DOCKETED	
Docket Number:	24-OPT-02
Project Title:	Compass Energy Storage Project
TN #:	265735
Document Title:	Roger Butow Comments - Alarming Earthquake Factors
Description:	N/A
Filer:	System
Organization:	Roger Butow
Submitter Role:	Public
Submission Date:	8/21/2025 11:07:57 AM
Docketed Date:	8/21/2025

Comment Received From: Roger Butow
Submitted On: 8/21/2025
Docket Number: 24-OPT-02

Alarming Earthquake Factors

Additional submitted attachment is included below.

BESS Facility In CSJC: Imminent Earthquake Predictable?

The existence of the **San Joaquin Hills Blind Thrust Fault** (**SJHBTF**) should preclude developing any such project within the following cities (plus County-controlled lands) in South Orange County: Aliso Viejo (AV), Laguna Niguel (LN), San Juan Capistrano (SJC) and Dana Point (DP)---perhaps the northern most neighborhoods of San Clemente.

Many seismic and geotechnical experts have predicted an approximate 6.7 in the immediate future (similar to the **Northridge Blind Thrust** event in January of 1994), while many agencies and professional analysts chimed in, at UCI they believe a much stronger 7.0---7.5 temblor event is overdue, imminent along the SJHBTF.

https://en.wikipedia.org/wiki/1994_Northridge_earthquake

https://sites.uci.edu/energyobserver/2012/04/25/san-joaquin-hills-blind-thrust-fault-scenario/

First identified (discovered) in 1999 by **Dr. Lisa Grant-Ludwig** @ UCI, embedded in a paper presented at a national seismic conference, the SJHBTF's existence and future ramifications have been peer reviewed by both academia plus various federal and state staff.

https://laist.com/news/39-earthquake-shakes-san-juan-capis

https://www.latimes.com/local/la-xpm-2012-apr-24-la-me-oc-quake-20120424-story.html

The 3.9 event in late April of 2012 helped sustain proof of the SJHBTF, and online research reveals that the epicenter was

approximated to be near the intersection of Del Avion and Del Obispo, where the city limits of LN, SJC and DP meet.

The SJHBTF is a recognized source of potential future earthquakes in Orange County (from Costa Mesa-to-Laguna Beach-to-AV-to-LN-to-SJC-DP-to-San Clemente).

It is acknowledged to be capable of producing large-magnitude quakes, such as the event that caused the uplift of the hills.

Again, it has been referenced in numerous reconnaisance reports and OC Public Works/Flood control District studies: **https://ocip.ocpublicworks.com/sites/ocpwocip/files/2023-08/2002%2008%2001%2C%20L01%2C%20SJC%2C%20USACE_F5_Report%2C%20Watershed.pdf**

Dr. Grant was interviewed immediately after the late April 2012 event:

https://www.pbssocal.org/shows/real-orange/clip/real-orange-oc-earthquake-fault

A USGS grant study paper performed by peers, among them **Dr. Karl Mueller**, University of Colorado @ Boulder is insightful:

https://sites.uci.edu/energyobserver/2012/04/25/san-joaquin-hills-blind-thrust-fault-scenario/

https://earthquake.usgs.gov/cfusion/external_grants/reports/02HQGR0100.pdf

Scroll down for a map that identifies the approximate location of the SJHBTF.

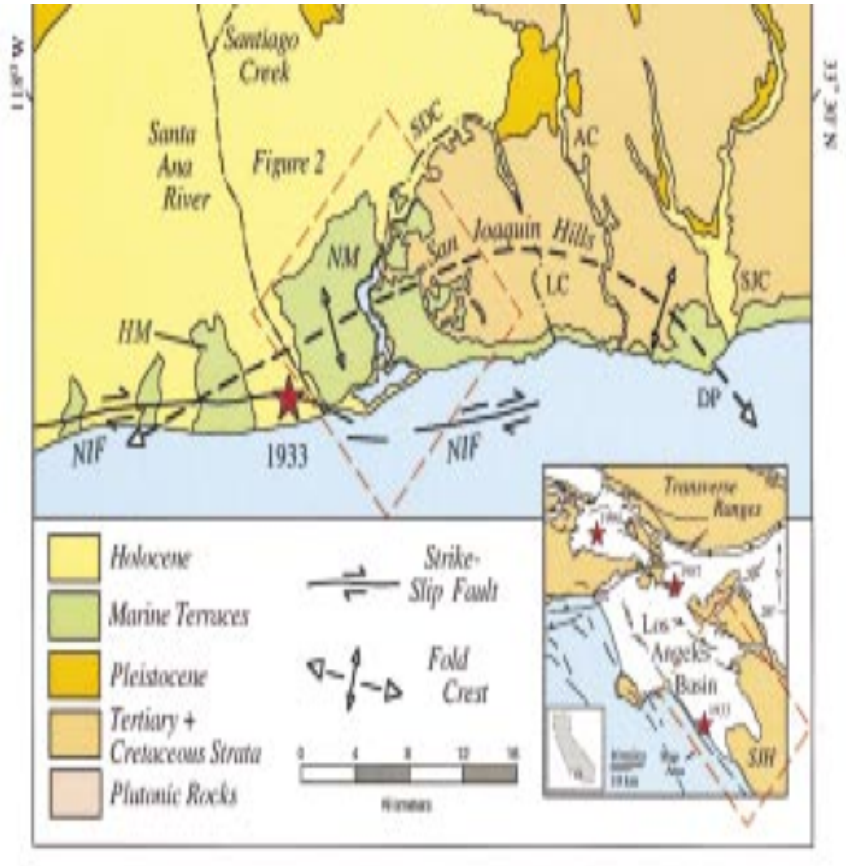
In a subsequent section I'll reveal why certain parts of LN, SJC and DP are more vulnerable to potentially amplified impacts due

to a known **exponential or logarithmic multiplier** (**liquefaction**), plus larger than average yearly rainfall totals.

The SJHBTF becomes a clear and imminent danger once it's bisected AV (crossing Aliso Creek) and LN laterally, respectively, parallel to the ocean (West to East).

The SJHBTF then begins curving (at approximately Moulton Parkway/Golden Lantern and Crown Vally Parkway), its ***"soft 45° turn"*** towards its landward terminus near DP Harbor/San Clemente city line (Doheny State Beach).

I'll dedicate discrete remarks and alarming concerns regarding ***liquefaction*** in this region later in my recital.



mediate terraces were probably occupied by multiple highstands (Fig. 3).

RECENCY OF UPLIFT

The location and thickness of Holocene sediments in the San Joaquin Hills suggest that tectonic uplift continued during the middle to late Holocene. Isopach and structure contour maps of the Holocene Talbert aquifer beneath the Santa Ana River (Sprotte et al., 1980) suggest that the aquifer has been deformed. The distribution of fluvial and estuarine sediments southeast of the Santa Ana River also suggests that Holocene uplift occurred. Newport Bay was incised at least 36 m below present sea level during the last glacial maximum, but rapid sea-level rise at the close of the Pleistocene inundated coastal drainages and induced sedimentary infilling with Holocene sedi-

Subsequent to its identification, the SJHBTF is now recognized and listed on official federal and state mapping websites,

including those dedicated to emergency response forward planning scenarios.

A legitimate question to be asked of the Applicant and Geotech vendor is given the 2012 event, the socializing, the publicity and media saturation given it, how and why hasn't this come up before as a legitimate item of concern for public discussion?

April 21, 2012

SAN JUAN CAPISTRANO – A magnitude-3.9 earthquake centered about a mile west of San Juan Capistrano rattled homes and offices across much of the county Monday.

According to the U.S. Geological Survey, the quake struck at 10:37 a.m. about two miles north-northeast of Dana Point and three miles south-southeast of Laguna Niguel.

Simple online search notes multiple South OC public safety websites for catastrophic fire and hazardous seismic mitigation planning purposes.
https://www.google.com/search?client=safari&rls=en&q=south+orange+county+seismic+response&ie=UTF-8&oe=UTF-8&sei=ZS6naLqKB9XZkPIPr5LGoQk

Fault Name	Comments	References
San Joaquin Hills blind thrust	2002 fault parameters include the San Joaquin Hills blind thrust fault, based on Grant and others (1999) and Grant and Runnerstrom (written communication November 2, 2001). We select Grant and Runnerstrom's model B (their weight of 45%). This model assumes a 23° SW dip of a shallow backthrust (after Rivero and others, 2000), extending from 2 – 8 km depth. The rupture bottom is approximately coincident with location of the offshore Newport-Inglewood fault zone. Slip rate of 0.5 ± 0.2 mm/yr is based on the average late Quaternary uplift rate of the San Joaquin Hills of 0.21 - 0.27 mm/yr and inferred dip of 20° to 30°.	Grant, L.B., Mueller, K.J., Gath, E.M., Cheng, H., Edwards, R.L., Munro, R., and Kennedy, G.L., 1999, Late Quaternary uplift and earthquake potential of the San Joaquin Hills, southern Los Angeles Basin, California: Geology, v. 27, p. 1031-1034. Grant, Lisa, and Runnerstrom, Eric, 2001, Notes on proposed models for the San Joaquin Hills blind thrust: Unpublished written communication to W. A. Bryant, November 2, 2001. Rivero, C., Shaw, J.H., and Mueller, K.J., 2000, Oceanside and Thirtymile Bank blind thrusts: Implications for earthquake hazards in coastal southern California: Geology, v. 28, p. 891-894.

SOURCE: Alquist-Priolo Earthquake Fault Zoning Map

https://earthquake.usgs.gov/cfusion/qfault/show_report_AB_archive.cfm?fault_id=186&section_id=

An approximated 7.5 earthquake occurred back in 1812 which resulted in the complete destruction of the Mission in SJC. Some sources believe that this quake was preceeded in the early 1600s (thus occuring ≈every 200 years), before the Spaniards settled.

https://en.wikipedia.org/wiki/1812_San_Juan_Capistrano_earthquake

Nowhere have I found any mention of or broaching this subject, the historical seismic events nor concerns about **ANY** other faults (confirmed by historical archives and analyses) that could affect the Project. In my opinion as a professional, a credentialed CEQA analyst my concerns should be brought into the discussion.

It may not be possible to build out the proposed facility anywhere on the parcel….to withstand a 7.5 considering other amplifying threat factors, variables like **liquefaction** and other multipliers (e.g. El Niño or consecutive ENs) need to be addressed as issues.

Perhaps UCI scientists could peer review the topic and mitigations proffered by the Applicant, if in fact mitigation is even possible?

The proposed facility's proximity to lower Oso, its siting basically at the toe of an approximate 400 foot tall slope ridgeline, a large (7.0 or greater) earthquake event could result in the BESS being buried, maybe pushed towards the creek—reducing the buffer.

It could dismantle, basically demolished by natural forces and/or lateral spreading (aka migrational slumping of infrastructure).

It could dangerouly decrease the Project's already precipitous distance from Oso Creek or presently failing banks and ledges, possibly topple it into the watercourse (***in toto***), recovery and rehabilitation difficult if not outright impossible.

These catastrophic scenarios should not be under-valued, marginalized, down-played or ignored, are certainly in the forefront of many local's collective minds.

Liquefaction With Significant Rainfall As A Multiplier

CEQA Checklist Appendix G §VI:

VI. GEOLOGY AND SOILS
Would the project:
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the
State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.
ii) Strong seismic ground shaking?
iii) Seismic-related ground failure, including liquefaction?
iv) Landslides?
b) Result in substantial soil erosion or the loss of topsoil?
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

The corridors of the existing CGS mapped liquefaction-prone areas in South OC, cannot possibly reflect existing soil saturation level around the watercourses/creeks as they're not visible.

Obviously soil types (permeability), rainfall events (durations and totals) plus year round carrying capacities vary.

Clearly, the proposed site is within known/knowable multiplier swaths, every acre near or around the watercourses subject to liquefaction effects. These are acknowledged to amplify/intensify and extend both destructive distance but amplitude, vertical lift.

https://www.google.com/search?q=amplitude+earthquake+definition&ie=UTF-8&oe=UTF-8&hl=en-us&client=safari

CGS Survey Mapped Liquefaction Vulnerable Watersheds

It would not be unreasonable, in fact quite logical, to inject for advanced, in depth analyses of potentially significant impacts demanding both dialogue and mitigation to include a swath which brings a perpendicular radius of 2-3 miles from the SJHBTF mapped center line.

Logic and common sense should encourage the Commission to consider it reasonable to prohibit any SOC BESS site facility (once

the SJHBTF bends, begins it's southerly direction towards Dan Point): Westward to Crown Vally Parkway, at minimum Eastward to (and including) the !-5 Freeway.

https://www.google.com/search?client=safari&rls=en&q=blind+thrust+faults+and+liquefication&ie=UTF-8&oe=UTF-8

During long term, significant rainy periods, the dominant volumes of the water are stored and migrate subsurface, as groundwater. Owing to the fact that South OC has no true deep, isolated aquifers but only slightly subsurface extensions of the watercourses, caution is intuited.

In addition, that groundwater is perched **very** close to the surface, is considered by the SWRCB Water Rights Division as an extension of surface flows: Hence the majority of SOC flows are invisible to the naked eye because they're traveling as groundwater---liquefaction enhancement conditions not obvious.

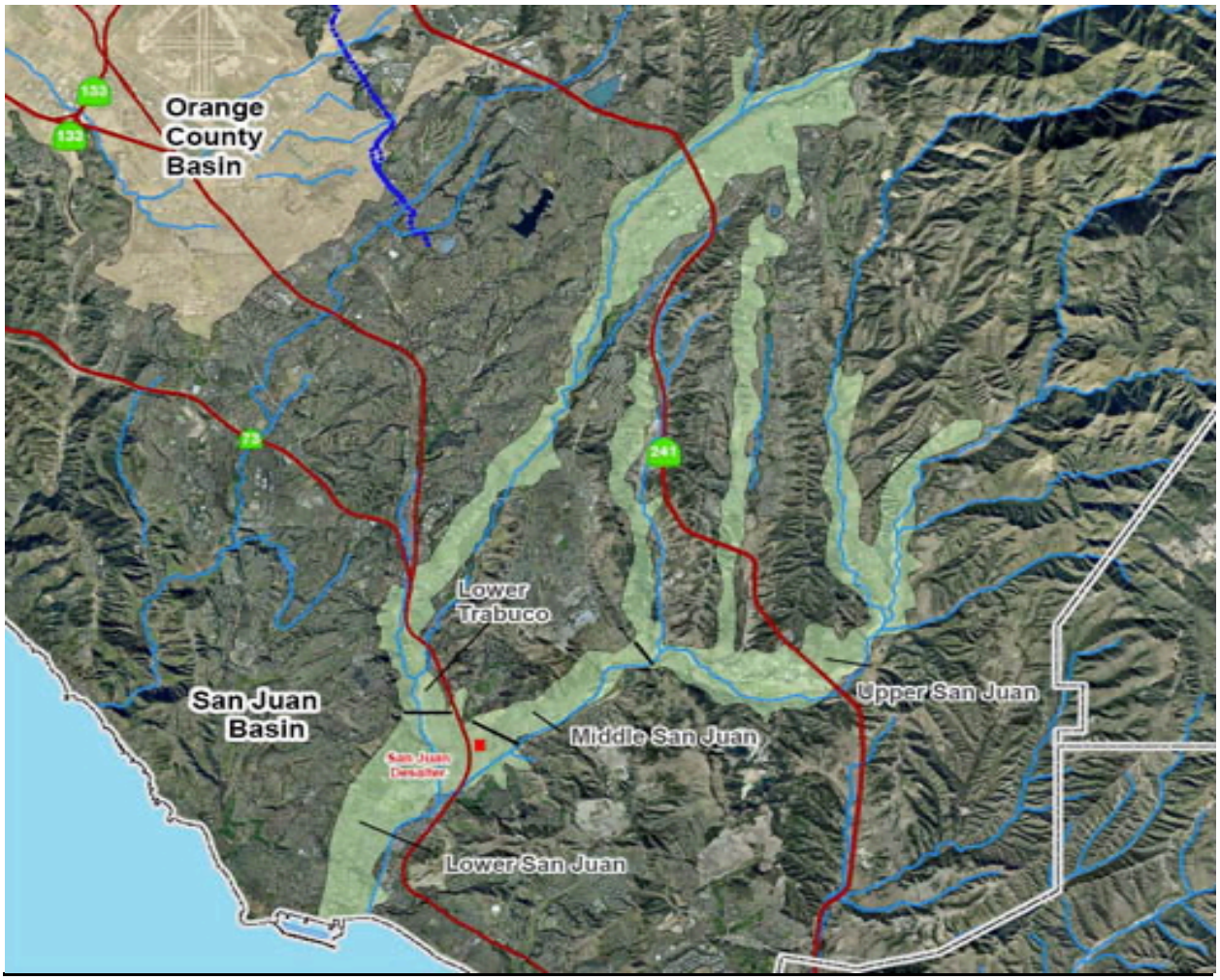
Appropriative and riparian Water Rights Permits are mandated. The only other major water rights holder, beyond minor pumping of groundwater by a few isolated private wells, is Rancho Mission Viejo (riparian water rights in the upper reach of San Juan Creek).

The major appropriative water rights holders are the members of the San Juan Basin Authority: **https://www.sjbauthority.com**

When the JPA formed it had Moulton-Niguel, Trabuco Canyon, Santa Margarita (SMWD), City of San Juan Capistrano and South Coast Water Districts (SCWD) as founding members. Two remain.

There have been innumerable studies performed and delivered over the years, a website visit might enable interested parties to get a better, more wide-ranging grasp of the JPA's stewardship.

To assist, to enable stakeholders to compare the CGS liquefaction and SJBA maps, here's the online map of the Basin's contributing rechargers (commensurate with the CGS Survey map)



Note: The Basin management boundaries are smaller, basically within the city limits of SJC and Dana Point.

It should also be noted that the total current capacity of the Basin is estimated at 41,000 acre feet (af).

Only 60% (≈24,000 af) is readily available or amenable to pumping per the SJBA's managed water rights.

A study funded by the City of Laguna Niguel stated that the lower Oso carried ≈ 10.0 cfs for 6 months of the year. This is 6.5 million gallons/day.

Once unobservable/discretely unmeasurable subsurface flows are added, there's easliy 10 million gallons in the vicinity of the Project (lower Oso) most of the year.

Obviously, the carrying capacity is expanded depending upon intensity and duration during events typical of El Niños (Ens).

There are precedents regarding consecutive, above-average rainy seasons (approximately 10-14"/year in this region), ***"charging"*** (bank-to-bank filling due to drainage rates) of surface and subterannean flows.

Back-to back ENs are not unheard of and it can takes months for the headland's (National Forest land) mountainous areas to release their storage, begin their journey towards the sea.

The subsequent drainage doesn't necessarily immediately migrate the trapped water in the soaked soil.

It's not unusual for it to take months, once again dependent on elevation, soil composition and distance differentials to receiving watercourses.

The other 40% in regards to the SJ Basin is ***"semi-locked"*** in the soil and sediment adjacent to the Oso, Trabuco and San Juan Creeks.

Basically the SJC Watershed floodplain begins near the confluence of the lower Oso and lower Arroyo Trabuco Creeks (in proximity to the BESS facility).

According to the San Diego Regional Water Quality Control Board, ***"significant"*** is ½" or greater rainfall within a 24-hour period.

Consecutive EN events are becoming more frequent and potentially more intense due to climate change. These multi-year events, characterized by EN conditions persisting for 2 or more consecutive years, can have devasting, long-lasting impacts on ecosystems, the totals expanding groundwater recharging.

https://theconversation.com/consecutive-el-ninos-are-happening-more-often-and-the-result-is-more-devastating-new-research-251504

To repeat: A ***"perfect storm/worst case scenario,"*** a convergence of consecutive significant rainy periods, coupled with existent soil instability (inluding potential soil/sediment saturation adjacent/contiguous with mapped water courses) require intense scrutiny and disinterested 3rd party, independent assessments.

These ***"maxed"*** earthquake liquefaction conditions, could result in not only in a alterations to lower Oso Creek's alignment, but attendant landslides.

Slope failures and slippages (both above this site plus Creek banks/ledges/benches) depends upon compaction and composition (as yet not thoroughly investigated) could readily occur due to the increased weight of saturated sediment and soil.

The Project locale is rife with unique, compounding stressors, it might not require a large/strong SJHBTF event (6.3+) but only a moderately (5.3+).
https://www.usgs.gov/programs/earthquake-hazards/earthquake-magnitude-energy-release-and-shaking-intensity#:~:text=Types%20of%20Magnitudes&text=For%20example%2C%20a%20magnitude%205.3,as%20measured%20on%20a%20seismogram

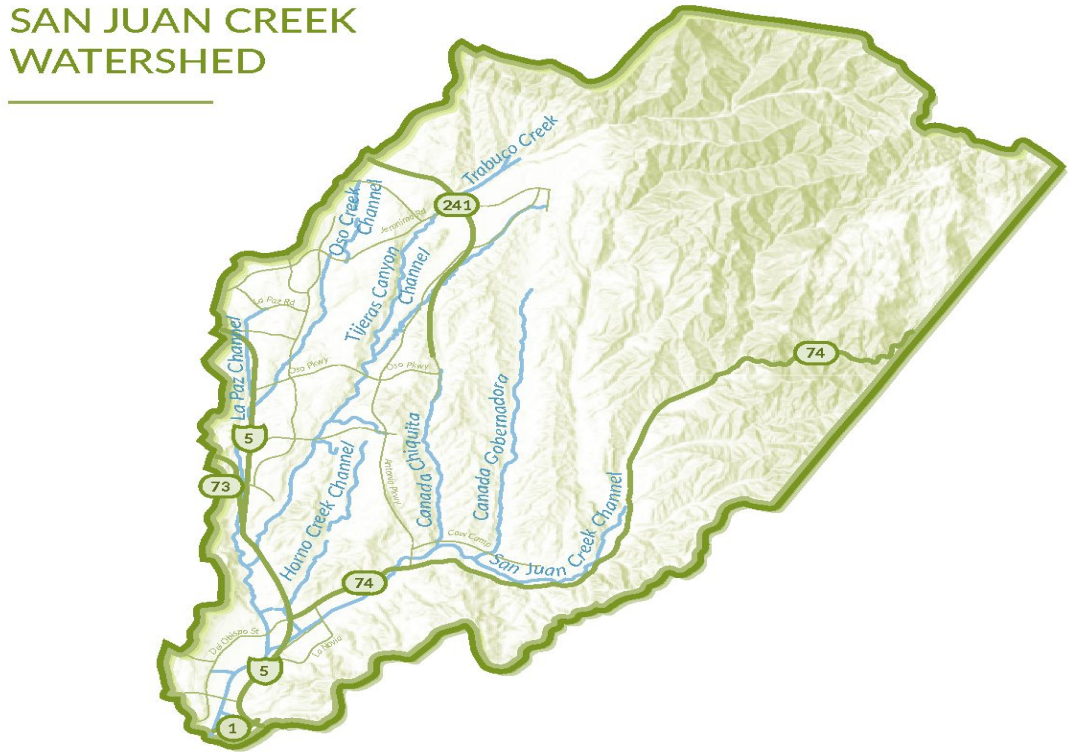
Ditto if a reoccurrence of the 1812 event (even though fault ruptures/slippages and uplifting were a bit remote) happens.

The uncertainty of this location (once historical records are cross-referenced and collated) should therefore suffice to act as a red flag.

The Applicant should move down their list of alternatives, this placement might be cheaper and/or simpler for them but represents greater public safety hazard exposure.

IMO, this site's restraints leads me to call this Project an ***"experiment,"*** gambling with ***"house money"*** (locale residents and their domiciles).

Corporations can file BKs, write these ventures off, if an LLC could just walk away if catastrope strikes---meanwhile the locals will be left with the enviro-tab.



Above: Contributing major drainages to the mainstem of San Juan Creek are Oso, Trabuco, Tijeras, Horno, Chiquita, Gobernadora and Bell Canyon.

A 7.5 magnitude would be several thousands of times greater in magnitude and release more energy in the 10s of thousands times greater range than the 2012, 3.9 event. This is because they're calculated logarithmically.

Lessons learned: Utility disruption and compromised distribution systems were rampant in and around the city of Northridge. Water delivery, wastewater disposal, gas and electrical distribution systems, cable, all went offline.

Dozens of fires broke out due to breaches in gas connections. So the threat, the risky fire hazards for the CSJC BESS location need not come from internal combustion events but from without----- e.g., sage scrub catching fire from contiguous residences and businesses in the general vicinity.

Liquefaction can increase these same or similar metric values logarithmically too, 5-10 fold.

The specter of adjacent slopes during rainy periods thoroughly saturated, in a region known to be earthquake prone/vulnerable justifiably alarms the public. Certainly, it wouldn't be the Applicant or its vendors going through a pile of contaminated rubble.

https://earthquake.usgs.gov/education/calculator.php"p-

What assurances, if any, can be offered regarding Emergency Response Team (ERT) priorities, the dangers of incorrectly or inefficiently directing these teams, further jeopardizing public health and safety?

If the facility sloughs (laterally slips/slides) into Oso, carried by peak flows on to Trabuco then joins the main stem of San Juan Creek near Descanso Park (downtown confluence), where will the ERT personnel be dispatched to provide maximum ecological protection?

What arrangements or activities can protect the thousands of af of reclaimed and drinking water sources which Santa Margarita Water District pumps that could become contaminated indefinitely?

The scenarios and variations thereof I've brought into the discussion constitute legitimately perplexing eventualities. That the public and **NOT** the Applicant is interjecting them into the conversation is actually quite disturbing in and of itself.

Did liquefaction and attendant seismic vulnerabilities come up on the recent field visit or previously in dialogue with State agency personnel or Commissioners? If not, why not?

There's a fair argument to be made that these storage facilities shouldn't be fast-tracked, let alone be allowed to progress through State not local approval processes if in proximity to mapped liquefaction zones in So Cal.

Sacramento policy-makers paint with a broad, one-size-fits-all generic brush, whereas (in this case) implementation, the real inhibitions and potential restraints of unique sites, the follow-through, problematic.

Stakeholders are filling uncompensated, ***de facto*** niche roles as geotechnical, fire and other related vulnerability oversight committee members. As I am here.

If public stakeholders had not stridently, repeatedly brought the soil/slope instabilities and proximity to the forefront, would the recent site visit have even taken place?

That is a valid, bona fide accountability question to be asked---- The Applicant has had several years to study and research the proposed site privately, at its own pace and lawfully provided discretion.

If the Applicant persists, no doubt that their vendors will ***"low-ball,"*** i.e., downplay the risk percentages of the scenarios I've noted.

And no doubt the subcontractors delegated design features will claim that a building housing the batteries can be ***"failure-proof,"*** remain stable, in place, intact, neither migrate, crumble or pose a threat.

Subs tell clients what they want to hear. What do you call a firm that fails to do so? Out of business.

Public stakeholders were neither invited nor offered observational attendance for the recent staff field trip. The largest identified stakeholder constituent, non-profit **BLESSINOC,** should have been given the courtesy of an invitation if ground rules were established (like no animosity or friction to be exhibited).

BLESSINOC could then have combed its volunteer ranks for Geotech/Habitat expertise, this IMO would have streamlined via proactive, incisive interplay. 2 or 3 additional attendees would not have slowed down the visit.

I've attended such venues myself, they act as a form of ***"mutual benefit triage,"*** and do greatly assist process participants. Early, open intervention can winnow, reduce later misunderstandings, reduce staff time therefore taxpayer expenditures.

Stakeholders are anxious, NGOs, CBOs, ***et al*** being held hostage by the Applicant's self-inflicted uncertainties, and if CEQA is followed, an EIR produced, then **THIS** present offering, **NO PROJECT** and at least **1 ALTERNATIVE** as well TBA.

The Applicant's failure to announce, to identify even one is **NOT** reassuring. It ramps up, it foments and feeds distrust, undoubtably stirs up more resentment, more animosity.

Last: What would be an estimate regarding remediation and rehabilitation if the Project ***"under-performs,"*** is deemed an environmental causal culprit in a worst case scenario?

Damages possibly in the tens of millions, can the State mandate a bond as an exaction, one that travels with the property if developed, includes negative enviro-impacts triggered or exacerbated by the failure/deficiencies of the site be funded asap post-event?

A bond that would indemnify and hold legally liable, responsible/accountable, regardless if the Applicant filed BK?

A foreign-owned Applicant, if they're so confidant, wish to develop innovative projects in our locale, be good neighbors, then a ***"you broke it, you bought it"*** mentality regarding damages attributable to their facility if it fails should be a concession.

If you/your agency has any questions, please don't hesitate to contact me,

Roger E. Bütow

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