spent brine so close to many large faults, including the San Andreas Fault. According to California Natural Resources Agency (2024), "An environmental impact concern of future integrated geothermal development and Li production at the SSGF [Salton Sea Geothermal Field] is the potential for induced seismicity due to the increased pumping and re-injection of geothermal brines, a well-known phenomenon associated with large-scale subsurface fluid extraction and injection operations. This concern is of particular interest at the SSGF since it is located within a tectonically active region of many active regional faults, including the San Andreas Fault nearby. According to the seismic monitoring data (Brodsky and Lajoie, 2013; Trugman et al., 2016), the seismic rate in the area was initially low during the period of low-level geothermal operations before 1986. As the operations expanded, so did the seismicity. The seismic rate increased during the mid-1980s to early 1990s, during which most geothermal development activities occurred in the SSGF."

The LBNL report further discussed the relationship between geothermal energy and seismicity in the Salton Sea Geothermal Field and finally concluded that the relationship was "unclear" and in need of "further study" (Dobson et al., 2023). According to the LBNL report, "We analyze the relationship between geothermal energy production and seismicity in the SS-GF between 1972

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and 2022. The seismicity ratio increased in this period. A simple linear relationship of proportionality between energy production and seismicity exists for the first 14 years of production (until 1996), but not thereafter. The increase in seismic activity associated with energy production is greatest to the east of the Brawley fault, where the amount of injection exceeds the amount of production. Interestingly, the SS-GF appears seismically quiescent (i.e., exhibits relatively low seismicity) relative to the surrounding region prior to energy production. Energy production in the SS-GF correlates with an increase of seismic hazards within the field – not beyond that of the broader tectonic regime, but rather from a quiescent state to a state statistically the same as the broader regional tectonic conditions. The detailed subsurface response to the expected increase in injection and production is still unclear, and further study is needed to forecast the seismicity ratio and magnitude" (Dobson et al., 2023).

Another concern expressed by California Natural Resources Agency (2024) is that the brine that has historically been re-injected by a geothermal operation has been much hotter than the brine that would be re-injected by a geothermal operation combined with a DLE operation. Not only is the temperature of the re-injected brine from the DLE projects at the LVSP unknown, but the seismic effects of re-injecting a relatively cool brine are also unknown. According to California Natural Resources Agency (2024), "Historically, the geothermal brines have been produced from the reservoir at a temperature of ~450 – 480 °F, and the effluent brines were re-injected back into the reservoir at a temperature of 205-230 °F. When coupled with Li extraction from brines, the injected brines might be cooler than the current normal power plant reinjection temperature. It is unclear from publicly available data what the temperature range of injectate would likely be after the removal of Li. The cooler injectate might promote seismic activities within the reservoir. Reservoir modeling considering the thermoelastic effects could clarify the importance of the impacts on reservoir stress state and fault slip potential due to the injection of cooler brines." It should be noted that the storage of brine in ponds prior to re-injection could result in a brine that had cooled to air temperature with seismic impacts that are even more difficult to predict.

In response to the risk of induced seismicity from brine pumping and re-injection, the Draft PEIR proposes a monitoring plan. According to the Draft PEIR, "Prior to the issuance of any Drilling Use Permit for the construction of a new well that may be used for geothermal activities including fluid extraction or injection, or for a permit to conduct such activities on an existing well, the proponent shall develop an Induced Seismicity Avoidance, Monitoring, Evaluation, and Mitigation Plan to be submitted to California Geologic Energy Management (CalGEM) Division and the County Planning and Development Services Department for review and approval. The Mitigation Plan shall be consistent with the 'traffic light' system recommended by the National Research Council. The minimum requirements for this Mitigation Plan include, without limitation:

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- Establish a high-resolution micro-seismic network to map micro-seismic events at appropriate locations to accurately monitor seismicity at and near the well location subject to geothermal energy related activities.
- Develop a traffic light threshold system where GREEN allows for seismicity of a range of magnitudes as determined by CalGEM and the County to be within an acceptable range; YELLOW requires that operation-specific measures involving fluid withdrawal or extraction, be enacted such as inspection of operations for any malfunctioning elements or potentially making immediate adjustments to operations to reduce the risks of a larger seismic event (e.g., reduced injected volumes and/or extraction rates); and RED requiring the cessation of all fluid extraction or injection for observed seismic events that are deemed as potentially capable of causing substantive damage.
- For seismic events that exceed the YELLOW or RED thresholds, conduct an evaluation to determine if the geothermal activity is correlated in any way to the seismic event.
- Establish a notification protocol for informing the County and CalGEM about seismic events for review and evaluation. Resumption of activity can only resume at the explicit direction, based on approval of the evaluation, from CalGEM and Imperial County" (Dudek, 2025a)."

The first concern with the proposed mitigation is the requirement to "conduct an evaluation to determine if the geothermal activity is correlated in any way to the seismic event" (Dudek, 2025a). The Draft PEIR emphasizes the difficulty in distinguishing between an earthquake caused by a geothermal/DLE project at the LVSP site and either an existing geothermal operation off the LVSP site or a naturally-occurring earthquake. According to the Draft PEIR, "In addition, it could be difficult to distinguish between seismicity that is induced by other existing geothermal operations or that of geothermal activities associated with the proposed project … Considering the complexities of the regional seismic systems and uncertainties in direct correlations between geothermal operations and induced seismicity, it is difficult to quantify how the approximate 50% reduction in development intensity under Alternative 3 would reduce seismic hazards compared to the proposed project … Considering the complexities of the regional seismic systems and uncertainties in direct correlations between geothermal operations and induced seismicity, it is difficult to quantify the extent of how the increased development intensity under Alternative 4 would increase seismic hazards compared to the proposed project" (Dudek, 2025a).

A factor that is completely missing from the above monitoring and mitigation plan is any information as to the standard that would be used for determining whether a particular well had or had not caused a particular earthquake. In other words, would the default position (null hypothesis) be that a particular well had caused an earthquake or that a particular well had not caused an earthquake? Would the investigating party be required to prove "beyond a reasonable doubt" that a particular well had caused a particular earthquake? In other words, the standard could be set so high that it could never be determined that a particular well has caused a

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particular earthquake, so that industrial activity would always re-commence at the suspect well. Along the same lines, there is no information as to which party would "conduct an evaluation," but based upon the other language in the plan ("Establish a high-resolution micro-seismic network … Develop a traffic light threshold system"), it seems as if it would be the well owner who would conduct the evaluation. The second related concern with the proposed mitigation is that nothing clarifies what initiates even the suspicion that a particular well might be associated with a particular seismic event.

The third concern is that the mitigation plan is directed toward individual wells with the potential outcome that industrial activity could be terminated at one well if it were established that that one well had caused an earthquake with a magnitude above some threshold. However, there is no consideration as to whether the geothermal/DLE project as a whole could be causing earthquakes. In other words, multiple compliant wells could still have cumulative impacts. There is certainly no plan to evaluate the seismic impact of the geothermal/DLE project as a whole with the potential outcome of closing down the entire project. This concern is explored further under Point #12.

12) The claim that there are no cumulative effects for induced seismicity is not correct and is not supported by recent academic reviews.

The Draft PEIR claims that, because of the monitoring plan discussed under Point #11, the additional seismic risk due to brine extraction and re-injection would not be significant. According to the Draft PEIR, "While this monitoring plan would not eliminate the potential for induced seismicity to occur, it would provide adaptive measures to ensure that adverse effects are minimized. Therefore, since all cumulative projects would be subject to building code and CalGEM requirements, and geothermal activities associated with the proposed project would be conducted in accordance with the requirements of an induced seismicity monitoring plan (Mitigation Measure GEO-1), the project's contribution to seismic hazards would not be cumulatively considerable" (Dudek, 2025a).

The preceding claim disregards the potential for interaction among multiple wells on the project site, interaction between wells on the project site and off the project site, and interaction between wells and the naturally-occurring geological activity, even if no individual well on the project site could have caused an earthquake. For example, when several wells are either extracting or re-injecting fluid, their pressure "halos" (zones of increased or decreased pore pressure) can begin to overlap underground. This can raise the pore pressure near critically stressed faults even in areas not immediately adjacent to any single well. As a second example, if the geology has faults or fracture networks that extend across the field, pressure changes from different wells can propagate farther than expected by following connected fractures, which could trigger seismic events on faults that otherwise would remain stable. The preceding phenomena would certainly

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complicate the proposal in the Draft PEIR to conduct investigations only into whether one well on the LVSP site had caused one particular earthquake.

The induced seismicity resulting from interactions among multiple geothermal wells is an emerging area of research. For example, according to Khanesfid et al. (2022), "However, most of these earlier works focused on the statistical analysis of induced seismicity caused by the water injection in a single well. In this study, with a regional perspective, the effect of water injection in multiple active wells in the different GPP zones is considered … From the risk assessment point of view, it is not enough to know the effects of only a single injection well. In an area with several wells, their cumulative effects are important on the people, buildings, and other infrastructure of the region." Then, based on seismic data in four areas of geothermal energy production, including Imperial County, Khanesfid et al. (2022) concluded, "Therefore, injection in multiple wells simultaneously can lead to a higher range of distances, in comparison with the case of considering earthquakes due to injecting water in only a single well."

In summary, the current mitigation plan for induced seismicity with its emphasis on the need to establish that a particular well had caused a particular earthquake is entirely inadequate.

This concludes my comments. Please let me know if I can help with anything else.

Best wishes,

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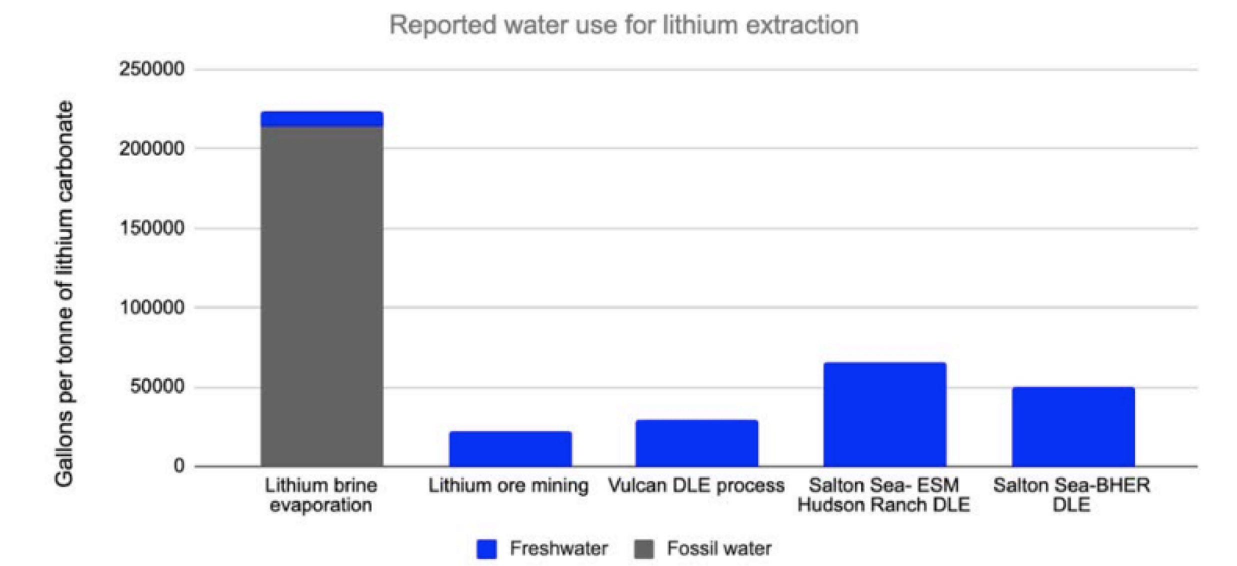

Figure 7.8. Water usage for different lithium extraction methods (Vulcan Energy, 2021; Moran et al., 2022; Paz et al., 2022). DLE is direct lithium extraction. ESM is Energy Source Materials. BHER is Berkshire Hathaway Energy Renewables.

Figure 1. The claim in the Draft PEIR that direct lithium extraction (DLE) has lower environmental impacts than brine evaporation ponds or hard-rock mining is not correct and is not supported by recent academic reviews, especially in terms of fresh water consumption. In fact, the study cited in the Draft PEIR (Dobson et al., 2023) states the opposite of what is said in the Draft PEIR. The above bar graph from Dobson et al. (2023) shows that fresh water consumption by three DLE projects under development, including two projects in Imperial Valley, is projected to be greater than is typical for hard-rock mining and far greater than is typical for brine evaporation ponds. It should be noted that the DLE water consumption data in the bar graph all come from the companies, which raises the possibility that the estimates are optimistic. The projected annual production of 450,800 metric tons of lithium is equivalent to the annual production of 2,399,482 metric tons of lithium carbonate. The bar graph shows that the Berkshire Hathaway Energy Renewables (BHER) project has estimated its fresh water consumption as 65,846 gallons per metric ton of lithium carbonate, or 0.20207 acre-feet of fresh water per metric ton of lithium carbonate. Combining the above estimates yields an annual water consumption by the DLE facilities alone as 484,873 acre-feet, which is approximately 10 times the total water supply for the entire LVSP site that was estimated by Rick (2025). Figure from Dobson et al. (2023).

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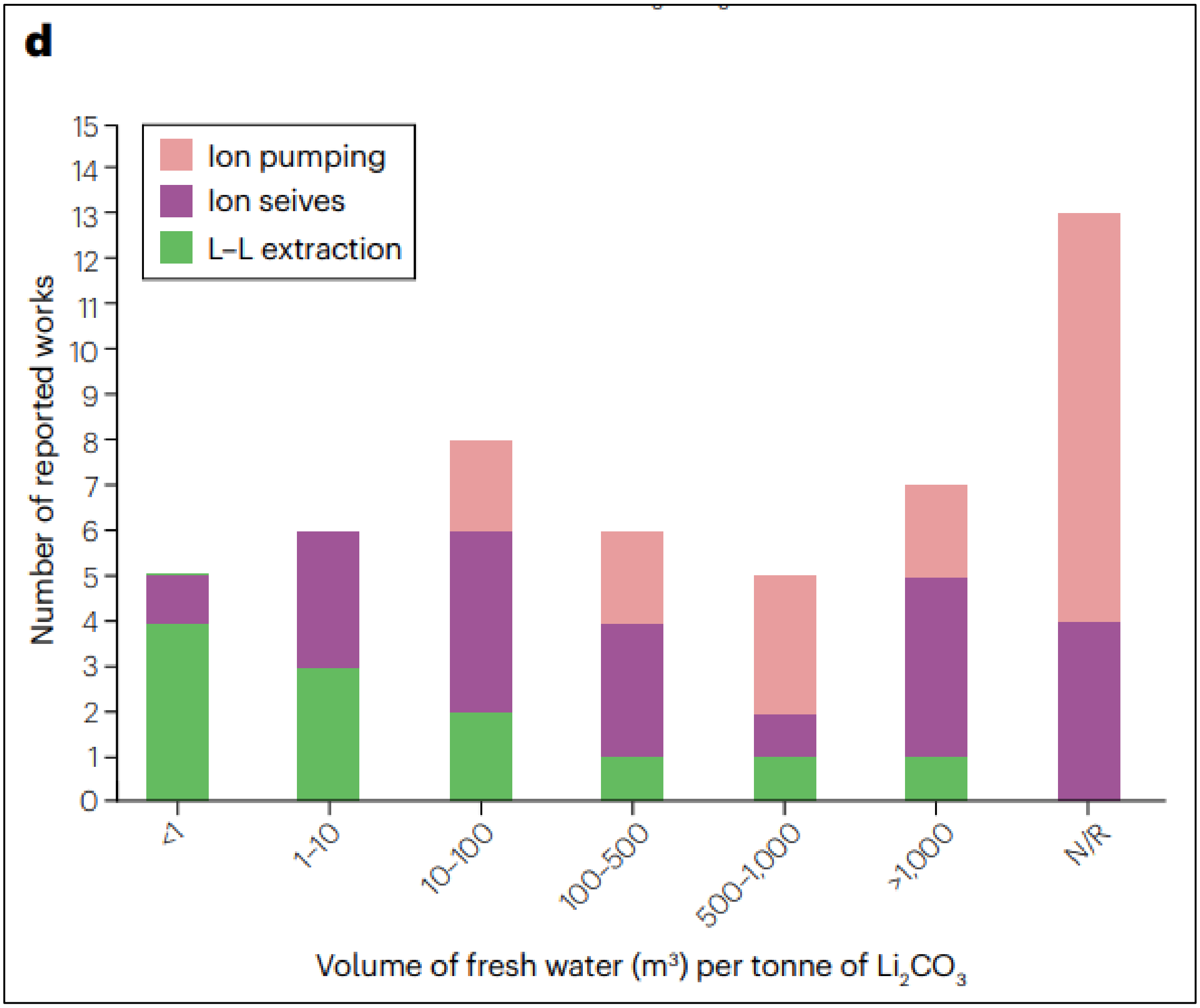

Figure 2a. A recent academic review showed that fresh water consumption by direct lithium extraction (DLE) is highly variable, but, in general, greatly exceeds the fresh water consumption by brine evaporation ponds, contrary to what is claimed in the Draft PEIR. According to Vera et al. (2023), "We compiled data on the freshwater requirements of ion pumping, solvent extraction and ionic exchange resins from 57 articles in the period 2017–2022. A quarter of these reports do not provide freshwater consumption data, 13 use lower amounts than current practice and 9 require similar amounts. A quarter of the analysed articles report freshwater requirements of over 500 m^3 per tonne Li_2CO_3, over 10 times greater than that used in current practice [referring to brine evaporation ponds]." Figure from Vera et al. (2023).

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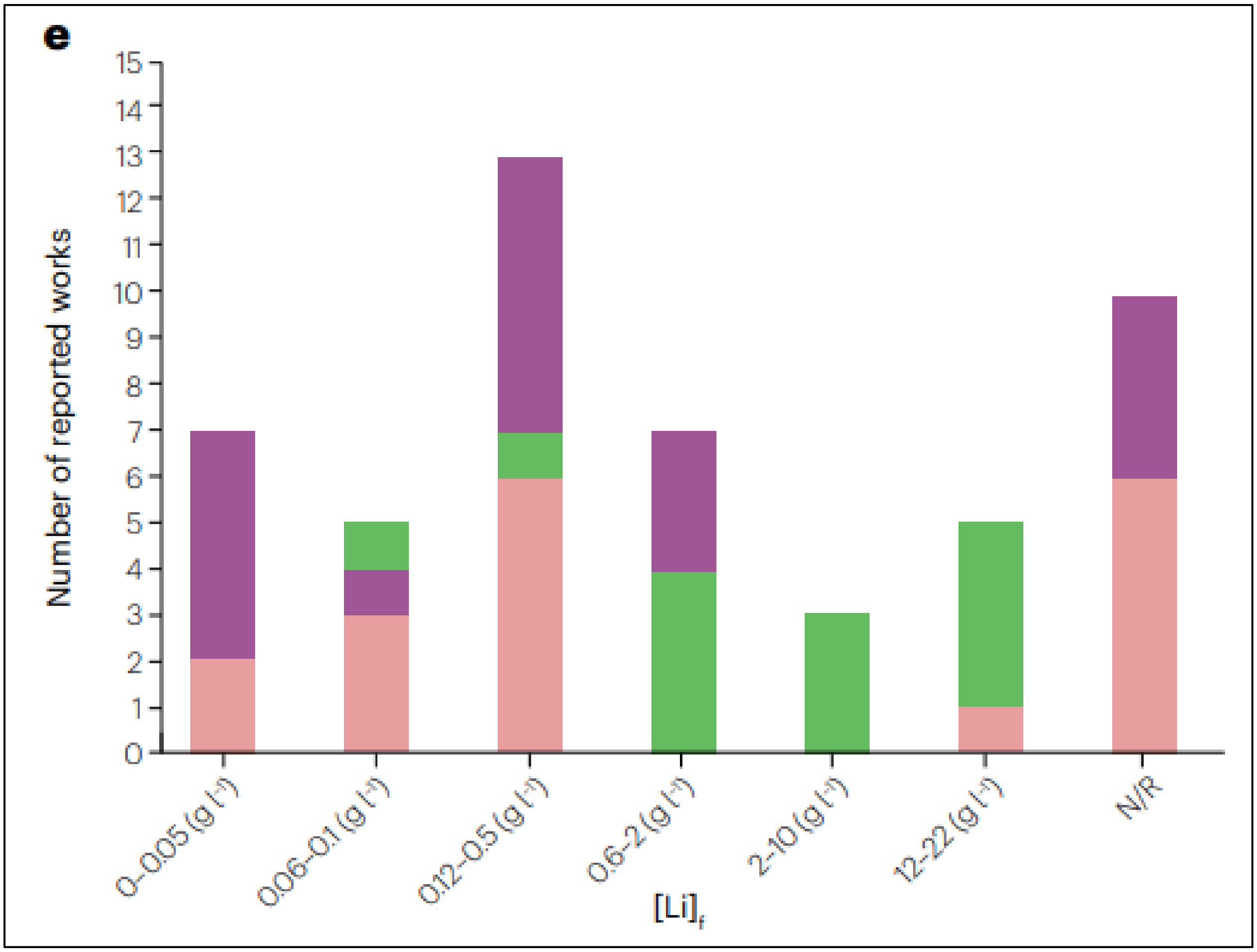

Figure 2b. Vera et al. (2023) pointed out that it is unusual for DLE pilot projects to produce a eluent that would not require further concentration of the lithium ion through evaporation ponds, thus, greatly increasing the land footprint of the project. According to Vera et al. (2023), "Data on the final Li^+ concentration after elution are shown in Fig. 4e [the bar graph above] using the same data compilation sources as Fig. 4d [Fig. 2a in this memo]. Final concentrations are not reported in 20% of the articles, 50% of the articles report elution concentrations that are below the average continental brine concentration (0.5 g l^{-1}) and only 10% report Li^+ concentrations that could be considered sufficient for direct crystallization of Li_2CO_3 [10 g l^{-1}] . Most of those articles highlight the purity of the Li^+ solution in comparison to the original solution. However, these pure but dilute Li^+ solutions will require either solar evaporation or energy-consuming evaporators." Figure from Vera et al. (2023).

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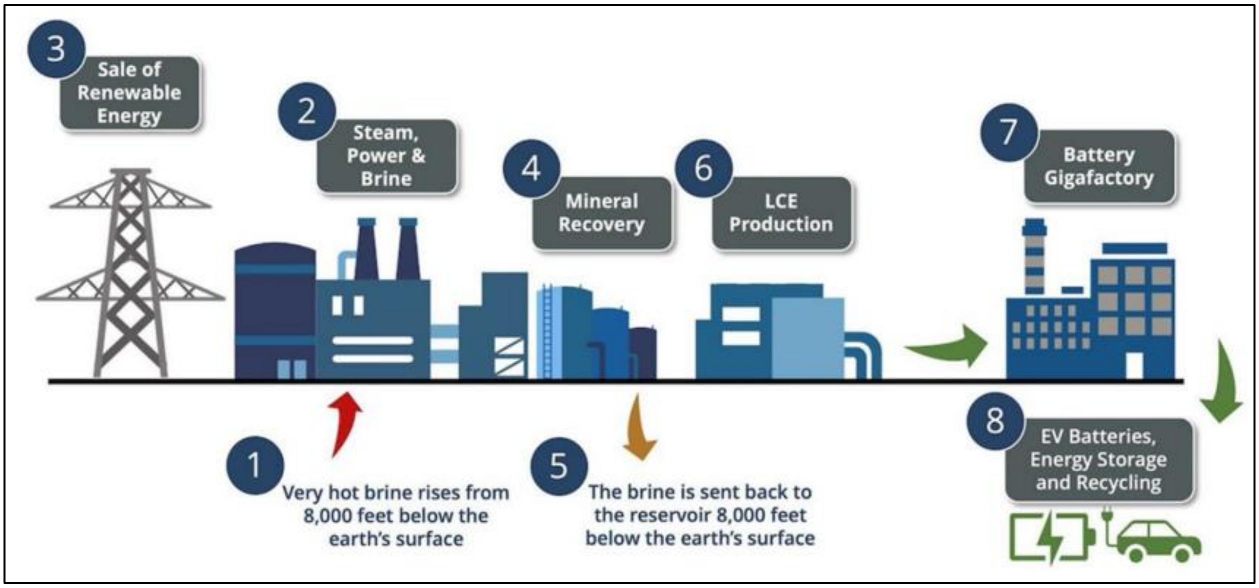

Figure 3. The Draft PEIR is shockingly devoid of any information on the DLE technology that would be implemented in Imperial Valley. In fact, the only information is the above figure with a set of blue silos labeled "Mineral Recovery." The report by Lawrence Berkeley National Laboratory (Dobson et al., 2023) also emphasized the lack of information on the DLE technology and the corresponding difficulties in making any reliable estimations of fresh water consumption. According to Dobson et al. (2023), "Though we obtained facility-wide estimates of water use at lithium facilities near the Salton Sea, we were not able to obtain details about the specific DLE methods they plan to use, or more specific information about how water would be used for lithium extraction in the area. We understand that the proposed lithium extraction method in most area facilities involves or is similar to ion exchange … Without more information on the precise processes being used, we were unable to verify projections for water use at future facilities near the Salton Sea or identify opportunities to reduce water consumption through, for example, onsite water recycling." Figure from Dudek (2025a).

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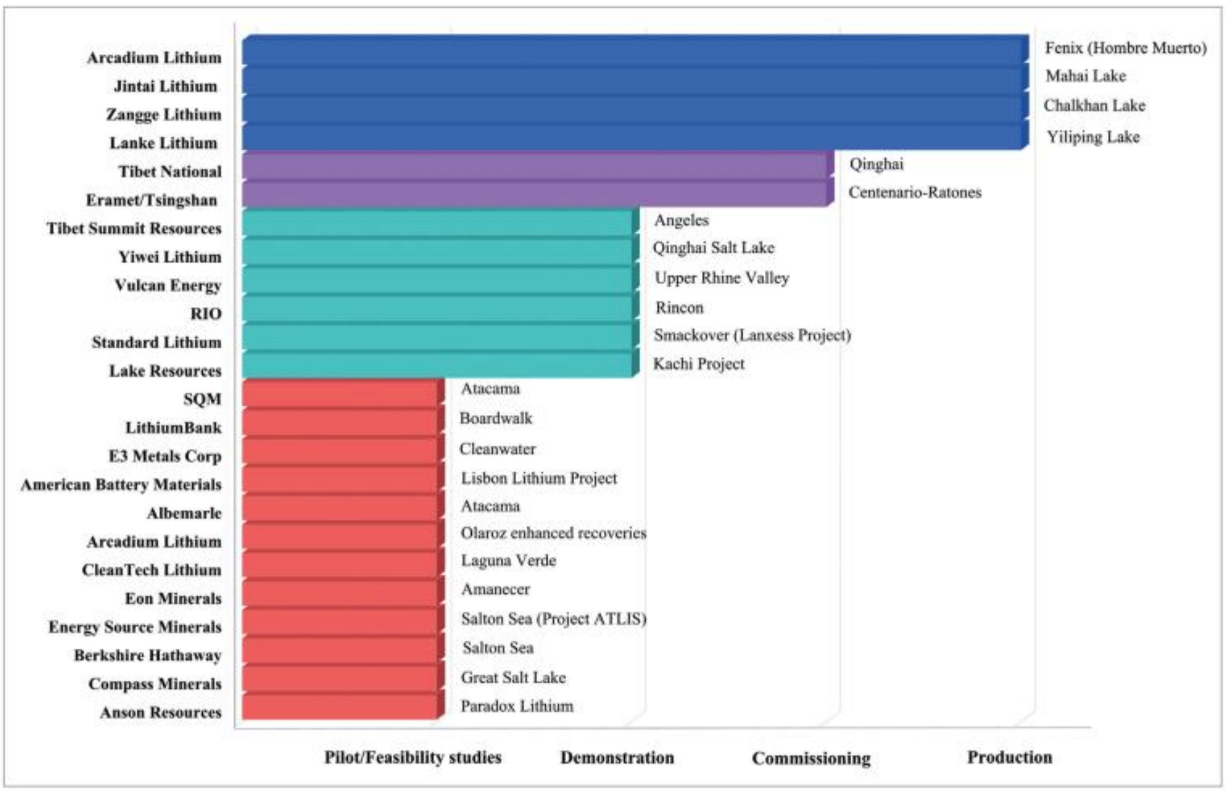

Figure 4: DLE projects and their project stage. (Source: Data obtained from [11, 12, 14]).

Figure 4a. According to a publication by the International Lithium Association (Razmjou, 2024), there are only five operating DLE projects in the world, which are the Arcadium Lithium Fénix (Hombre Muerto) project in Argentina, the Jintai Lithium Mahai Lake project in China, the Zangge Lithium Chalkhan Lake project in China, the Lanke Lithium Yiliping Lake project in China, and the EVE Energy project in China (see Fig. 4b). Figure from Razmjou (2024).

DLE is already producing lithium at industrial scale at a handful of sites. This plant in China, owned by EVE Energy Co. Ltd, extracts up to 10,000 tpa LCE (battery grade) from brines using DLE technology provided by Sunresin New Materials Co. Ltd. The lithium concentration in the brine which is treated at this plant is 100-120 mg/L (Photo: Sunresin New Materials Co. Ltd).

Figure 4b. According to a publication by the International Lithium Association (Razmjou, 2024), there are only five operating DLE projects in the world, which are the Arcadium Lithium Fénix (Hombre Muerto) project in Argentina, the Jintai Lithium Mahai Lake project in China, the Zangge Lithium Chalkhan Lake project in China, the Lanke Lithium Yiliping Lake project in China (see Fig. 4a), and the EVE Energy project in China. Figure from Razmjou (2024).

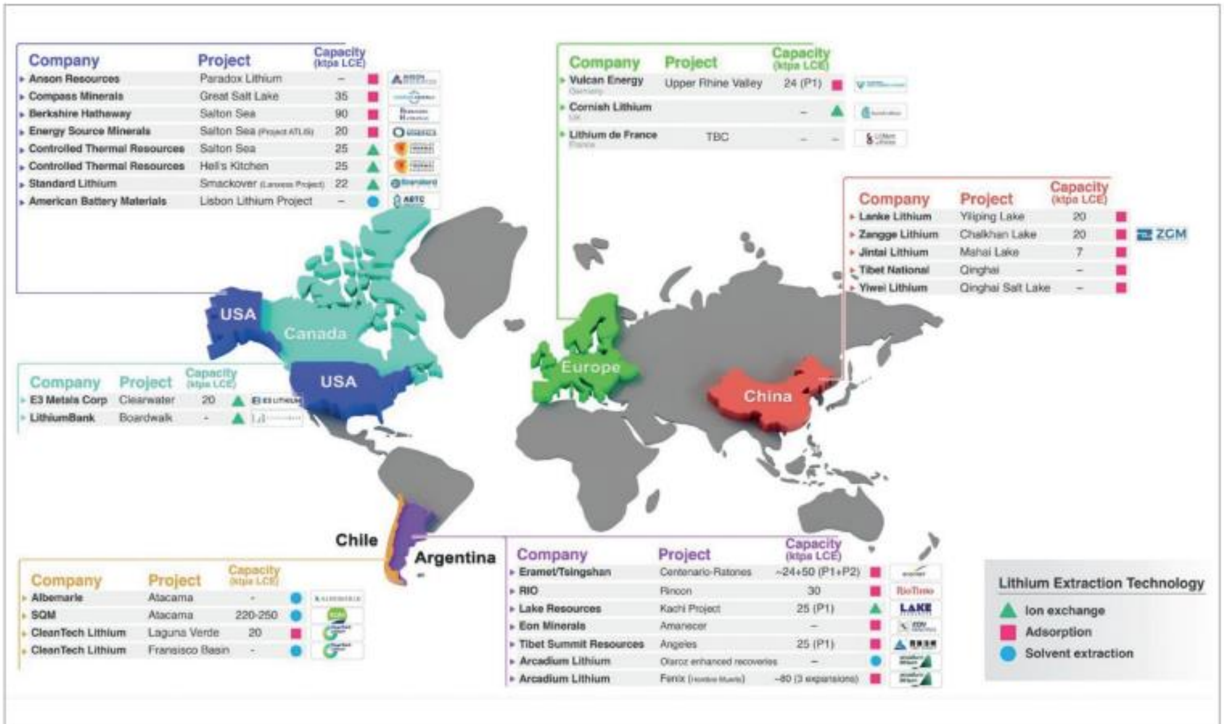

Figure 1: Worldwide distribution of the key DLE project developers and their target annual LCE output. (Source: Data obtained from [11-14])

Figure 5. According to the report by Lawrence Berkeley National Laboratory, "We understand that the proposed lithium extraction method in most area facilities involves or is similar to ion exchange" (Dobson et al., 2023). However, according to a figure in a report by the International Lithium Association, the Berkshire Hathaway and Energy Source Minerals projects would use the absorption method, while the Controlled Thermal Resources project would use the ion exchange method. Furthermore, the report by the International Lithium Association states that, out of the five operational DLE projects (see Figs. 4a-b), only the EVE Energy project in China uses the solvent extraction method, while the other four projects use the adsorption method. In other words, not only are the DLE technologies to be used in Imperial County essentially unknown, but, at least the Controlled Thermal Resources project, and potentially the Berkshire Hathaway and Energy Source Minerals projects would be the first examples of operating DLE projects using the ion exchange method anywhere in the world. Figure from Razmjou (2024).

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Table 4.8-3. Estimated Annual Construction Greenhouse Gas Emissions-Unmitigated

	CO_2	CH_4	N_2O	R	CO_2e
Year	Metric Tons per Year				
Phase 1					
2025	51,872.89	1.83	2.23	36.03	52,618.80
2026	54,490.34	1.96	2.23	32.79	55,236.95
2027	54,041.76	1.93	2.20	29.46	54,775.88
2028	53,676.99	1.93	2.13	26.37	54,386.83
2029	53,000.90	1.50	2.11	23.30	53,690.92
2030	52,028.36	1.48	2.04	20.49	52,692.95
2031	51,069.22	1.44	2.03	17.93	51,726.80
2032	50,750.05	1.44	1.96	15.69	51,386.24
2033	49,524.60	1.40	1.98	13.74	50,164.58
2034	48,451.77	1.27	2.02	11.98	49,096.93
				Phase 1 Subtotal	**525,776.88**
Phase 2					
2035	17,102.52	0.39	0.64	4.51	17,308.50
2036	20,177.12	0.52	0.67	3.93	20,392.37
2037	19,999.20	0.51	0.66	3.34	20,211.91
2038	19,905.69	0.51	0.63	2.83	20,108.44
2039	19,802.61	0.51	0.63	2.39	20,004.93
2040	19,300.47	0.49	0.63	2.01	19,501.20
2041	17,472.50	0.43	0.57	1.61	17,653.41
2042	17,403.65	0.42	0.57	1.36	17,584.02
2043	16,543.05	0.38	0.58	1.16	16,726.99
2044	15,735.16	0.35	0.60	0.99	15,923.15
				Phase 2 Subtotal	**185,414.92**
Phase 3					
2045	13,741.54	0.35	0.45	0.61	13,886.07
2046	16,870.68	0.48	0.47	0.54	17,024.55
2047	16,854.92	0.48	0.45	0.46	17,002.47
2048	15,652.95	0.44	0.40	0.36	15,783.76
2049	15,593.99	0.44	0.40	0.31	15,724.40
2050	15,217.30	0.42	0.42	0.55	15,352.67
2051	14,732.47	0.41	0.41	0.47	14,866.23
2052	14,717.04	0.41	0.39	0.39	14,844.57

Figure 6a. The total greenhouse gas emissions from the LVSP site are estimated as 862,795.96 metric tons of carbon dioxide equivalent. See continuation of table in Fig. 6b. Table from Dudek (2025a).

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Table 4.8-3. Estimated Annual Construction Greenhouse Gas Emissions-Unmitigated

Year	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
2053	13,876.24	0.37	0.40	0.34	14,005.45
2054	12,984.26	0.33	0.41	0.30	13,113.99
				Phase 3 Subtotal	**151,604.16**
				Total Construction Emissions	**862,795.96**
				Amortized 30-Year Construction Emissions	*28,759.87*

Notes: CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; R = refrigerant; CO_2e = carbon dioxide equivalent.
Totals may not add due to rounding.
See Appendix C for complete results.

Figure 6b. The total greenhouse gas emissions from the LVSP site are estimated as 862,795.96 metric tons of carbon dioxide equivalent. See beginning of table in Fig. 6a. Table from Dudek (2025a).

Table 4.8-4. Estimated Annual Operational Greenhouse Gas Emissions – Phase 1 – 2035

Emission Source	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
Mobile	164,869.77	3.40	8.17	95.18	171,177.16
Area	557.20	0.02	0.00	0.00	559.21
Energy	532,548.03	70.47	8.38	0.00	536,807.48
Water	9,216.36	320.52	7.70	0.00	19,522.49
Waste	2,670.24	266.88	0.00	0.00	9,342.25
Refrigerants	0.00	0.00	0.00	2,752.91	2,752.91

Figure 7a. The total annual operating greenhouse gas emissions in 2035 are estimated as 868,715.29 metric tons of carbon dioxide equivalent per year (including amortized construction total). The greenhouse gas emissions would correspond to the annual emissions from 188,851 US passenger cars. However, according to this memo, the total greenhouse gas emissions at the LVSP site have been under-estimated by at least four orders of magnitude. See continuation of table in Fig. 7b. Table from Dudek (2025a).

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Table 4.8-4. Estimated Annual Operational Greenhouse Gas Emissions – Phase 1 – 2035

Emission Source	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
Offroad	86,456.24	3.51	0.70	0.00	86,752.94
Stationary	24,184.69	0.69	0.24	0.00	24,274.95
Total	**820,502.54**	**665.49**	**25.19**	**2,848.09**	**851,189.39**
Amortized 30-Year Construction Emissions[a]					*17,525.90*
Phase 1 Operation + Amortized Construction Total					**868,715.29**
Threshold					*3,000*
Exceeds Threshold?					**Yes**

Notes: CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; R= refrigerant; CO_2e = carbon dioxide equivalent; <0.01 = reported value less than 0.01; N/A = not applicable.
Columns may not add due to rounding.
Emissions shown in Table 4.8-4 reflect the implementation of HP-7 during operation.
See Appendix C for complete results.
[a] Emissions are representative of total Phase 1 construction emissions over 30 years.

Figure 7b. The total annual operating greenhouse gas emissions in 2035 are estimated as 868,715.29 metric tons of carbon dioxide equivalent per year (including amortized construction total). The greenhouse gas emissions would correspond to the annual emissions from 188,851 US passenger cars. However, according to this memo, the total greenhouse gas emissions at the LVSP site have been under-estimated by at least four orders of magnitude. See beginning of table in Fig. 7a. Table from Dudek (2025a).

Table 4.8-5. Estimated Annual Operational Greenhouse Gas Emissions – Phases 1-2 - 2045

Emission Source	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
Mobile	276,738.89	4.94	14.92	36.73	285,933.49
Area	852.35	0.04	0.01	0.00	855.42
Energy	30,539.60	2.70	0.06	0.00	30,624.31

Figure 8a. The total annual operating greenhouse gas emissions in 2045 are estimated as 573,337.76 metric tons of carbon dioxide equivalent per year (including amortized construction total). The greenhouse gas emissions would correspond to the annual emissions from 124,639 US passenger cars. However, according to this memo, the total greenhouse gas emissions at the LVSP site have been under-estimated by at least four orders of magnitude. See continuation of table in Fig. 8b. Table from Dudek (2025a).

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Table 4.8-5. Estimated Annual Operational Greenhouse Gas Emissions – Phases 1-2 – 2045

Emission Source	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
Water	3,811.00	390.77	9.28	0.00	16,347.21
Waste	3,987.52	398.54	0.00	0.00	13,950.98
Refrigerants	0.00	0.00	0.00	5,120.14	5,120.14
Offroad	179,774.51	7.29	1.46	0.00	180,391.45
Stationary	28,775.21	0.88	0.28	0.00	28,880.79
Total	**524,479.08**	**805.16**	**26.01**	**5,156.87**	**562,103.79**
				Amortized 30-Year Construction Emissions[a]	*11,233.97*
				Phases 1-2 Operation + Amortized Construction Total	**573,337.76**
				Threshold	*3,000*
				Exceeds Threshold?	**Yes**

Notes: CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; R= refrigerant; CO_2e = carbon dioxide equivalent; <0.01 = reported value less than 0.01; N/A = not applicable.
Columns may not add due to rounding.
Emissions shown in Table 4.8-5 reflect the implementation of HP-7 during operation.
See Appendix C for complete results.
[a] Emissions are representative of the total construction emissions from Phases 1+2 over 30 years.

Figure 8b. The total annual operating greenhouse gas emissions in 2045 are estimated as 573,337.76 metric tons of carbon dioxide equivalent per year (including amortized construction total). The greenhouse gas emissions would correspond to the annual emissions from 124,639 US passenger cars. However, according to this memo, the total greenhouse gas emissions at the LVSP site have been under-estimated by at least four orders of magnitude. See beginning of table in Fig. 8a. Table from Dudek (2025a).

Table 4.8-6. Estimated Annual Operational Greenhouse Gas Emissions – Phase 3 – 2055 (Buildout)

Emission Source	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
Mobile	333,324.02	5.62	18.14	20.99	345,488.23
Area	1,043.11	0.04	0.01	0.00	1,046.86
Energy	35,270.43	3.12	0.07	0.00	35,368.26
Water	5,748.45	589.44	14.00	0.00	24,657.84
Waste	4,890.39	488.78	0.00	0.00	17,109.83
Refrigerants	0.00	0.00	0.00	5,752.36	5,752.36

Figure 9a. The total annual operating greenhouse gas emissions in 2055 (full buildout) are estimated as 687,388.55 metric tons of carbon dioxide equivalent per year (including amortized construction total). The greenhouse gas emissions would correspond to the annual emissions from 149,432 US passenger cars. However, according to this memo, the total greenhouse gas emissions at the LVSP site have been under-estimated by at least four orders of magnitude. See continuation of table in Fig. 9b. Table from Dudek (2025a).

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Table 4.8-6. Estimated Annual Operational Greenhouse Gas Emissions – Phase 3 – 2055 (Buildout)

Emission Source	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
Offroad	190,214.19	7.72	1.54	0.00	190,866.95
Stationary	38,198.12	1.16	0.37	0.00	38,338.34
Total	**608,688.72**	**1,095.87**	**34.14**	**5,773.35**	**658,628.68**
Amortized 30-Year Construction Emissions[a]					*28,759.87*
Buildout Operation + Amortized Construction Total					**687,388.55**
Threshold					*3,000*
Exceeds Threshold?					**Yes**

Notes: CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; R= refrigerant; CO_2e = carbon dioxide equivalent; <0.01 = reported value less than 0.01; N/A = not applicable.
Columns may not add due to rounding.
Emissions shown in Table 4.8-6 reflect the implementation of HP-7 during operation.
See Appendix C for complete results.
[a] Emissions are representative of the total construction emissions from Phases 1+2+3 over 30 years.

Figure 9b. The total annual operating greenhouse gas emissions in 2055 (full buildout) are estimated as 687,388.55 metric tons of carbon dioxide equivalent per year (including amortized construction total). The greenhouse gas emissions would correspond to the annual emissions from 149,432 US passenger cars. However, according to this memo, the total greenhouse gas emissions at the LVSP site have been under-estimated by at least four orders of magnitude. See beginning of table in Fig. 9a. Table from Dudek (2025a).

Table 4.8-2. 2018 Imperial County Greenhouse Gas Emissions by Source

Source	Reported 2018 Annual Greenhouse Gas Emissions (MT CO_2e)	Percent of Total
Energy	98,708	3.5%
Transportation	339,132	11.9%
Water	9,694	0.3%
Waste	49,635	1.7%
Agriculture	2,342,975	82.5%
Total	**2,840,144**	**100%**

Source: Imperial County Transportation Commission 2021.
Notes: MT CO_2e = metric tons of carbon dioxide equivalent.
Totals may not sum due to rounding.

Figure 10. By 2035, the annual operational greenhouse gas emissions from the LVSP will increase the total greenhouse gas emissions from Imperial County by 31% (compare with Figs. 7a-b). However, according to this memo, the total greenhouse gas emissions at the LVSP site have been under-estimated by at least four orders of magnitude. Table from Dudek (2025a).

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Table 3-5. Estimated Annual Interim Operational Greenhouse Gas Emissions by Land Use - Phase 1 (2035)

Land Use	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
Solar	396.97	3.10	0.01	119.22	595.43
Substations	798.50	5.75	0.01	11.95	957.74
Battery Energy Storage System	1,828.30	10.68	0.03	98.67	2,202.32
Agrivoltaics	53.23	0.12	0.00	0.04	56.47
Floatovoltaics	168.54	0.13	0.00	59.68	232.36
Restoration/ Passive Uses	603.70	7.13	0.01	0.00	784.56
Parks	168.26	0.05	0.01	0.08	171.34
Housing	—	—	—	—	—
Temporary Workforce Housing	8,376.71	8.04	0.31	4.19	8,673.36
Workforce Training	902.57	0.43	0.03	0.43	923.47
Public Transit Hub	3,169.49	0.61	0.12	1.69	3,222.65
Research and Development	19,402.04	15.93	1.06	13.64	20,129.77
Commercial	23,569.27	3.57	1.05	13.19	23,985.56
Emergency Services	6,837.88	10.35	0.35	18.35	7,219.87
Geothermal	57,526.14	229.65	4.65	331.91	64,986.31
Mineral Recovery, Processing, and Production	23,591.27	93.30	1.83	129.08	26,598.37
Battery Manufacturing	50,858.02	55.94	2.02	106.41	52,964.59
Green Hydrogen	24,060.55	40.06	0.93	59.60	25,397.53
Anaerobic Digestor	2,223.58	12.40	0.35	3.10	2,641.32
Wastewater Treatment Plant	10,785.93	6.95	0.46	17.19	11,114.98
Water Storage Facility	260.74	0.03	0.00	0.00	262.89
Data Centers	448,150.73	102.09	7.78	98.13	453,119.75
Business Industrial Parks	10,460.39	8.41	0.26	27.72	10,777.36
Automobile Manufacturing	5,733.02	4.04	0.17	12.09	5,897.82
Manufacturing of Green Industrial Equipment	17,136.06	12.11	0.52	36.26	17,630.27
Wholesale Distribution	53,219.52	16.04	1.78	1,010.38	55,162.57
Logistics and Warehousing	35,670.96	10.70	1.19	673.59	36,966.99
Outdoor Storage of Trucks, Trailers, and Shipping Containers	267.42	0.02	0.01	0.06	270.13

Figure 11a. Appendix C of the Draft PEIR (Dudek, 2025c) breaks down operating greenhouse gas emissions by land use, in which one of the land uses is "Mineral Recovery, Processing, and Production," corresponding to the DLE facilities. Thus, the annual greenhouse gas emissions for the DLE facilities are projected to be 26,598.37 metric tons of carbon dioxide equivalent in 2035. The greenhouse gas emissions for the DLE facilities correspond to 3.1% of the total greenhouse gas emissions for 2035, based on the totals stated in Appendix C. It should be noted that the total operating greenhouse gas emissions stated in the Draft PEIR (Dudek, 2025a) do not correspond to the total operating greenhouse gas emissions stated in Appendix C (Dudek, 2025c) (compare with Figs. 7a-b). There are, in fact, numerous such contradictions throughout both the Draft PEIR and Appendix C. No attempt has been made in this memo to "proofread" the Draft PEIR or to document all of the contradictions. See continuation of table in Fig. 11b. Table from Dudek (2025c).

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Table 3-5. Estimated Annual Interim Operational Greenhouse Gas Emissions by Land Use – Phase 1 (2035)

Land Use	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
Intermodal Rail Hub	12,267.86	7.59	0.20	1.44	12,518.43
Electric Vehicle Charging Stations	2,014.89	0.27	0.03	0.00	2,031.38
				Phase 1 Total	847,495.58

Notes: CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; R= refrigerant; CO_2e = carbon dioxide equivalent; — = no date available.
Totals may not sum due to rounding.
Emissions shown in Table 3-5 reflect the implementation of Program HP-7 during operation.
See Appendix B, Operational CalEEMod Files, for complete results.

Figure 11b. Appendix C of the Draft PEIR (Dudek, 2025c) breaks down operating greenhouse gas emissions by land use, in which one of the land uses is "Mineral Recovery, Processing, and Production," corresponding to the DLE facilities. Thus, the annual greenhouse gas emissions for the DLE facilities are projected to be 26,598.37 metric tons of carbon dioxide equivalent in 2035. The greenhouse gas emissions for the DLE facilities correspond to 3.1% of the total greenhouse gas emissions for 2035, based on the totals stated in Appendix C. It should be noted that the total operating greenhouse gas emissions stated in the Draft PEIR (Dudek, 2025a) do not correspond to the total operating greenhouse gas emissions stated in Appendix C (Dudek, 2025c) (compare with Figs. 7a-b). There are, in fact, numerous such contradictions throughout both the Draft PEIR and Appendix C. No attempt has been made in this memo to "proofread" the Draft PEIR or to document all of the contradictions. See beginning of table in Fig. 11a. Table from Dudek (2025c).

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Table 3-6. Estimated Annual Interim Operational Greenhouse Gas Emissions by Land Use - Phase 2 (2045)

Land Use	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
Solar	101.87	6.59	0.00	119.50	386.35
Substations	99.19	7.16	0.00	9.72	288.13
Battery Energy Storage System	184.41	14.26	0.00	103.56	644.69
Agrivoltaics	5.13	0.11	0.00	0.04	7.98
Floatovoltaics	14.65	0.11	0.00	5.97	23.47
Restoration/ Passive Uses	73.97	7.39	0.00	0.00	258.79
Parks	268.46	0.08	0.01	0.03	273.95
Housing	3,565.88	2.44	0.15	0.58	3,673.10
Temporary Workforce Housing	11,398.49	12.81	0.45	2.33	11,853.72
Workforce Training	1,975.05	1.29	0.09	0.29	2,034.36
Public Transit Hub	7,836.77	1.80	0.34	1.05	7,983.70
Research and Development	23,385.29	22.05	1.44	7.93	24,373.89
Commercial	61,400.59	10.39	2.95	8.28	62,548.23
Emergency Services	7,203.79	13.06	0.44	22.35	7,682.50

Figure 12a. Appendix C of the Draft PEIR (Dudek, 2025c) breaks down operating greenhouse gas emissions by land use, in which one of the land uses is "Mineral Recovery, Processing, and Production," corresponding to the DLE facilities. Thus, the annual greenhouse gas emissions for the DLE facilities are projected to be 20,927.31 metric tons of carbon dioxide equivalent in 2045. The greenhouse gas emissions for the DLE facilities correspond to 3.9% of the total greenhouse gas emissions for 2045, based on the totals stated in Appendix C. It should be noted that the total operating greenhouse gas emissions stated in the Draft PEIR (Dudek, 2025a) do not correspond to the total operating greenhouse gas emissions stated in Appendix C (Dudek, 2025c) (compare with Figs. 8a-b). There are, in fact, numerous such contradictions throughout both the Draft PEIR and Appendix C. No attempt has been made in this memo to "proofread" the Draft PEIR or to document all of the contradictions. See continuation of table in Fig. 12b. Table from Dudek (2025c).

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Table 3-6. Estimated Annual Interim Operational Greenhouse Gas Emissions by Land Use – Phase 2 (2045)

Land Use	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
Geothermal	19,669.60	45.96	0.96	68.86	21,172.34
Mineral Recovery, Processing, and Production	16,660.13	134.40	2.45	176.30	20,927.31
Battery Manufacturing	56,787.70	76.60	2.64	130.38	59,621.14
Green Hydrogen	19,657.01	45.96	0.96	68.86	21,159.71
Anaerobic Digestor	1,801.02	14.19	0.39	2.36	2,274.21
Wastewater Treatment Plant	12,216.24	8.52	0.58	17.05	12,619.87
Water Storage Facility	3.80	0.00	0.00	0.00	3.85
Data Centers	21,029.04	53.56	0.95	116.57	22,766.29
Business Industrial Parks	14,883.15	15.59	0.43	51.55	15,453.55
Automobile Manufacturing	6,836.88	5.84	0.21	16.05	7,063.01
Manufacturing of Green Industrial Equipment	20,870.22	17.53	0.72	48.17	21,571.65
Wholesale Distribution	111,258.92	35.38	3.63	2,276.38	115,501.94
Logistics and Warehousing	74,237.60	23.60	2.42	1,517.59	77,066.89
Outdoor Storage of Trucks, Trailers, and Shipping Containers	306.79	0.01	0.01	0.04	310.82
Intermodal Rail Hub	23,217.02	16.72	0.40	0.70	23,753.61
Electric Vehicle Charging Stations	0.00	0.00	0.00	0.00	0.00
				Total	**543,299.05**

Notes: CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; R= refrigerant; CO_2e = carbon dioxide equivalent.
Totals may not sum due to rounding.
Emissions shown in Table 3-6 reflect the implementation of Program HP-7 during operation.
See Appendix B, Operational CalEEMod Files, for complete results.

Figure 12b. Appendix C of the Draft PEIR (Dudek, 2025c) breaks down operating greenhouse gas emissions by land use, in which one of the land uses is "Mineral Recovery, Processing, and Production," corresponding to the DLE facilities. Thus, the annual greenhouse gas emissions for the DLE facilities are projected to be 20,927.31 metric tons of carbon dioxide equivalent in 2045. The greenhouse gas emissions for the DLE facilities correspond to 3.9% of the total greenhouse gas emissions for 2045, based on the totals stated in Appendix C. It should be noted that the total operating greenhouse gas emissions stated in the Draft PEIR (Dudek, 2025a) do not correspond to the total operating greenhouse gas emissions stated in Appendix C (Dudek, 2025c) (compare with Figs. 8a-b). There are, in fact, numerous such contradictions throughout both the Draft PEIR and Appendix C. No attempt has been made in this memo to "proofread" the Draft PEIR or to document all of the contradictions. See beginning of table in Fig. 12a. Table from Dudek (2025c).

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Table 3-7. Estimated Annual Interim Operational Greenhouse Gas Emissions by Land Use – Buildout (2055)

Land Use	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
Solar	104.80	6.84	0.00	143.40	419.24
Substations	109.09	8.78	0.00	11.95	340.68
Battery Energy Storage System	240.14	18.91	0.00	106.99	820.07
Agrivoltaics	–	–	–	–	–
Floatovoltaics	14.60	0.11	0.00	5.97	23.42
Restoration/ Passive Uses	76.73	7.67	0.00	0.00	268.45
Parks	265.03	0.08	0.01	0.02	270.42
Housing	3,285.02	2.41	0.16	0.36	3,394.29
Temporary Workforce Housing	11,321.23	32.28	0.97	1.89	12,419.86
Workforce Training	1,950.65	1.29	0.09	0.16	2,009.28
Public Transit Hub	7,737.49	1.79	0.33	0.52	7,881.64
Research and Development	30,939.40	27.07	1.95	8.43	32,204.78
Commercial	60,622.76	10.32	2.89	4.17	61,746.65
Emergency Services	8,729.33	16.11	0.56	26.39	9,325.01
Geothermal	33,598.90	384.20	7.09	542.41	45,857.73
Mineral Recovery, Processing, and Production	20,070.06	161.16	2.97	210.87	25,195.61
Battery Manufacturing	65,825.92	99.27	3.56	175.67	69,545.52
Green Hydrogen	26,103.43	59.57	1.25	89.88	28,056.30
Anaerobic Digestor	3,531.89	18.57	0.56	4.50	4,166.69
Wastewater Treatment Plant	17,877.97	11.93	0.89	23.68	18,465.71
Water Storage Facility	3.83	0.00	0.00	0.00	3.89
Data Centers	28,259.07	71.51	1.29	155.56	30,587.37
Business Industrial Parks	18,350.22	19.62	0.58	62.67	19,074.76
Automobile Manufacturing	11,403.56	9.53	0.42	25.72	11,791.59
Manufacturing of Green Industrial Equipment	34,245.11	28.60	1.25	77.17	35,409.31

Figure 13a. Appendix C of the Draft PEIR (Dudek, 2025c) breaks down operating greenhouse gas emissions by land use, in which one of the land uses is "Mineral Recovery, Processing, and Production," corresponding to the DLE facilities. Thus, the annual greenhouse gas emissions for the DLE facilities are projected to be 25,195.61 metric tons of carbon dioxide equivalent in 2055 (full buildout). The greenhouse gas emissions for the DLE facilities correspond to 3.9% of the total greenhouse gas emissions for 2055, based on the totals stated in Appendix C. It should be noted that the total operating greenhouse gas emissions stated in the Draft PEIR (Dudek, 2025a) do not correspond to the total operating greenhouse gas emissions stated in Appendix C (Dudek, 2025c) (compare with Figs. 9a-b). There are, in fact, numerous such contradictions throughout both the Draft PEIR and Appendix C. No attempt has been made in this memo to "proofread" the Draft PEIR or to document all of the contradictions. See continuation of table and interpretation in Fig. 13b. Table from Dudek (2025c).

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Table 3-7. Estimated Annual Interim Operational Greenhouse Gas Emissions by Land Use - Buildout (2055)

Land Use	CO_2	CH_4	N_2O	R	CO_2e
	Metric Tons per Year				
Wholesale Distribution	119,687.06	38.21	3.88	2,456.74	124,255.88
Logistics and Warehousing	80,140.85	42.02	2.98	1,637.83	83,717.94
Outdoor Storage of Trucks, Trailers, and Shipping Containers	338.36	0.01	0.02	0.02	343.08
Intermodal Rail Hub	23,856.23	18.00	0.44	0.36	24,436.67
Electric Vehicle Charging Stations	0.00	0.00	0.00	0.00	0.00
				Total	**652,031.84**

Notes: CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; R= refrigerant; CO_2e = carbon dioxide equivalent;— = no data available.
Totals may not sum due to rounding.
Emissions shown in Table 3-7 reflect the implementation of Program HP-7 during operation.
See Appendix B, Operational CalEEMod Files, for complete results.

Figure 13b. Appendix C of the Draft PEIR (Dudek, 2025c) breaks down operating greenhouse gas emissions by land use, in which one of the land uses is "Mineral Recovery, Processing, and Production," corresponding to the DLE facilities Thus, the annual greenhouse gas emissions for the DLE facilities are projected to be 25,195.61 metric tons of carbon dioxide equivalent in 2055 (full buildout). The greenhouse gas emissions for the DLE facilities correspond to 3.9% of the total greenhouse gas emissions for 2055, based on the totals stated in Appendix C. It should be noted that the total operating greenhouse gas emissions stated in the Draft PEIR (Dudek, 2025a) do not correspond to the total operating greenhouse gas emissions stated in Appendix C (Dudek, 2025c) (compare with Figs. 9a-b). There are, in fact, numerous such contradictions throughout both the Draft PEIR and Appendix C. No attempt has been made in this memo to "proofread" the Draft PEIR or to document all of the contradictions. According to a report by the International Lithium Association (Razmjou, 2024), the minimum value of greenhouse gas emissions reported in the literature is 2.5 metric tons of carbon dioxide equivalent per metric ton of lithium carbonate. Based on the preceding minimum estimate of greenhouse gas emissions and the projected annual production of 2,399,482 metric tons of lithium carbonate, the minimum estimate for greenhouse gas emissions by the DLE facilities at the LVSP site would be 5,998,706 metric tons of carbon dioxide equivalent per year. Thus, the minimum estimate for DLE operations alone is already nearly 240 times the total operating greenhouse gas emissions for all activities at the LVSP site at full buildout. For comparison, 5,998,706 metric tons of carbon dioxide equivalent would correspond to the annual greenhouse gas emissions by 1,304,066 US passenger cars. Based on the discrepancy between greenhouse gas emissions in the Draft PEIR and the estimates by the International Lithium Association, it should be assumed that total greenhouse gas emissions at the LVSP site have been under-estimated by at least four orders of magnitude, considering that "Mineral Recovery, Processing, and Production" is just one of 30 land uses at the LVSP site. See beginning of table in Fig. 13a. Table from Dudek (2025c).

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Table 4.6-2. Annual Operational Electricity Demand Summary

Operational Year	Electricity Demand (kWh/year)
Phase 1 (2035)	4,627,886,007
Phase 2 (2045)	5,834,810,398
Buildout (2055)	7,701,759,506

Source: Appendix C.
Note: kWh = kilowatt-hour.

Figure 14. Like the estimate for water consumption in the Draft PEIR, but unlike the estimates for greenhouse gas emissions, there are no separate estimates for energy consumption by the DLE operations, the geothermal operations, or any other land use or industrial activity. Ruberti (2024) estimated an energy consumption for DLE projects of 50 gigajoules per metric ton of lithium carbonate. Based on the preceding estimate and a production rate of 2,399,482 metric tons of lithium carbonate per year, the estimated energy consumption by the DLE facilities alone will be 33,326,165,550 kilowatt-hours per year, which is over 4.3 times the estimated electricity consumption of 7,701,759,506 kilowatt-hours per year in 2055 (full buildout) by all activities at the LVSP site. Based on the discrepancy between electricity consumption in the Draft PEIR and the estimate by Ruberti (2024), it should be assumed that total electricity consumption at the LVSP site has been under-estimated by at least two orders of magnitude, considering that "Mineral Recovery, Processing, and Production" is just one of 30 land uses at the LVSP site (see Figs. 11a-b, 12a-b, and 13a-b). Table from Dudek (2025a).

Table 4.6-3. Annual Operational Natural Gas Demand Summary

Operational Year	Natural Gas Demand (kBTU/year)
Phase 1 (2035)	341,407,831
Phase 2 (2045)	575,567,364
Buildout (2055)	664,727,364

Source: Appendix C.
Note: kWh = kilowatt-hour.

Figure 15. Like the estimate for water consumption in the Draft PEIR, but unlike the estimates for greenhouse gas emissions, there are no separate estimates for natural gas consumption by the DLE operations, the geothermal operations or any other land use or industrial activity. The estimates for electricity consumption (see Fig. 14) can be combined with the estimates for natural gas consumption and petroleum consumption (see Figs. 16a-b) to yield estimates for total energy consumption at the LVSP site. Based on the discrepancy between energy consumption in the Draft PEIR and the estimate by Ruberti (2024), it should be assumed that total energy consumption at the LVSP site has been under-estimated by at least two orders of magnitude, considering that "Mineral Recovery, Processing, and Production" is just one of 30 land uses at the LVSP site (see Figs. 11a-b, 12a-b, and 13a-b). See further explanation in captions to Figs. 16a-b. Table from Dudek (2025a).

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Table 4.6-4. Annual Operational Fuel Demand Summary

Construction Phase	Vehicles (Gasoline)	Vehicles (Diesel)	Off-Road Equipment (Diesel)	Stationary Equipment (Diesel)	Rail (Diesel)	Total
	Gallons					
Phase 1 (2035)	15,810,974	2,551,364	8,467,800	2,368,726	361,783	29,560,647

Figure 16a. Like the estimate for water consumption in the Draft PEIR, but unlike the estimates for greenhouse gas emissions, there are no separate estimates for petroleum consumption by the DLE operations, the geothermal operations or any other land use or industrial activity. Ruberti (2024) estimated an energy consumption for DLE projects of 50 gigajoules per metric ton of lithium carbonate. Based on the preceding estimate and a production rate of 2,399,482 metric tons of lithium carbonate per year, the estimated energy consumption by the DLE facilities alone will be 33,326,165,550 kilowatt-hours per year. The natural gas consumption in 2055 (664,727,364 kiloBTU per year) (see Fig. 15) corresponds to 194,812,360 kilowatt-hours, while the petroleum consumption (59,763,920 gallons) corresponds to 2,187,359,472 kilowatt-hours. Thus, the total predicted energy consumption (electricity + natural gas + petroleum) in 2055 would be equal to 10,083,931,338 kilowatt hours per year, which would still be only 30% of the energy consumed by the DLE facilities alone. Based on the discrepancy between energy consumption in the Draft PEIR and the estimate by Ruberti (2024), it should be assumed that total energy consumption at the LVSP site has been under-estimated by at least two orders of magnitude, considering that "Mineral Recovery, Processing, and Production" is just one of 30 land uses at the LVSP site (see Figs. 11a-b, 12a-b, and 13a-b). See continuation of table in Fig. 16b. Table from Dudek (2025a).

Table 4.6-4. Annual Operational Fuel Demand Summary

Construction Phase	Vehicles (Gasoline)	Vehicles (Diesel)	Off-Road Equipment (Diesel)	Stationary Equipment (Diesel)	Rail (Diesel)	Total
	Gallons					
Phase 2 (2045)	25,183,869	5,448,043	17,607,689	2,818,336	449,283	51,507,219
Buildout (2055)	29,270,253	7,476,122	18,630,185	3,741,246	646,115	59,763,920

Source: Appendix C.

Figure 16b. Like the estimate for water consumption in the Draft PEIR, but unlike the estimates for greenhouse gas emissions, there are no separate estimates for petroleum consumption by the DLE operations, the geothermal operations or any other land use or industrial activity. Ruberti (2024) estimated an energy consumption for DLE projects of 50 Gigajoules per metric ton of lithium carbonate. Based on the preceding estimate and a production rate of 2,399,482 metric tons of lithium carbonate per year, the estimated energy consumption by the DLE facilities alone will be 33,326,165,550 kilowatt-hours per year. The natural gas consumption in 2055 (664,727,364 kiloBTU per year) (see Fig. 15) corresponds to 194,812,360 kilowatt-hours, while the petroleum consumption (59,763,920 gallons) corresponds to 2,187,359,472 kilowatt-hours. Thus, the total predicted energy consumption (electricity + natural gas + petroleum) in 2055 would be equal to 10,083,931,338 kilowatt-hours per year, which would still be only 30% of the energy consumed by the DLE facilities alone. Based on the discrepancy between energy consumption in the Draft PEIR and the estimate by Ruberti (2024), it should be assumed that total energy consumption at the LVSP site has been under-estimated by at least two orders of magnitude, considering that "Mineral Recovery, Processing, and Production" is just one of 30 land uses at the LVSP site (see Figs. 11a-b, 12a-b, and 13a-b). See beginning of table in Fig. 16a. Table from Dudek (2025a).

Appendix B:

Steven H. Emerman Consulting Resume and Publications

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Consulting Areas:
Mine waste management, tailings and earthen dams, groundwater and surface water modeling, geophysical interpretation, satellite image interpretation, environmental arsenic and heavy metals, scientific translation

Software Expertise:
AquiferTest, ArcGIS, FLO-2D, HEC-RAS, Hydrus, MATLAB, Python, R, Visual MODFLOW, Vulcan

Languages:
Chinese, English, French, Hebrew, Indonesian, Latin, Nepali, Polish, Portuguese, Russian, Spanish

Selected Recent Clients (with location of project): Above Ground (Brazil), Acción Ecológica (Ecuador), Acangau Foundation (Brazil), AGHAM-Advocates of Science and Technology for the People (Philippines), Amazon Watch (Brazil), Andrew Lees Trust (Madagascar), Arizona Mining Reform Coalition, Arkansas Valley Conservation Coalition (Colorado), Asociación de Propietarios de Tierras Rurales del Norte (Ecuador), Asociación Interamericana para la Defensa del Ambiente (Colombia), Asociación Verdegaia (Spain), Associação Povo e Natureza do Barroso (Portugal), Associações Unidos em Defesa de Covas do Barroso, Bantuan Hukum dan Advokasi Rakyat Sumatera Utara (Indonesia), Black Warrior Riverkeeper (Alabama), British Columbia Mining Law Reform, Brolly Jameson Solicitors (Northern Ireland), Center for Biological Diversity (Nevada), Citizens' Alliance for North Korean Human Rights, City of Richmond (Virginia), Comissão Pastoral da Terra de Minas Gerais (Brazil), Comissão Pro Indio (Brazil), Communities Against the Injustice of Mining (Ireland), Comunidad Amazónica de Acción Social Cordillera del Cóndor Mirador (Ecuador), Concerned Citizens for Lake County (Colorado), Concerned Citizens of Charles City County (Virginia), Confederated Tribes of the Colville Reservation (British Colombia), Confraría de Pescadores San Bartolomé de Noia (Spain), ContraMINAcción (Spain), Cooperacción (Peru), Conselho Nacional de Direitos Humanos (Brazil), Coosa Riverkeeper (Alabama), Coromandel Watchdog of Hauraki (New Zealand), Deertail Scientific (Wisconsin), Deep Sea Mining Campaign (Northeast Pacific), Defensa y Conservación Ecológica de Íntag (Ecuador), Earthjustice (Montana, Washington), Earthworks (Brazil, California, Idaho, Indonesia, Montana, Peru), Earth Community Garden and Food Pantry (Utah), Eau Secours (Quebec), EcoJustice (Noba Scotia), Ecologistas en Acción (Spain), Education, Economics, Environmental, Climate and Health Organization (Mississippi), Ekvn-Yefolecv Maskoke Ecovillage (Alabama), Espacio Nacional por la Transparencia de la Industria Extractivas (Dominican Republic), E-Tech International (Ecuador), European Center for Constitutional and Human Rights (Germany), European Environmental Bureau, Fondation Rivières (Quebec), Frank Bold Society (Poland), Frente Antiminero (Ecuador), Friends of Buckingham (Virginia), Friends of the Boundary Waters Wilderness (Minnesota), Fundación Montescola (Spain), Gauḍīya Society of Sacred Archaeology (Utah), Global Justice Clinic of the New York University School of Law (Dominican Republic), Global Witness, Great Basin Resource Watch (Nevada), Great Basin Water Network (Utah), Greencastle Community Voices/Save our Sperrins (Northern Ireland), Greenpeace International (Northeast Pacific), Groundwater Relief (Burkina Faso, South Sudan, Syria, Yemen), Heinrich Böll Foundation (El Salvador, Guatemala), Inclusive Development International (Indonesia, Guinea), Information Network for Responsible Mining (Colorado), International Rivers (Ecuador), Ionic Mineral Technologies (Utah), Jaringan Advokasi Tambang (Indonesia), Jubilee Australia Research Centre (Papua New Guinea), Kaplan Fox & Kilsheimer LLP (Brazil, Indonesia), Keep Coxheath Clean (Nova Scotia), Latinoamérica Sustentable (Ecuador), LEAD Agency (Oklahoma), League of Conservation Voters (Virginia), Leigh Day Solicitors (Lesotho, Madagascar), Lil'wat Nation

(British Columbia), Living Rivers (Utah), London Mining Network (Spain), Maluti Community Development Forum (Lesotho), Matías J. Adrogué Attorneys (Texas), MiningWatch Canada (Canada, Ecuador), Minnesota Center for Environmental Advocacy, Northern Confluence Initiative (British Columbia), Pacific Asia Resource Center (Ecuador), Patagonia Area Resource Alliance (Arizona), Pembroke Clean Water Committee (Maine), Perkumpulan Aksi Ekologi dan Emansipasi Rakyat (Indonesia), Pew Charitable Trust (Northeast Pacific), Phoenix Law (Northern Ireland), Plataforma Mina Touro-O Pino Non (Spain), Prolific Mining (Utah), PowerShift e. V. (European Union), Rainforest Information Centre (Ecuador), Residents Against Flooding (Texas), Richwood Advisory Council (Texas), Royal Gorge Preservation Project (Colorado), San Carlos Apache Tribe (Arizona), Satya Bumi (Indonesia), Saving Island Green (South Carolina), Seascapes Consultants (Northeast Pacific), SkeenaWild Conservation Trust (British Columbia), Smarter Shift (British Columbia), South Carolina Coastal Conservation League, SOS Suído Seixo (Spain), South Tacoma Economic Green Zone (Washington), Southeast Queens Residents Environmental Justice Coalition (New York), Southern Environmental Law Center (Alabama), Survival International (Indonesia), Transport & Environment (Indonesia), Utah Valley University (Utah), Valle Unido por Beneficios Comunitarios (California), Virginia Community Rights Network, Voices NGO (Brazil), Water Legacy (Minnesota), Ymir Community Watershed Society (British Columbia)

Education:
Ph.D., Geophysics, Cornell University, 1984
M.A., Geophysics, Princeton University, 1980
B.S., Mathematics, The Ohio State University, 1978

Professional Experience:
Fulbright Professor (October-November 2018), Visiting Professor (June-July 2016), Faculty of Geological and Petroleum Engineering, Escuela Politécnica Nacional, Quito, Ecuador
Associate Professor of Hydrology, Utah Valley University, Orem, Utah, 2008-2018
Associate Professor of Geology (2004-2007), Assistant Professor of Geology (1998-2004), Simpson College, Indianola, Iowa
Fulbright Professor of Geology, Tri-Chandra Multiple Campus, Kathmandu, Nepal, 2003
Assistant Professor of Geology, Ashland University, Ashland, Ohio, 1995-1998
Visiting Scientist (Plant Physiological Ecology, 1994-1995), Research Associate III (Soil Hydrology and Soil Physics, 1993-1994), Cornell University, Ithaca, New York
Mechanical Engineer, Transonic Systems, Ithaca, New York, 1989-1992
Lecturer, Department of Physics, University of Botswana, Gaborone, Botswana, 1987-1989
Postdoctoral Research Associate, Cornell Injection Molding Program, School of Mechanical and Aerospace Engineering, Cornell University, Ithaca, New York, 1984-1986

Selected Awards:
Community Engaged Faculty, Utah Campus Compact Presidential Award, 2017
Community Engaged Scholar of the Year, Utah Valley University, 2017
University Faculty Fellow in Ethics for Liberal Arts and Science, Utah Valley University, 2012
Presidential Award of Excellence in Engagement, Utah Valley University, 2011
Full-Time Faculty of the Year, Wolverine Achievement Awards, Utah Valley University, 2010

Selected Membership on Expert Panels:
IRMA Initiative for Responsible Mining Expert Working Group on Waste and Materials Management
IRMA Initiative for Responsible Mining Expert Working Group on Water Management
United Nations Environment Programme Expert Review Panel for Report on Knowledge Gaps in Tailings Management
Product Water Footprint Working Group, International Lithium Association

IRMA Expert Working Group on Tailings Storage and Mine Waste Facility Management
ISO/TC [International Standardization Organization/Technical Committee] 82/SC 7/WG5 (Underground Mine Tailings Backfill)

Selected Recent Testimony to Governmental Bodies:
U.S. House of Representatives Subcommittee on Indigenous Peoples of the United States, Hearing on "The Irreparable Environmental and Cultural Impacts of the Proposed Resolution Copper Mining Operation," March 12, 2020
United Nations Permanent Forum on Indigenous Issues, Side Event on "Protection of Indigenous Peoples in Amazon Region, Pará, Brazil: Human Rights Violations of 'Volta Grande' Mining Project," April 29, 2021
European Parliament Public Hearing on "Environmental and Social Impacts of Mining Activity in the EU," Session on "Mining Legislation, Safety Standards, Social and Environmental Impacts of Miners," December 2, 2021
United Nations Environment Assembly, 5.2 Green Tent Event: "Sustainable Solutions to Risky Mine Tailings Management," February 28, 2022
Permanent Commission on Human Rights, Dominican Republic Chamber of Deputies, "Presentation of the 'Emerman Report' on the Barrick Gold Tailings Dam," October 6, 2023
Minnesota Senate Environment, Climate and Legacy Committee, "Hearing for Prove It First Law—Protect Clean Water," February 22, 2024 and February 24, 2025
Nevada Assembly Natural Resources Committee, January 28, 2026

Selected Recent Depositions and Court Testimony:
Administración de Justicia (Galicia, Spain), October 31, 2024
United States District Court, Eastern District of New York, September 8, 2023
Office of the Hearing Examiner, City of Tacoma, July 25, 2023
Arizona Water Quality Appeals Board, January 19, 2022
Mississippi Environmental Quality Permit Board, April 23, 2021
Jueza Constitucional [Constitutional Court] (Ecuador), April 15, 2021
South Carolina Circuit Court, January 19, 2021
District Court of Brazoria County, Texas, 23rd Judicial District, December 3, 2020

Selected Recent Consulting Reports:
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Emerman, S.H., 2025. Implications of the QMM 2024 Water Report for the impact of the Rio Tinto QMM ilmenite-zircon-monazite mine on downstream water quality, southeastern Madagascar: Report to Leigh Day, 102 p.
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Emerman, S.H., 2025. Potential impacts of a failure of the Dry Stack Facility at the proposed Dalradian Gold Curraghinalt mine in Northern Ireland on the rivers of the Republic of Ireland: Report to Communities Against the Injustice of Mining and Save Our Sperrins, 41 p.

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Emerman, S.H., 2025. Issues of dam stability, public safety, and worker safety in the 2023 Dam Safety Inspection Report and the 2024-2028 Five-Year Operating Plan for the Northshore Mining Mile Post 7 tailings storage facility, northeastern Minnesota: Report to WaterLegacy, 34 p.

Emerman, S.H., 2025. Evaluación del plan de gestión de residuos mineros en el Estudio de Impacto Ambiental y el Análisis de Rotura de Presa de la mina de cobre Touro de Cobre San Rafael, Galicia, noroeste de España [Evaluation of the mine waste management plan in the Environmental Impact Study and Dam Break Analysis for the proposed Cobre San Rafael Touro copper mine, Galicia, northwestern Spain]: Report to Ecologistas en Acción, 111 p.

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Emerman, S.H., 2024. Evaluación del plan de gestión de relaves y generación de electricidad en el Estudio de Pre-Factibilidad del Proyecto de Oro-Plata-Cobre Cascabel de SolGold, Provincia de Imbabura, norte de Ecuador [Evaluation of the plan for tailings management and electricity generation in the Pre-Feasibility Study for the SolGold Gold-Silver-Copper Cascabel Project, Imbabura Province, northern Ecuador]: Report to Rainforest Information Centre, 76 p.

Emerman, S.H., 2024. Evaluation of a proposal for cyanide extraction of gold and silver from mine waste at the Leadville mill, Lake County, west-central Colorado: Report to Concerned Citizens for Lake County, 113 p.

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Emerman, S.H, 2021. Recommendations for addressing the water emergency for communities in the vicinity of the CBG bauxite mine, Guinea, west Africa: Report to Inclusive Development International, 22 p.

Emerman, S.H., 2021. Evaluación de un plan de tratamiento de agua para la reapertura de la mina de tungsteno San Finx, Galicia, noroeste de España [Evaluation of a water treatment plan for the re-

opening of the San Finx tungsten mine, Galicia, northwest Spain]: Report to Confraría de Pescadores San Bartolomé de Noia, 56 p.
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