

Zero Emissions Construction and Operation Equipment and Related Infrastructure

Introduction and Statement of Qualifications:

My name is Kenneth Taylor and I am an experienced civil engineer with a career spanning over three decades, currently serving as Design Manager at Griffith Company since July 2022. I hold over 35 years of experience as an engineer, with significant experience related to construction and operation of large transportation projects in Southern California. I have been asked to respond to certain comments raised with respect to the feasibility of zero-emissions construction and operation equipment and related infrastructure for BIG.

1. Mischaracterization of the FEIR's Basis for Determining Infeasibility

Commenters mischaracterize the City's analysis by suggesting that the infeasibility determination was based solely on a single contractor discussion. The FEIR did not rely on a singular anecdotal reference; rather, it considered a **combination of project-specific operational constraints**, including:

- Scale of construction (thousands of acres, ~26 million cubic yards of earthwork)
- Equipment duty cycles (continuous, high-load operations)
- Required horsepower classes (large scrapers, dozers, excavators)
- Reliability requirements for coordinated multi-phase construction activities

The referenced contractor input was **illustrative**, not dispositive, and was consistent with broader industry observations regarding the **current limitations of heavy-duty ZE construction equipment at the scale required for this project**.

2. Distinction Between Equipment Availability and Project-Level Feasibility

Commenters conflate **catalog availability** with **practical deploy-ability**.

Key Clarification:

- CARB and ICCT sources demonstrate that:
 - Numerous ZE equipment models **exist**
 - Certain categories are **commercially available or pilot-scale**

However, CEQA feasibility requires evaluation of whether equipment can be:

- **Obtained at required quantity**
- **Deployed at required scale**
- **Operated reliably under project conditions**
- **Supported by sufficient charging/fueling infrastructure**
- **Integrated without causing construction delays or safety risks**

The FEIR correctly focuses on **project-level feasibility**, not theoretical availability.

3. Limitations of CARB Equipment Lists as Evidence of Feasibility

While CARB identifies:

- ~1,000 electric off-road equipment models
- ~333 construction/mining equipment options
- 9 equipment categories “available” in California

these lists **do not demonstrate**:

- Availability in **large fleet quantities**
 - **See Table 1 below listing the type and quantity of equipment need for each major phase of the project.**
- Suitability for:
 - high-horsepower earthmoving (e.g., scrapers, large dozers)
 - continuous multi-shift operation
- Proven performance in:
 - extreme load conditions
 - desert environments (heat, dust)
- Availability of:
 - trained operators
 - maintenance supply chains

Additionally:

- Many listed models are:
 - **pilot deployments**
 - **early commercial-stage**
 - **limited production units**
- CARB’s own materials acknowledge that large off-road ZE equipment remains **emerging**

Therefore, these lists **do not constitute substantial evidence** that a fully ZE fleet is feasible for a project of this magnitude.

4. Geographic Transferability (China vs. California)

The FEIR appropriately distinguishes between international and California market conditions.

Key Differences:

- Regulatory standards (CARB certification requirements)
- Grid infrastructure and interconnection requirements
- Equipment distribution and dealer networks
- Maintenance and parts support
- Workforce training and safety compliance standards

Even if equipment is deployed in China:

- It may **not be certified or permitted in California**
- It may lack **U.S.-based service and support**
- It may not meet **OSHA / CARB / EPA requirements**

Accordingly, the FEIR correctly concluded that **international availability does not equate to local feasibility**.

5. Charging Infrastructure Constraints

The commenters do not adequately address a critical constraint:

High-power charging requirements for construction equipment

- Large ZE equipment requires:
 - **megawatt-scale charging**
 - rapid turnaround cycles
- The project involves:
 - geographically dispersed work zones
 - mobile and constantly shifting operations

Practical challenges include:

- Insufficient temporary grid capacity at the site
- Lack of portable large-scale charging systems
- Inability to maintain productivity with recharge downtime

These constraints significantly affect feasibility independent of equipment availability.

6. Partial Electrification Consideration

Commenters assert that the FEIR did not consider partial ZE deployment.

Rebuttal:

- The FEIR evaluated feasibility in terms of:
 - **technological readiness**
 - **operational constraints**
 - **project efficiency and safety**
- Even partial deployment requires:
 - sufficient equipment supply
 - integrated charging logistics
 - operational compatibility with conventional fleets

At present:

- Evidence in the record does **not demonstrate** that meaningful levels of ZE equipment could be deployed **without adversely affecting project delivery**

7. CEQA Standard: Feasible vs. Speculative

CEQA requires mitigation measures to be:

“capable of being accomplished in a successful manner within a reasonable period of time.”

The commenters’ position relies on:

- emerging technologies
- limited pilot programs
- generalized availability lists

These sources do not establish **demonstrated feasibility at project scale**, and therefore do not meet the CEQA standard for enforceable mitigation.

8. Response to Claims Regarding Other Mitigation Measures

A. Truck-Related Measures (MM BIG AQ-9, AQ-10, AQ-11, AQ-14)

The FEIR:

- evaluated these measures within the context of:
 - jurisdictional authority
 - operational control
 - enforceability
- and incorporated:
 - idling restrictions
 - routing controls
 - infrastructure planning

Revisions reflect:

- balancing enforceability with practical implementation

B. Zero-Emission Truck Requirements

The commenters' comparison to MM GP AQ-2 is misplaced.

- General Plan measures are:
 - **policy-level**
 - applied to **future discretionary projects**
- BIG mitigation must be:
 - **project-specific**
 - **technically and contractually enforceable**

Additionally:

- The City lacks authority to mandate:
 - fleet procurement decisions of third-party operators beyond reasonable limits

9. Adequacy of the FEIR's Analysis

The FEIR:

- considered:
 - current technology status
 - site-specific constraints
 - infrastructure limitations
- and determined:
 - full ZE construction fleet is **not currently feasible**

This conclusion is supported by:

- substantial evidence in the record
- consistency with current industry deployment levels
- alignment with regulatory guidance on emerging technologies

Conclusion

The commenters' argument relies primarily on:

- generalized equipment availability lists
- early-stage technology deployment

- assumptions about scalability that are not supported by the record

However, CEQA requires **demonstrated, project-specific feasibility**, not theoretical or emerging possibilities.

Accordingly, **the FEIR reasonably and appropriately concluded that a fully zero-emission construction fleet is not presently feasible for a project of this scale and complexity, and its conclusions are supported by substantial evidence.**

Table 1: Construction Equipment					
Construction Phase	Equipment	Number	Hours per Day	Horsepower (hp)	Load Factor
South Main Demolition, Site Preparation, Mobilization (34 days)	Dozers	1	8	367	0.40
	Dump Trucks	5	10	376	0.38
	Excavators	1	3	36	0.38
	Generators	4	2	14	0.74
	Loaders	1	3	150	0.36
	Scrapers	2	10	423	0.48
	Water Trucks	2	4	376	0.38
South Main Mass Grading (190 days)	Dozers	4	10	367	0.40
	Dump Trucks	275	10	376	0.38
	Excavators	2	10	36	0.38
	Generators	4	2	14	0.74
	Graders	1	10	148	0.41
	Grapple/Pump Trucks	1	1	376	0.38
	Loaders	2	10	150	0.36
	Rollers	1	1	36	0.38
	Scrapers	4	10	423	0.48
	Water Trucks	20	10	376	0.38
South Main Bridges and Box Culverts (214 days)	Auger Boring Machine	1	3	83	0.50
	Cranes	1	7	367	0.29
	Dozers	1	3	190	0.40
	Dump Trucks	3	10	376	0.38
	Excavators	2	10	236	0.38
	Generators	4	2	20	0.74
	Graders	1	3	250	0.41
	Grapple/Pump Trucks	3	8	376	0.38
	Light Carts/Generator Sets	8	8	20	0.74
	Loaders	2	10	265	0.36
	Rollers	1	3	150	0.38
	Skid Steers	1	4	90	0.37
	Water Trucks	20	10	376	0.38
South Main Fine Grading/Place Subballast (22 days)	Dozers	4	10	367	0.40
	Generators	4	2	14	0.74
	Graders	8	10	148	0.41
	Rollers	8	10	36	0.38
	Water Trucks	20	10	376	0.38
South Main	Cranes	1	5	367	0.29

Table 1: Construction Equipment					
Construction Phase	Equipment	Number	Hours per Day	Horsepower (hp)	Load Factor
Track and Signal Equipment (130 days)	Dozers	1	3	190	0.40
	Dump Trucks	3	10	376	0.38
	Excavators	2	10	236	0.38
	Generators	4	2	20	0.74
	Grapple/Pump Trucks	4	10	376	0.38
	Light Carts/Generator Sets	8	8	20	0.74
	Loader/Swing Loaders	3	10	265	0.36
	Regulators	1	2	82	0.42
	Skid Steers	1	4	90	0.37
	Track Laying Machines	1	3	525	0.42
	Tampers	1	2	89	0.36
	Water Trucks	2	10	376	0.38
Intermodal Facility Demolition, Site Preparation, Mobilization (34 days)	Dozers	7	10	419	0.40
	Dump Trucks	36	10	376	0.38
	Excavators	3	10	450	0.38
	Loaders	3	10	360	0.36
	Generators	4	2	20	0.74
	Scrapers	11	10	1,051	0.48
	Water Trucks	2	4	376	0.38
Intermodal Facility Mass Grading (142 days)	Dozers	34	10	419	0.40
	Dump Trucks	41	10	376	0.38
	Excavators	13	10	450	0.38
	Generators	4	2	20	0.74
	Graders	1	7	250	0.41
	Loader	16	10	360	0.36
	Rollers	1	7	325	0.38
	Scrapers	39	10	1,051	0.48
	Water Trucks	20	10	376	0.38
Intermodal Facility Drainage and Underground (286 days)	Crane	1	6	367	0.29
	Dump Trucks	23	10	376	0.38
	Excavators	7	10	236	0.38
	Generators	4	2	20	0.74
	Loaders	9	10	265	0.36
	Trencher	1	9	115	0.50
	Water Trucks	2	10	376	0.38
Intermodal	Auger Boring Machine	1	8	83	0.50

Table 1: Construction Equipment

Construction Phase	Equipment	Number	Hours per Day	Horsepower (hp)	Load Factor
Facility Bridges and Box Culverts (286 days)	Cranes	3	10	367	0.29
	Dozer	1	8	190	0.40
	Dump Trucks	7	10	376	0.38
	Excavator	5	10	236	0.38
	Generators	4	2	20	0.74
	Grader	2	8	250	0.41
	Light Carts	8	8	20	0.74
	Loaders	4	10	265	0.36
	Pump Truck	1	6	376	0.38
	Roller	1	8	150	0.38
	Skid steers	2	10	90	0.37
	Water Trucks	2	10	376	0.38
Intermodal Facility Fine Grading/Place Subballast (142 days)	Dozers	5	10	190	0.40
	Generators	4	2	20	0.74
	Graders	10	10	250	0.41
	Rollers	10	10	150	0.38
	Water Trucks	20	10	376	0.38
Intermodal Facility Buildings/Pavement (310 days)	Auger Boring Machine	1	4	83	0.50
	Backhoe	1	4	84	0.37
	Crane	1	7	367	0.29
	Dozer	1	10	100	0.40
	Dump Trucks	4	10	376	0.38
	Excavator	2	10	36	0.38
	Generators	4	2	20	0.74
	Grader	1	10	250	0.41
	Light Carts	8	8	20	0.74
	Loader	2	10	150	0.36
	Pump Truck	1	3	376	0.38
	Roller	1	10	136	0.38
	Skid steers	2	10	90	0.37
	Water Trucks	1	10	376	0.38
Intermodal Facility Track and Signal (274 days)	Crane	1	9	367	0.29
	Dozer	1	4	190	0.40
	Dump Trucks	2	10	376	0.38
	Excavator	2	10	236	0.38
	Generators	4	2	20	0.74

Table 1: Construction Equipment					
Construction Phase	Equipment	Number	Hours per Day	Horsepower (hp)	Load Factor
	Grapple Truck	1	1	376	0.38
	Light Carts	8	8	20	0.74
	Loader	2	10	265	0.36
	Regulator	1	3	82	0.42
	Skid steer	1	1	90	0.37
	Swing Loader	1	4	265	0.36
	Tamper	1	3	89	0.36
	Track Laying Machine	1	4	525	0.42
	Water Trucks	1	10	376	0.38
Block Swap Yard Demolition, Site Preparation, Mobilization (34 days)	Dozer	19	10	419	0.40
	Dump Truck	101	10	376	0.38
	Excavator	7	10	450	0.38
	Generators	4	2	20	0.74
	Loader	7	10	360	0.36
	Scrapers	30	10	1,051	0.48
	Water Trucks	2	4	376	0.38
Block Swap Yard Mass Grading (94 days)	Dozers	142	10	419	0.40
	Dump Trucks	172	10	376	0.38
	Excavators	51	10	450	0.38
	Generators	4	2	20	0.74
	Graders	3	10	250	0.41
	Loaders	66	10	360	0.36
	Rollers	3	10	325	0.38
	Scrapers	163	10	1,051	0.48
	Water Trucks	20	10	376	0.38
Block Swap Yard Drainage and Underground (238 days)	Crane	1	1	367	0.29
	Dump Trucks	7	10	376	0.38
	Excavators	3	10	236	0.38
	Generators	4	2	20	0.74
	Loaders	3	10	265	0.36
	Pump Truck	1	1	376	0.38
	Water Trucks	2	10	376	0.38
Block Swap Yard Bridges and Box Culverts	Auger Boring Machine	1	9	83	0.50
	Crane	3	10	367	0.29
	Dozer	1	9	190	0.40
	Dump Trucks	8	10	376	0.38

Table 1: Construction Equipment					
Construction Phase	Equipment	Number	Hours per Day	Horsepower (hp)	Load Factor
(238 days)	Excavators	6	10	236	0.38
	Generators	4	2	20	0.74
	Grader	1	9	250	0.41
	Light Carts	8	8	20	0.74
	Loaders	5	10	265	0.36
	Pump Truck	1	8	376	0.38
	Roller	1	9	150	0.38
	Skid Steers	2	10	90	0.37
	Water Trucks	2	10	376	0.38
Block Swap Yard Fine Grading, Place Subballast (310 days)	Dozers	11	10	190	0.40
	Generators	4	2	20	0.74
	Graders	20	10	250	0.41
	Loaders	4	10	150	0.36
	Rollers	20	10	150	0.38
	Trencher	4	10	115	0.50
	Water Trucks	20	10	376	0.38
Block Swap Yard Track and Signal (334 days)	Dozers	2	10	190	0.40
	Dump Truck	1	1	376	0.38
	Excavator	5	10	236	0.38
	Generators	4	2	20	0.74
	Grapple Truck	2	10	376	0.38
	Light Carts	8	8	20	0.74
	Loaders	5	10	265	0.36
	Regulator	1	9	82	0.42
	Skid Steer	1	2	90	0.37
	Swing Loader	2	10	265	0.36
	Tamper	1	9	89	0.36
	Track Laying Machine	2	10	525	0.42
	Water Trucks	1	10	376	0.38
North Main Demolition, Site Preparation, Mobilization (34 days)	Dozer	1	5	419	0.40
	Dump Truck	3	10	376	0.38
	Excavator	1	2	450	0.38
	Generators	4	2	20	0.74
	Loader	1	2	360	0.36
	Scrapers	1	8	1,051	0.48
	Water Trucks	2	4	376	0.38
North Main	Dozer	5	10	419	0.40

Table 1: Construction Equipment					
Construction Phase	Equipment	Number	Hours per Day	Horsepower (hp)	Load Factor
Mass Grading (94 days)	Dump Trucks	2	10	376	0.38
	Excavators	2	10	450	0.38
	Generators	4	2	20	0.74
	Grader	1	1	250	0.41
	Loaders	3	10	360	0.36
	Roller	1	1	325	0.38
	Scrapers	5	10	1,051	0.48
	Water Trucks	20	10	376	0.38
North Main Bridges and Box Culverts (94 days)	Auger Boring Machine	1	8	83	0.50
	Crane	3	10	367	0.29
	Dozer	1	8	190	0.40
	Dump Trucks	9	10	376	0.38
	Excavator	6	10	236	0.38
	Generators	4	2	20	0.74
	Grader	1	8	250	0.41
	Light Carts	8	8	20	0.74
	Loaders	6	10	265	0.36
	Pump Truck	1	4	376	0.38
	Roller	1	8	150	0.38
	Skid Steers	2	10	90	0.37
	Water Trucks	2	10	376	0.38
North Main Fine Grading, Place Subballast (46 days)	Dozers	2	10	190	0.40
	Generators	4	2	20	0.74
	Graders	3	10	250	0.41
	Rollers	3	10	150	0.38
	Water Trucks	20	10	376	0.38
North Main Track and Signal (154 days)	Crane	1	4	367	0.29
	Dozer	1	1	190	0.40
	Dump Truck	2	10	376	0.38
	Excavator	2	10	236	0.38
	Generators	4	2	20	0.74
	Grapple/Pump Trucks	3	10	376	0.38
	Light Carts	8	8	20	0.74
	Loaders	2	10	265	0.36
	Regulator	1	1	82	0.42
	Skid Steer	1	8	90	0.37
	Swing Loader	1	1	265	0.36

Table 1: Construction Equipment					
Construction Phase	Equipment	Number	Hours per Day	Horsepower (hp)	Load Factor
	Tamper	1	1	89	0.36
	Track Laying Machine	1	1	525	0.42
	Water Trucks	1	10	376	0.38
Transload Warehouses Warehouse Construction (274 days)	Dozers	3	10	419	0.40
	Dump Trucks	69	10	376	0.38
	Generators	4	2	20	0.74
	Graders	3	10	250	0.41
	Light Carts	8	8	20	0.74
	Pump Trucks	4	10	376	0.38
	Roller	3	10	36	0.38
	Water Trucks	2	4	376	0.38
Transload Warehouses Civil Site Improvements (226 days)	Backhoe	1	2	84	0.37
	Dozer	3	10	419	0.40
	Dump Trucks	7	10	376	0.38
	Excavator	3	10	450	0.38
	Generators	4	2	20	0.74
	Graders	3	10	250	0.41
	Light Carts	8	8	20	0.74
	Loaders	3	10	360	0.36
	Roller	3	10	325	0.38
	Trencher	3	10	115	0.50
	Water Trucks	2	4	376	0.38
33kV Transmission Line Construction (516 days)	Auger Boring Machine	1	1	83	0.50
	Backhoes	2	10	84	0.37
	Boom Trucks	3	10	376	0.38
	Crane	1	2	367	0.29
	Dump Truck	1	1	376	0.38
	Excavators	3	10	450	0.38
	Generators	4	2	20	0.74
	Boring Machine	1	5	200	0.42
	Light Carts	8	8	20	0.74
	Skid Steer	1	1	90	0.37
	Tampers	3	10	89	0.36
	Water Truck	3	10	376	0.38
Solar Farm Construction (296 days)	Backhoe	1	5	84	0.37
	Boom Truck	1	5	376	0.38
	Crane	1	1	367	0.29

Table 1: Construction Equipment					
Construction Phase	Equipment	Number	Hours per Day	Horsepower (hp)	Load Factor
	Dozer	1	1	419	0.40
	Excavator	1	8	450	0.38
	Flat Bed Truck	1	5	82	0.42
	Generators	4	2	20	0.74
	Light Carts	8	8	20	0.74
	Loader	1	2	360	0.36
	Pile Driver	1	1	82	0.42
	Skid Steer	1	3	90	0.37
	Tamper	1	6	89	0.36
	Water Truck	1	6	376	0.38
Sources: Project construction equipment provided by TranSystems/Burns & McDonnell. Horsepower and load factor based on CAPCOA. 2022. <i>CalEEMod User Guide Appendix G, Table G-12, Horsepower and Load Factors for Construction Equipment by Fuel Type.</i>					