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ZONING PRACTICE

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Battery Energy Storage Systems

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Battery Energy Storage Systems

By Brian Ross, AICP, and Monika Vadali, PHD

The electric energy system in our country is undergoing dramatic changes, with new technologies and infrastructural investment occurring at a speed and scale unprecedented in our nation's history. One manifestation of those changes is the introduction of new land uses into our communities, land uses whose risks, conflicts, and synergies with existing land uses are uncertain or unknown by the host communities.

One such example is the rapid increase in use of battery energy storage systems (BESS) and related technologies. Grid-connected BESS regularly take the form of one or more shipping containers with ventilation equipment on the outside and row upon row of batteries and control systems secured inside. These systems are being deployed as part of utility substations and transmission systems and as part of solar and wind electric generation projects. Depending on state enabling legislation, some BESS will be exempt from local zoning, such as when BESS is part of renewable energy or transmission projects that are exempt. However, BESS have potential applications across the rural-to-urban transect, and most communities will need to address BESS in some form.

This issue of *Zoning Practice* explores how stationary battery storage fits into local land-use plans and zoning regulations. It briefly summarizes the market forces and land-use issues associated with BESS development, analyzes existing regulations for these systems, and offers guidance for new regulations rooted in sound planning principles.

A one megawatt hour lithium-ion BESS at the National Renewable Energy Laboratory's National Wind Technology Center (Photo by Dennis Schroeder, NREL 47215)

Battery Energy Storage Basics

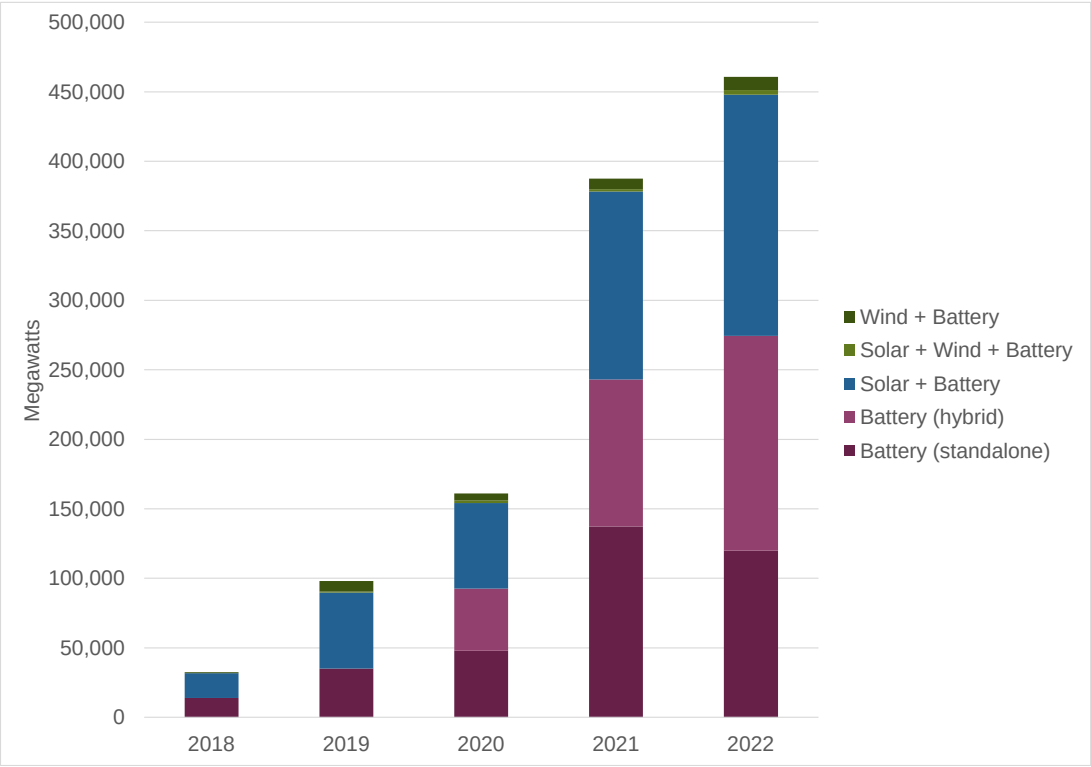
Energy can be stored using mechanical, chemical, and thermal technologies. Batteries are chemical storage of energy. Several types of batteries are currently used, and new battery chemistries are coming to market. The most used chemistry is the lithium-ion battery. These batteries are used in a variety of devices, from cell phones to electric vehicles to large-scale BESS.

To complicate matters, not all lithium batteries use the same chemistry and present different risks and benefits; there are actually six distinct chemistries with different benefits and use cases, and different risk profiles. The type of lithium battery used depends on the device or use case where energy storage is needed. Lithium iron phosphate (LFP) batteries are the preferred choice for grid-scale storage. LFP batteries are less energy dense than lithium nickel cobalt aluminum (NCA) and lithium nickel manganese cobalt (NMC) batteries—which are preferred in electric vehicles where weight matters— but more stable and have greater thermal stability (lower thermal runaway risk) than other lithium chemistries.

Emerging battery chemistries that are not lithium based also present different risk/benefit profiles, including promising characteristics for stationary uses. These include iron-air batteries, zinc-air batteries, flow batteries, and solid-state batteries. Several of these technologies promise to be a good choice for stationary storage and grid integration as they have a longer performance period, showing no degradation for up to 30 years (IEA 2023).

Solid-state batteries are typically used in medical devices like pacemakers and other wearable devices, but over the last decade there has been significant research in this field to expand applicability to automotive, transportation, and other industrial uses (Weppner 2003). These batteries use a solid electrolyte instead of a liquid/polymer gel and could potentially prove to be safer, less flammable, and provide better cycling performance and strength (Ping et al. 2019).

Zinc-air batteries are another emerging technology that could be useful for utility-scale energy storage. Although they have not yet been tested for grid energy storage, these batteries may be safer and more environmentally friendly than



Proposed generation capacity of projects that include battery storage in the interconnection queues between 2018 and 2022 (Berkeley Lab 2023)

lithium-ion batteries since they use water as a component and zinc is less destructive to mine (Proctor 2021).

BESS Market Forces

While non-battery energy storage technologies (e.g., pumped hydroelectric energy storage) are already in widespread use, and other technologies (e.g., gravity-based mechanical storage) are in development, batteries are and will likely continue to be the primary new electric energy storage technology for the next several decades. There are three reasons for the dramatic increase in deployment of grid-connected BESS:

1. The rapid increase in variable renewable energy development (especially solar and wind) creates a large market for energy storage technologies to control the flow of energy between power generators and end uses on the grid and mitigate energy spikes or power quality issues.
2. Dramatic drops in the cost of batteries combined with improved performance have made batteries a much more useful tool for electric grid resilience and reliability, potentially replacing fossil-fuel-based peaking power plants.
3. The **2022 Inflation Reduction Act** included significant new tax credits for energy storage, providing a substantial incentive that is rapidly pushing battery system investments across the nation.

BESS is a land use that can have value at any point on the electric grid. The grid runs across the rural-to-urban transect and is infrastructure that exists in almost every zoning district. The upshot is that communities will need to consider how stationary battery storage, particularly the larger BESS applications, fits into their land-use plans and should be addressed through zoning regulations.

Energy Storage as a Land Use

While stationary battery storage is a new land use for most communities, all communities already have and likely regulate other forms of energy storage. How communities treat existing energy storage land uses in ordinances can help inform the level of risk and degree of regulation needed to protect the community's health, safety, and general welfare.

A propane and oil distribution business in an incorporated city (Credit: Brian Ross)

Established Energy Storage Uses

While rarely categorized as "energy storage," many communities already host various energy storage land uses, and many of these uses carry safety risks. Long-established energy storage uses include gas stations (underground tanks store thousands of gallons of highly volatile fuel), propane storage and delivery businesses, ammonia storage and delivery businesses, and even grain elevators, which contain a vast and potentially volatile energy source (Donley 2023).

> "As is true with many technological advances or with new and potentially dangerous products, there is a tendency either to view the advance as a fearful monster, and outlaw it from the city, or to assume that the new project differs little from its predecessor… both of these are wrong" (ASPO 1951).

In addition, many industrial land uses include substantial energy storage facilities. Many of these land uses are storing more energy than typical BESS installations. Existing zoning standards addressing the risks associated with energy storage include isolation of the land use in particular districts, use of setbacks and buffers, requiring safety equipment and safety design standards consistent with established best practices for that energy risk, and training of first responders in how to manage the specifics of each type of energy storage. Some of these tools can also make sense for large-scale BESS, although adapted for safety best practices specific to batteries.

Unique Risks of Battery Storage

While examination of how non-electric energy storage facilities are regulated should inform regulation of battery energy storage, BESS do have some unique characteristics relative to other energy storage land uses and some unique considerations in addressing risks and emergency events. The primary safety risk associated with most battery chemistries, including

Perhaps the most common energy storage use in communities across the country (Credit: Brian Ross)

Residences near a grain elevator complex in Halifax, Nova Scotia (Credit: Alexei & Verne Stakhanov, Flickr)

the predominant lithium-based batteries, is thermal runaway or thermal stability. As indicated by this term, an incident (i.e., a hazardous electrical, thermal, or mechanical event) causes a cell or cells within the battery bank to overheat and can lead to an escalating thermal event that damages the BESS and can result in fire, or rarely, an explosion (Jeevarajan et al. 2022).

Some battery chemistries are more prone to thermal runaway than others, particularly chemistries with higher energy density (e.g., NMC and NCA). Planners should be aware that different types of lithium batteries carry different risks. In stationary applications, particularly BESS used in electric utility applications, LFP batteries are widely used and are less prone to thermal runaway.

According to the Electric Power Research Institute, there have been 22 BESS fires since 2012 in the U.S (but seven in 2023 alone) (2023). Some of the fires were minor, with the facilities being able to resume operation after the fire was suppressed (Twitchell, Powell, and Paiss 2023). But several higher profile fires or explosions that resulted in first responder injuries have raised awareness of risks and resulted in modified best practices in containing risks. Public perception was also shaped by high profile events, and lead to the perception that BESS presents risks (or risks greater than other energy storage land uses).

The National Fire Prevention Association (NFPA) standard **855** sets safety code thresholds for batteries. Under this standard, operators of facilities with total energy storage exceeding 600 kWh must complete a hazard mitigation analysis, utilize fire suppression designs and equipment, conduct fire and explosion testing in accordance with **UL 9540A**, develop emergency planning, and conduct annual training of maintenance staff. These requirements are not applicable to residential BESS; the International Fire Code limits residential battery banks to 20 kWh for residential applications (**§1207**). Multiple banks (up to 80 kWh total) can be installed if each bank is physically separated and protected from fire, but this is still well below the 600 kWh threshold.

Zoning standards can reference **NFPA 1: Fire Code**, **NFPA 70: National Electric Code**, **NFPA 855: Standard for the Installation of Stationary Energy Storage Systems**, and the International Fire Code in order to ensure that battery

A Tesla Powerwall residential battery system (Photo by Dennis Schroeder, NREL 48520)

installations are meeting safety best practices (rather than creating safety standards from whole cloth in an ordinance). States that set mandatory state-wide electric or fire codes will usually preclude a community from requiring additional safety standards or equipment.

American Clean Power (ACP) has developed the "**First Responders Guide to Lithium-Ion Battery Energy Storage System Incidents**" for first responders. Large-scale BESS site owners or managers (such as solar or wind farm operators or utilities installing at substations) should be required to train first responders in battery firefighting techniques and standards. Specific hazards noted by ACP include fire, explosion, arc flash, shock, and toxic chemicals.

Battery Energy Storage Use Cases

As the cost of batteries declines and the efficacy improves, batteries are being used in many new applications where costs were previously prohibitive. People are quite familiar with how this has changed consumer devices and function. Mobility devices using batteries, from electric bicycles and scooters to passenger vehicles and even buses, are also increasingly common in the market.

Stationary battery use cases are less well understood by the general public and are perceived as having land-use impacts that may require planning or zoning consideration. A review of the literature and existing standards applied by state and local jurisdictions shows that stationary battery applications fall into four general use cases, each of which has potential subcategories: residential, commercial, standalone utility asset, and integrated with wholesale energy generation.

Residential battery systems are generally coupled with rooftop or backyard solar arrays designed to supply household energy. These battery applications serve primarily a backup power or resilience function but are increasingly being deployed as an alternative to selling excess production to the utility as "net metering" buy back rates are reduced by state regulators or legislators. These systems all fall well below the 600 kWh NFPA 855 threshold for mandatory fire and thermal protections. Most residential backup systems would also fall below the 20 kWh International Fire Code (IFC) limitation for residential battery units.

Commercial battery systems are increasingly used in conjunction with on-site solar generation, particularly as

A commercial battery system outside of the Energy Systems Integration Facility at the National Renewable Energy Laboratory (Photo by Werner Slocum, NREL 74338)

a means to reduce the demand charge portion of commercial electric bills. Some applications are also designed to provide backup power or resilience benefits. Most systems will fall below the NPFA 855 threshold, but larger commercial or industrial applications will exceed the 600-kWh standard and need to meet structure containment, fire suppression, personnel training, and a variety of other standards.

Standalone utility asset battery systems are high-capacity systems deployed at substations or occasionally as a standalone land use, which serve to enhance performance and resilience of the local electric system. These systems will always be over the 600-kWh threshold and need to meet required safety and fire standards for large-scale energy storage.

Integrated with wholesale energy generation battery systems are high-capacity systems deployed within or as part of large-scale solar or wind facilities. These BESS serve the wholesale electric market at either the transmission or distribution system scale. These systems will always be over the 600-kWh threshold and need to meet required safety and fire standards for large-scale energy storage.

These use cases can be a distinguishing factor in how communities choose to regulate (or not) stationary batteries as a land use. Batteries incorporated into other land uses generally do not need separate consideration for setbacks or buffers. Smaller scale applications (residential and some commercial) similarly do not rise to the level of risk requiring special treatment through local zoning.

Examples of Battery Storage Ordinances

In October 2023, the Pacific Northwest National Lab (PNNL) published a **summary** of energy storage provisions in local ordinances (Twitchell, Powell, and Paiss). The study identified, through a search of the **Municode** database, 59 jurisdictions with ordinances (zoning but also building, fire, tax, and sustainability ordinances) addressing battery energy storage systems. The extensive search across thousands of jurisdictions shows that very few jurisdictions have clear standards for battery energy storage land uses. Similar experiences with solar and wind energy land uses demonstrated that the lack of definition and standards results in widely varying treatment across jurisdictions, slowing deployment and raising the likelihood of inappropriate standards.

The Great Plains Institute (GPI) also conducted a national scan of jurisdictions for locally developed (i.e., sub-state) battery energy storage zoning standards. GPI queried energy storage or renewable energy developers regarding jurisdictions

that have standards and identified others through news stories on energy storage installations or ordinance changes. Additional sources included the **Solar@Scale guidebook**, resources from the **SolSmart** national designation and technical assistance program, and unpublished work from the University of Michigan Graham Sustainability Institute's **Solar Zoning in the Great Lakes States** project (all funded by the U.S. Department of Energy). GPI's scan was to identify regional examples of local approaches to regulation of battery energy storage, not to complete an inventory of standards. GPI's scan looked at the details of 14 adopted or draft ordinances and two model ordinances across nine states.

While energy storage regulations are rare overall, some consistent patterns and practices can be identified across existing ordinances. BESS ordinances typically included the following components:

- *Definitions*: Provisions identifying the battery use cases that will be regulated and identifying the distinctions between use cases that fit with the jurisdiction's priorities.
- *Use permissions*: Provisions identifying the districts where BESS are permitted or conditional, and the circumstances where BESS is accessory and where BESS are a primary use.
- *Dimensional standards*: Provisions identifying setbacks, including different setbacks for different use cases; height standards; lot size standards; and density or intensity standards.
- *Performance and design standards*: Provisions addressing noise, visual impact, treatment of power lines, fencing, lighting, and signage.
- *Safety and first responder standards*: Provisions identifying the required emergency plans and hazard information to be submitted and maintained as part of the permit, identifying design requirements for fire or environmental considerations, information or training for local first responders, and codes or safety standards for equipment or management.
- *Decommissioning standards*: Provisions identifying required decommissioning thresholds, decommissioning standards and outcomes, and financial sureties that are recommended or required.

Definitions

BESS definitions show some consistency across jurisdictions, such as the many definitions that distinguish between types of batteries consistent with fire and safety standards. However, the definitions still varied considerably.

A standalone utility asset battery system at a substation in central Whatcom County, Washington (Credit: Robert Ashworth, Flickr)

Some definitions intend to capture all BESS use cases, while others focus on only one application. For instance, Johnson County, Iowa, defines all BESS in two categories that reflect NPFA standards for safety and reporting (a threshold definition used by many jurisdictions that have BESS ordinances) (**Ordinance No. 05-19-22-01**). This definition is used by a number of jurisdictions and likely originated from the New York State Energy Research & Development Agency (NYSERDA) **model ordinance** developed in 2020. Johnson County defines *Battery Energy Storage System, Tier 1* as "one or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time, not to include a stand-alone 12-volt car battery or an electric motor vehicle; and which have an aggregate energy capacity less than or equal to 600 kWh and, if in a room or enclosed area, consist of only a single energy storage system technology." *Tier 2* uses the same definition but has a capacity greater than 600 kWH or uses more than one battery technology or chemistry.

Some jurisdictions focus on a specific application or use case. The most frequent such application is BESS as a component of a solar or wind installation. Several jurisdictions addressed only this use case in their ordinance.

Another variation in definitions and uses is the treatment of BESS as a principal/primary use or as an accessory use. Some jurisdictions addressed only one or the other, and some both, but in different ways. For instance, Ellsworth, Maine, distinguishes between *accessory* and *stand alone* (i.e., principal use) *energy storage systems* based on how the energy from the battery is to be used (§56-14). To be considered accessory, the system "shall be designed with appropriate storage capacity to serve the principal use only and not the electric power grid." In contrast, other jurisdictions included BESS installed at substations to be an accessory use to the utility or essential service land use, while Pueblo County, Colorado, defines BESS on solar farms as accessory but as a principal use at a substation (**§17-168.050.C.3**).

Use Permissions

Jurisdictions varied in the breadth of districts where BESS is permitted. Yorktown, New York, permits utility-scale BESS (*Tier 2*) in all zoning districts under a special use permit (**§300-81.5.G**). Will County, Illinois, permits BESS in one agricultural district, a special-purpose open space district, and three industrial districts (**§155-7.30**). Systems occupying 10-acres or less only require a discretionary use permit in the agricultural district, while larger systems require a discretionary use permit in all but the special-purpose open space district. These limits could restrict BESS from being used more broadly on the distribution system at local substations.

Dimensional Standards

Most ordinances required BESS to meet general structure setback standards for the district in which the system was located. Those that set BESS-specific setbacks used distances of 50–150 feet from property lines. For example, Johnson County, Kansas, requires a 150-foot setback from property lines for BESS within large-scale solar facilities (**Resolution No. 038-22**). Amelia County, Virginia, was the most restrictive in GPI's review, requiring 5,000 feet between battery energy storage facilities and public roads and property lines (**§325-34.2.T(3)**).

Performance and Design Standards

Most BESS ordinances for large-scale installations included several elements of site design, including mitigating visual impacts through vegetation or other screening, fencing standards, lighting standards, and treatment of power lines. Screening standards varied from simple requirements to screen from some adjacent land uses to requiring vegetation management plans that screened the entire facility or used solid fencing.

Safety and First Responder Standards

Nearly all jurisdictions included submittal requirements (with the permit application or site plan) for an emergency plan, operations plan, or fire safety plan. Some jurisdictions required separate approval

An integrated with wholesale energy battery system at the Beacon Solar Plant in eastern Kern County, California (Photo by Dennis Schroeder, NREL 50688)

of first responder officials for emergency plans. Utility-scale BESS are subject to many of these requirements through the National Electric Code or the National Fire Code, and to equipment testing and installation standards set in NFPA 885. Some ordinances listed all the requirements, others simply incorporated safety and first responder requirements by reference.

Decommissioning Standards

Most BESS ordinances include decommissioning standards and require financial sureties for the decommissioning process. Ordinances varied significantly in detail about decommissioning standards. Jurisdictions that addressed BESS as a component of solar or wind facilities included BESS decommissioning as a component of the larger project.

Recommended Practices

Several organizations have created guidance documents on how to treat battery energy storage systems within zoning (and sometimes other) ordinances with an eye toward enabling the local grid benefits of battery storage. The PNNL study (described earlier) identified considerations and best practices for several land-use issues. The New York State Energy Research & Development Agency (NYSERDA) created a **battery energy guide** for local governments that included both zoning and building/electric/fire code permitting recommendations, covering both residential and commercial use cases and BESS. Many ordinances catalogued for this issue used the NYSERDA standards. American Clean Power has developed **guidance for local and state governments** that permit BESS or evaluate site-specific conditions, which includes a set of recommendations to inform local zoning choices.

BESS land-use applications and potential local benefits are also addressed in the **Solar@Scale guidebook** and in guidance from **SolSmart**.

Based on the review of best practices and considering implications of existing practices in jurisdictions who have included BESS in ordinance, here are some basic recommended practices and considerations for planning and zoning.

Exempt Small BESS from Zoning Standards

Small BESS (residential and commercial battery systems) located within existing buildings do not present land use issues, nor health and safety issues that are materially different from other electric devices or appliances. Safety and fire issues for these systems are addressed under the NEC and NFC. Consequently, zoning standards are generally not necessary for these energy storage systems.

Define BESS as a Distinct Use

Define BESS as a land use, separate from electric generation or production but consistent with other energy infrastructure, such as substations. BESS have potential community benefits when sited with other electric grid infrastructure.

The Case for Consistent Standards

Connexus Energy is an independent electric cooperative serving the northern metro area of the Minneapolis/St. Paul metropolitan region and is the largest co-op by number of members served in the Midwest. Connexus Energy's mission is to power its members and communities toward a smarter energy future with a passionate focus on affordability, innovation, safety, and grid reliability. Connexus is a leader in integrating community-scale solar and battery storage into its generation portfolio and positioning the nonprofit utility and its member consumers to take advantage of new technological innovation and market transformations.

In coordination with the U.S. Department of Agriculture's announcement of the updated Empowering Rural America program, Connexus began considering stationary energy storage at strategic locations in its service territory to lower costs and improve reliability as load growth continued and climate-related weather vulnerabilities increased. Having already navigated multiple jurisdictions' (sometimes unpredictable) land-use permitting processes for building solar generating facilities, Connexus wanted to know how stationary battery storage facilities would be treated under the zoning code and permitting processes for each jurisdiction in the co-op's service territory.

Connexus worked with GPI, to assess how the landscape of jurisdictions would evaluate and permit standalone battery storage facilities (not part of a solar or wind energy project). Possible installations could be totally standalone or located at existing substations, so GPI and Connexus focused on the communities that hosted distribution substations, which included cities, counties, and townships with land-use ordinances.

GPI reviewed the published ordinances for these communities and then conducted a survey and a series of interviews with land-use planners and community development staff. The ordinance review revealed that only one jurisdiction referenced energy storage as a land use, and then only in the context of the solar ordinance (a solar + storage installation). In other jurisdictions, BESS would, therefore, either be treated as an accessory use, regulated under a general category such as "utility services," or not permitted. The survey and interview process focused on asking how the jurisdiction would likely treat BESS, should an application come forward.

The interviews documented that, while there were some consistencies across jurisdictions, the likely regulatory standards and permitting process varied from jurisdiction to jurisdiction. Most respondents were unfamiliar with the purpose of, need for, and land-use impacts and risks associated with battery storage.

Responses as to how battery storage would be treated ranged from "it would not be allowed" to "it's a permitted accessory use at substations." The most common response was that large-scale battery systems would require a conditional use permit (CUP), and if located at an existing substation, would instead require a modification to the substation's CUP.

Respondents acknowledged that staff and decision makers would need to interpret their land-use standards in order to permit stationary battery storage. Several jurisdictions had an "essential services" or "public utility services" land-use category that included other electric system infrastructure, such as distribution lines, transformers, and related equipment. Such categories may or may not be deemed to include battery storage, depending on whether battery storage was considered a subset of the listed components. Such interpretive regulation creates uncertainty and can significantly affect permitting times, construction schedules and costs, and ultimate deployment.

The work demonstrates that as standalone battery storage projects become more common, there will be a need for establishment of zoning best practices and inter-jurisdictional consistency. Part of establishing best practices is helping local planners and decision makers understand the local need for energy storage, the role of storage as part of renewable projects, and the basics of the technology and its risks relative to more familiar land uses that include energy storage.

Connexus proactively addresses planned BESS installations with local government officials. Steps they take include education on safety for the local fire marshal provided by a third-party expert, presentations on the need for the installation for local reliability and cost savings, providing a tour of another battery facility to diminish uncertainty, conducting training for first responders, providing results of NFPA required safety tests, and helping local staff and decision-makers understand different battery chemistries.

An integrated with wholesale energy battery system at the AES Lawai Solar Project in Kauai County, Hawaii (Photo by Dennis Schroeder, NREL 57997)

Permit BESS as Accessory Uses

Permit BESS as an accessory use for sites with energy generation, particularly community- or utility-scale solar and wind facilities, subject to national safety standards (NFPA 855). Clarify that BESS are a permissible accessory use to substations within the substation footprint. Require a modification to an existing discretionary use permit or a new discretionary use permit for installations that would expand the substation area.

Allow BESS Across the Transect

Allow BESS as a conditional use in districts across the rural-to-urban transect. BESS can provide resilience and electric power quality benefits everywhere that the grid serves. How or where the electricity or power from the battery is used does not affect the land-use implications of the system, and generally should not affect how the BESS is regulated.

Require Compliance with NFPA 855

Require BESS applications to meet NFPA 855 standards, rather than adding additional local standards. Also, consider who will be responsible for preparing and training local first responders in BESS risks.

Require a Decommissioning Plan

Require BESS applications to provide a decommissioning plan. If the community requires financial surety for other kinds of uses, BESS should be subject to equivalent requirements. When BESS are accessory to a new energy generation or substation facility, decommissioning and financial surety for the system should be incorporated into standards for the principal use.

Conclusions

Communities across the nation are seeing dramatic changes in our electric energy system, with new technologies and infrastructural investment occurring at an unprecedented speed and scale. One example is the rapid increase in use of battery energy storage systems (BESS), both in "behind-the-meter" installations in homes and businesses, and in utility-scale applications at substations on the grid and as part of new generations projects, primarily solar and wind energy deployments.

BESS are, however, new types of land uses not previously seen in most communities. While behind-the-meter installations do not have significant land-use implications, large-scale BESS is raising concerns due to the uncertainty associated with a new land use and because energy storage is necessarily associated with health and safety risks similar to those of other land uses with energy storage facilities such as gasoline stations, propane and ammonia businesses, and grain elevators.

BESS are a land use that can have value at any point on the electric grid. Communities need to assess how to host new technology including distributed generation, utility-scale generation, expanded

grid infrastructure, and energy storage facilities. Planners need to have a passing familiarity with energy storage basics and technologies, the risks and nuisances associated with batteries in different use cases, the benefits to the community of BESS deployment, and how batteries are similar to and different from existing forms of energy storage in the community.

Note: *This issue is available free to all from Solar@Scale, a partnership between the International City/County Management Association (ICMA) and the American Planning Association (APA) that aims to help cities, towns, counties, and special districts understand and realize the potential benefits of large-scale solar development. For additional information about Solar@Scale visit* ***icma.org/programs-and-projects/solarscale****.*

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Creating Great Communities for All

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Community Design Guide

El Dorado County
Planning Department
Prepared: November 1981

Reformatted: May 2017 [1, 2]

Adopted by the Board of Supervisors
April 24, 2018 by Resolution 071-2018

Reformatting Notes:

[1] Original document produced in 1981 not in electronic format. Due to poor print quality, the original photographs could not be reproduced in reformatting this document. For purposes of consistency, photographs of similar buildings, features or architectural theme(s) were used whenever possible.

[2] For purposes of readability, minor layout/typeface changes have been made to various section(s) of this document. However, no changes were made to the text.

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The photographs in this guide illustrate good design in buildings, sties, and landscaping of existing projects in this County. This guide is not intended to exemplify a particular style of architecture to which developments must conform.

Prepared: November 1981, by the El Dorado County Planning Department,
John Branch, Project Leader

FOREWORD

Good architecture is always desirable both for aesthetic and economic reasons.

Well-designed buildings and landscaping enhance the visual character of an area, reflect the values of a community and increase business and property values.

The very quality of life is affected by building design and the blending of structures to the building site.

Resident and tourist alike can take pleasure in an interesting roof line, contrasting textures of wood and stone, or landscaping of green lawn and flowering shrubs.

DESIGN REVIEW

To promote good architecture, the El Dorado County Board of Supervisors has adopted a design review ordinance that regulates design within designated districts judged to be of special natural beauty or contributing to the County's character and tourist economy.

The same ordinance provides design review for sites and structures of special historical interest and for development in the visually sensitive mountain areas of El Dorado County. This ordinance is also intended to help in situations where there are buffer zones between residential and commercial development or special uses which may be desirable, but are attended by problems like noise and traffic congestion.

Within design review districts, as designated on maps, the County has the ability to review and control the design of commercial, industrial and multi-family residential development.

Design review is just one of several procedures the County can use to guide development in the interest of the public's health, safety and general welfare. It is separate from, and in addition to, other procedures that might be necessary, such as a use permit, rezoning, variance or building permit.

The process looks at more than the proposed building. It also examines the project's layout, landscaping, parking, signs, and other features. It covers all the factors in the project's appearance, plus how well it fits its surroundings. This does not mean the County is dictating a particular style of architecture for design review districts. Variety is preferred, not uniformity. But it does mean the County is seeking higher standards of architecture.

GENERAL

In reviewing plans, County authorities will evaluate a project on its contribution to the County's character and on its suitabi1ity for its 1ocation. Stock building plans might not be acceptable. Some basic questions by which projects will be evaluated are:

Will the project be a good neighbor?

It should not impair the use, value or good development of neighboring property. Its design should minimize interference with the privacy, quiet and views of its neighbors and avoid traffic problems and damage to the natural environment.

Does the project follow the basic principles of good design?

Harmony, continuity, variety, proportion, simplicity and balance should prevail in all aspects of the project, whether it's a multi-unit complex or a single sign. The project should be designed as a whole, fit into its surroundings and avoid monotony in form, detai1 and siting.

Does the project give people some variety and something interesting to look at?

Aesthetics are important. Landscaped areas, benches and fountains are much more appealing to the eye than blank walls and uninterrupted rows of parking.

GUIDELINES

Does the project suit its purpose? Do the various components of the project work well together?

An apartment building, for example, should look residential and be livable.

Does the project make good use of the site?

The interior spaces should be oriented to take advantage of outward views. Natural topography and trees should be retained where possible.

Do different elements fit together logically?

Parking ought to be located so a person can easily get from car to building entrance.

Are materials, forms and other elements of a project suitable for its uses?

Exterior finishes should aid maintenance and be harmonious with surroundings.

SPECIFIC CRITERIA

SITE PLANNING

During review of development projects, specific criteria relating to the site, the building, landscaping, signs, parking and other features will be considered.

Suiting the Site – A designer should try to fit a project to the existing site, rather than alter the site to accommodate a stock plan. Preserve topography, the natural grade and vegetation. Avoid excessive cuts and fills.

Open Space – Natural features and views should be maintained and protected through use of adequate open space.

Parking Areas – Screen parking areas from public ways and divide them up with landscaping, walls, fences, berms and other means.

Lighting – Exterior lighting should be subdued and avoid creating a glare for occupants or neighboring properties. Lighting should enhance the building design and landscaping as well as providing for safety and security.

Trash and other Service Areas – Locate trash containers and loading docks away from public streets and store entrances and screen them. Screening should be durable and an integral part of the overall structural design.

BUILDING DESIGN

The building design should consider many points:

Harmony – Different structures and parts of structures should harmonize with each other and the neighborhood. New construction should go well with the old, or the old may be remodeled to go with the new.

Materials – Use materials honestly. Simulated wood or masonry, for example, generally is not acceptable.

Finishes, Textures, Colors – Exterior treatment should be subdued and restrained. Treatment should aim at durability and ease of maintenance as well as initial beauty. The different building materials of stone, wood and timber need to be skillfully blended. Large building masses should be broken with architectural detail, roof lines developed with interest and variety, and windows enlivened with detail.

Mechanical Equipment and Utilities – Design service equipment, including meter boxes, as part of the structure and provide screening for them.

Energy Conservation – Design should minimize the need for mechanical heating and cooling. Wherever possible, use sunlight for heating and illumination, and natural ventilation and shading for coolness.

LANDSCAPING

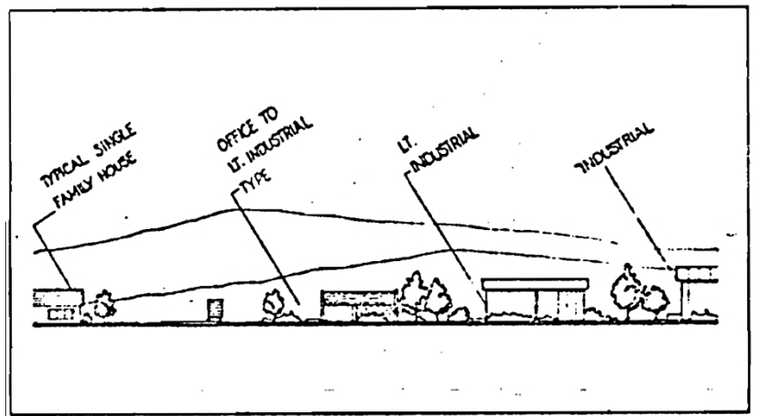
Landscaping improves the appearance of sites and buildings, helps erosion control and provides screening and shade. Landscaping, including trees, shrubs and ground cover, should be included in all development projects.

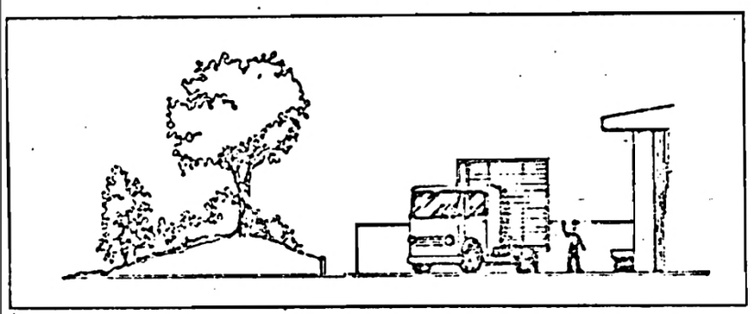
The good designer will incorporate existing vegetation and natural rock formations where possible. The plant materials used should be appropriate for the sun, wind, soil compaction and water conditions of the project.

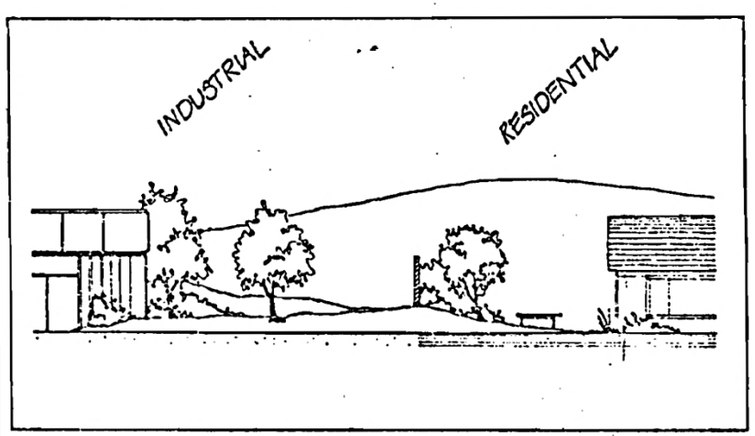
Maintenance – Choose landscape materials and arrangements to minimize maintenance. A permanent irrigation system should be provided. Automatic watering systems, set to water at night or early morning, are encouraged.

Parking Lots – Landscaping ought to include planters at suitable intervals throughout the lot and at the ends of parking rows. It should include trees that will provide adequate visual relief and shading when they mature. Landscaping must not block a driver's view.

Trees – Trees have many uses. They can provide summer shade for parked cars and pedestrian walkways; provide visual screening; provide accent points that help reduce the formless expanse of a parking lot; filter the glare of reflective pavement, muffle noise and trap dust and airborne particles.







BUFFERING

Adequate buffering and screening may be required in areas where different land uses are adjacent to each other.

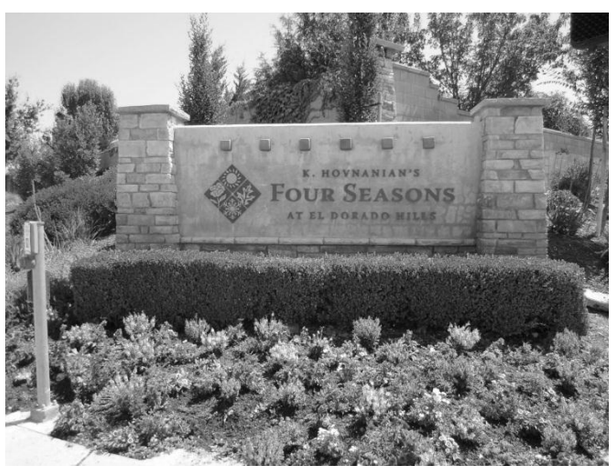
The purpose of screening and buffering is to reduce or eliminate the conflicts and nuisances that some land uses cause to others.

Industrial and commercial land uses should be screened from adjacent residential areas by use of dense landscaping, earth berms and fences so that noise, light glare, and other visual disturbances are minimized.

Where some types of land uses front on and can be viewed from a public road, the use of buffers and other screening techniques may be required to shield areas where there is outside storage of materials and equipment.

When new developments are proposed to be located in existing neighborhoods, the project should not be sited to overlook adjacent homes. The new structures should also be located so that the buildings do not block the sun's light to the adjacent parcels.

Changes of grade, fences, walls, earth berms and dense plantings of shrubs and trees can provide permanent buffering and screening to reduce or minimize the conflicts that one type of land use may cause to another.



SIGNS

Signs are a necessary aid to commercial enterprise but need as careful handling as the building and site.

Design Compatibility – Signs, their materials, size, color, lettering, location and arrangement, should be an integral part of the site and building design and compatible with the surroundings.

Consistency – Keep signing consistent in location and design throughout a development. This includes shopping centers.

Restraint – Signing should be simple, restrained and subordinate to the overall project design. A sign ought to attract and identify, but not dominate the site.

Types – Wall signs, graphic symbol signs and low profile free-standing signs are encouraged. Flashing, moving and rotating signs are prohibited by County ordinance.

Simplicity – Signs should use minimum copy and suitable lettering and avoid garish materials and shapes.

Lighting – Subtle lighting and landscaping can enhance a sign's setting and draw attention to it. The light source should be screened.

An excess of signs or wrong placing confuses a potential customer and destroys the sign's purpose.

PARKING

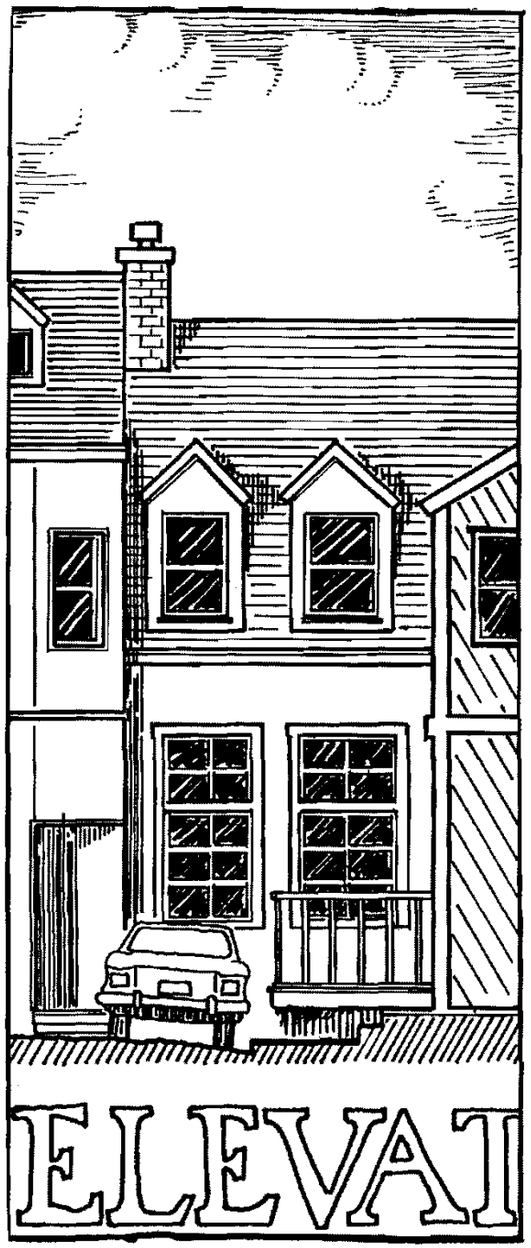
Designers should give careful thought to parking areas. Well designed buildings on choice sites lose their visual impact if all that is seen on approach is barren blacktop and monotonous rows of cars.

Parking lots also contribute to the deterioration of the environment by reducing ground water and increasing surface runoff and erosion.

Second, there must be a practical and economic use of land in layout of parking spaces, landscape areas and vehicle and pedestrian access.

Third, landscape plants, along with earth berms and walls, must be designed to screen, shade and soften the impact of parking areas.

A good designer should consider locating the parking to the rear or side of a building rather than in front. For a large development, a parking area's apparent size can be reduced by dividing it into several smaller lots or placing it on more than one level.



REVIEW PROCEDURE

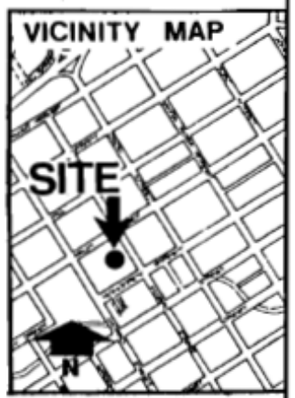
A developer planning to build in a design review district is encouraged to hold early, informal talks with county officials on what information will be required and in how much detail.

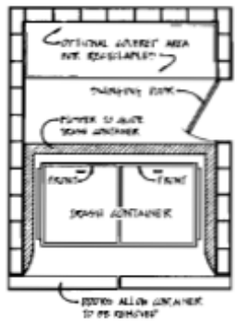
Then the developer should submit detailed plans covering the site, drainage, landscaping and sometimes grading, along with elevations of the proposed buildings and information on such features as signs. These papers first go to the County's Building Department which will pass them on to the Planning Department for review.

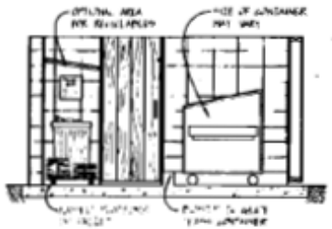
The County Planning Director, sometimes with the help of an advisory Design Review Committee, will be responsible for reviewing and approving or denying an application.

Any appeal will go to a public hearing before, the County's Planning Commission and its decision is final.

The Planning Director will have 15-20 days from the filing of the completed application for design review to give a written decision on whether the application meets the ordinance and a building permit should be issued.



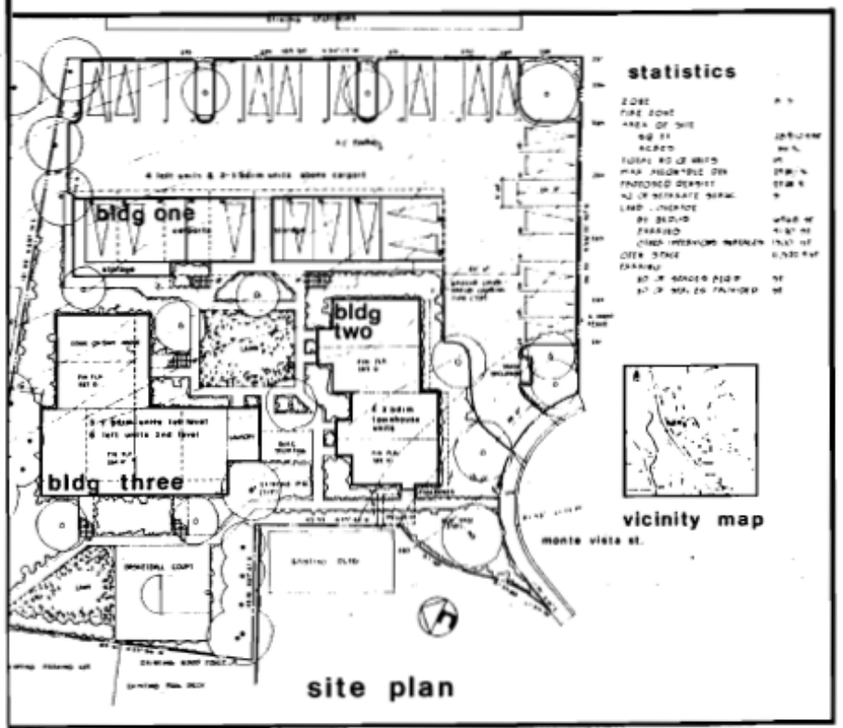


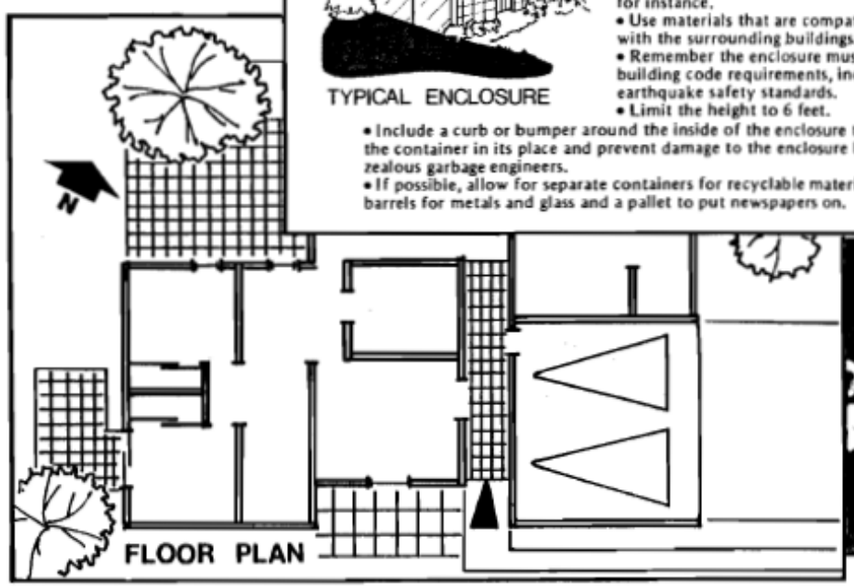


SUGGESTIONS FOR TRASH ENCLOSURE DESIGN

DESIGN NOTES:

- Make it easy for people to get trash in and for the garbage company to get trash out. A swinging door or open passage is easiest for someone with his hands full of trash.
- Make the enclosure easy to maintain — to hose down or sweep up, for instance.
- Use materials that are compatible with the surrounding buildings.
- Remember the enclosure must meet building code requirements, including earthquake safety standards.
- Limit the height to 6 feet.
- Include a curb or bumper around the inside of the enclosure to keep the container in its place and prevent damage to the enclosure by over-zealous garbage engineers.
- If possible, allow for separate containers for recyclable materials — barrels for metals and glass and a pallet to put newspapers on.





PROJECT TYPES

INDUSTRIAL

This section shows different types of projects and lists design considerations which particularly apply to that kind of building.

Select a site large enough to accommodate future expansion as well as provide a buffer to adjacent development.

Present your “best face” to public view.

Screen outdoor storage and loading operations with fencing and planting and separate them from car parking areas.

Install underground utilities where possible.

Provide ample parking for employees and separate from visitor parking.

Use landscaping to break up large areas of asphalt and soften the lines of building and site.

COMMERCIAL

Employ variations from conventional building design and materials.

Provide ample landscaping with large plant materials for quick effect.

Use a minimum of site grading and replant cuts and fills.

Integrate signing with the total architectural design.

Provide screening and light shielding from adjacent residential properties.

Separate pedestrian and car traffic.

Keep the public entrance free of parking.

Provide screening for utilities, trash disposal, vent stacks, etc.

Consider bicycle parking facilities.

PROFESSIONAL

Use landscaping plants suited to the general climate.

Take advantage of special environmental features at and around the site.

Provide sheltered outdoor spaces for informal conversation.

Install underground utilities where possible.

Architectural treatment is important and should integrate the building with the site and surrounding community.

Use construction materials suited to the building type and style and avoid garish colors and contrasts.

Minimize excessive site preparation and grading.

MULTIFAMILY

Take advantage of changes in grade but utilizing site terracing and avoid mass grading.

Leave open space areas within the project for landscaping and group use.

Provide private areas such as patios.

On steep sites, consider locating parking under buildings.

Screen the parking areas from public view.

Maintain driveways and parking areas at a minimum grade.

Avoid monotonous building design.

Provide for children's play areas.

SERVICE STATION

Provide ample landscaping to relieve large, paved areas.

Reduce outdoor display and storage to a minimum.

Screen outdoor storage with fencing and planting.

Reduce signing to that which is necessary for identification.

Separate pedestrian from vehicular circulation.

Refrain from using banners, pennants and wind powered devices.

RESTAURANTS

Choose an architectural treatment that fits into the natural environment.

Provide facilities for outdoor waiting areas.

Provide open areas for visual relief.

Use natural slopes to enhance the design.

Use appropriately placed landscaping to direct pedestrian and vehicular traffic.

Use a well-designed, carefully placed sign for identification.

MOTELS

Select your site to take advantage of special views.

Let the site design, architecture and landscaping works as a unit.

Design your sign to reflect your reputation of service.

Design the facilities to take advantage of the local climate.

Install underground utilities where possible.

Retain native tree cover and replant cuts and fills.

Screen outdoor storage with fencing and planting.

SHOPPING CENTERS

Design the complex to be attractive from ALL directions.

Select a site large enough to provide ample parking.

Enhance the parking area with landscaping.

Retain architectural unity throughout the center.

If outdoor display is necessary, provide a specially designed area for that purpose.

Provide screening and light shielding from adjacent residential properties.

Use planting and fencing to screen loading and outdoor storage or sales areas.

Northern California
604 Sutter Street, Suite 250
Folsom, CA 95630

Southern California
750 West Main Street
El Centro, CA 92243

ZGLOBAL
Power Engineering & Energy Solutions

MEMORANDUM

County of El Dorado Planning Department
Attn: Steven Craig Osborn
2850 Fairlane Court
Placerville, CA 95667

June 19, 2025

Subject: Landscaping – Fuji Battery, APN 048-280-030

Dear Craig,

This memorandum is to make note that the Fuji Battery Project will not be proposing any landscaping. The proposed project is nestled in a rural area, bordered by compact natural vegetation, and tucked behind existing buildings that front the site. Thus, the project design does not include landscape features or modifications.

Please let us know if any additional clarification is needed.

Sincerely,

SK

Sarah Kaaki
Environmental Analyst
ZGlobal, Inc.

Community Design Standards

In accordance with the Zoning Ordinance Update

Landscaping and Irrigation Standards

Adopted December 15, 2015

LANDSCAPING AND IRRIGATION STANDARDS

Sections:

1.1 Purpose

The purpose of this Chapter landscaping standards that enhance the appearance of development, increase property values, and protect the public health, safety, and welfare by providing buffers; parking lot shading; incentives for outdoor art and water features; a means to reduce impervious surfaces and site runoff by incorporating stormwater best management practices into landscape areas; and requirements for water conservation methods that encourage the use of native, drought tolerant species, reclaimed water and graywater systems. It is further the intent of this Chapter to comply with the Water Conservation in Landscaping Act: Model Water Efficient Landscape Ordinance (Gov. Code 65591 – 65599).

1.2 Applicability

All ministerial and discretionary development for industrial, research and development, commercial, multi-unit residential, civic or utility uses shall provide landscaping for all areas of a lot that do not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or impervious hardscapes, and other non-irrigated areas designated for non-development (e.g., open spaces and existing native vegetation).

1.3 Exemptions

A. Commercial uses on agricultural and resource zoned land shall be exempt from the requirements of this Chapter; except for the following:

1. A permanent parking lot located adjacent to a public road shall be subject to landscape buffer requirements in compliance with Paragraph 17.33.060.A.1.

2. A permanent paved parking lot shall be subject to the shade requirements under Subsection 17.33.060.C.

B. For purposes of public health and safety, proposed landscaping areas located within a public utilities easement may be subject to alternate planting requirements, as determined by the applicable public utilitie(s).

1.4 Definitions

As used in this Chapter, the following terms shall have the meanings set forth below:

Backflow Prevention Device. A safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.

Certified Landscape Irrigation Auditor. A person certified to perform landscape irrigation audits by an accredited academic institution, a professional trade organization or other program such as the US Environmental Protection Agency's WaterSense irrigation auditor certification program and Irrigation Association's Certified Landscape Irrigation Auditor program.

Check Valve or Anti-drain Valve. A valve located under a sprinkler head, or other location in the irrigation system, to hold water

in the system to prevent drainage from sprinkler heads when the sprinkler is off.

Drip Irrigation or Emitter. Any non-spray low volume irrigation system utilizing emission devices with a flow rate measured in gallons per hour.

Established Landscape. The point at which plants have developed significant root growth into the soil. Typically, most plants are established after one or two years of growth.

ET Adjustment Factor (ETAF). A factor of 0.7 that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape.

Evapotranspiration Rate. The quantity of water evaporated from adjacent soil and other surfaces and transpired by plants during a specified time.

Infiltration Rate. The rate of water entry into the soil expressed as a depth of water per unit of time (e.g., inches per hour).

Irrigation Efficiency (IE). The measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum average irrigation efficiency for purposes of this Chapter is 0.71. Greater irrigation efficiency can be expected from well designed and maintained systems.

Landscape Architect. A person who holds a license to practice landscape architecture in the state of California Business and Professions Code, Section 5615.

Landscape Area. All the planting areas, turf areas, and water features in a landscape plan.

Local Water District. Any entity, including a public agency, city, county, or private water company that provides retail water service.

Low Volume Irrigation. The application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip, drip lines, and bubblers. Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

Maximum Applied Water Allowance (MAWA). The maximum allowed limit of annual applied water for the established landscape area based upon its size, reference evapotranspiration, and the ET Adjustment Factor.

Mulch. Any organic material such as leaves, bark, straw, compost, or inorganic mineral materials such as rocks, gravel, and decomposed granite left loose and applied to the soil surface for the beneficial purposes of reducing evaporation, suppressing weeds, moderating soil temperature, and preventing soil erosion.

New Construction. A new building requiring landscaping or other new landscaping without an associated building, such as a park, playground, or greenbelt.

Overhead Sprinkler Irrigation Systems. Systems that deliver water through the air, such as spray heads and rotors.

Plant Factor or Plant Water Use Factor. A factor established in the Department of Water Resources: Water Use Classification of Landscape Species (2000) that, when multiplied by the reference evapotranspiration value (ETo) for the County, estimates the amount of water needed by plants.

Precipitation Rate. The rate of application of water measured in inches per hour.

Reference Evapotranspiration (ETo). A standard measurement of environmental parameters which affect the water use of plants, so that regional differences in climate can be accommodated. It is based on an estimate of the evapotranspiration of a large field of four- to seven-inch tall, cool-season grass that is well watered. The ETo for the County is 47.3 inches per year.

Special Landscape Area (SLA). An area of the landscape dedicated solely to edible plants such as orchards and vegetable gardens, areas irrigated with recycled water, water features, and areas dedicated to active play where turf provides a playing surface, such as parks, sports fields, and golf courses.

Static Water Pressure. The pipeline or municipal water supply pressure when water is not flowing.

Station. An area served by one valve or by a set of valves that operate simultaneously.

WUCOLS. The Water Use Classification of Landscape Species published by the Department of Water Resources, the University of California Cooperative Extension, and the Bureau of Reclamation (2000).

1.5 Landscape Plan

A. A landscape plan shall be required prior to the issuance of any building permit subject to the requirements of this Chapter. Plans shall include a site plan, grading plan, planting plan, irrigation design plan, and all other details and specifications necessary for a complete landscape plan review, on an application form provided by the Department.

B. Where the required landscape area exceeds 1,000 square feet in the whole, said plan shall be prepared by a California licensed landscape architect, civil engineer, architect, or landscaping contractor to the extent that his or her license allows.

C. If a Water Efficient Landscape Plan is required in compliance with Section 17.33.090, further requirements under 17.33.100 will apply.

D. The Director or applicable review authority may approve an alternative landscape plan when unique circumstances apply to the site that makes compliance with the standards of this Chapter infeasible. Consideration shall be given to adjacent land uses, the nature of the change, existing site conditions, and the suitability of the proposed alternative. The review authority must find that the alternative provides comparable buffering and shading, and otherwise meets the intent of this Chapter.

E. Prior to issuance of a certificate of occupancy, the applicant shall provide a Certificate of Completion by the preparer of the approved landscape plan that verifies the landscape improvements have been installed in compliance with the approved landscape plan, on a form provided by the Department.

1.6 Landscape Standards

Landscaping shall conform to the standards set forth below:

A. Landscape Buffers. Landscaped buffers shall be required along a road frontage, or property under a different ownership or zone, as follows:

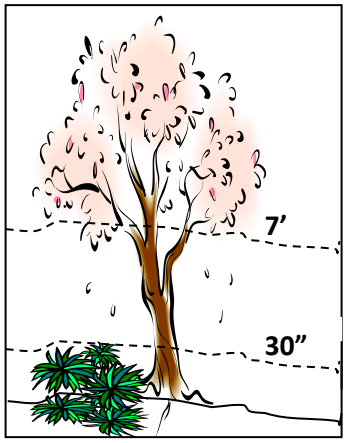
1. Road Frontage.

a. The required buffers along road frontage shall be a minimum of 10 feet in width outside of the right-of-way and exclusive of any curbs or sidewalks, unless otherwise set forth in the development standards for the zone.

b. Where industrial, research and development, commercial, civic, or utility uses are located across a county-maintained road from residentially zoned lots and parking is provided facing said lots, either of the following shall be required:
(1) An ornamental masonry wall not less than three feet in height from grade shall be installed between the parking spaces and the landscape buffer; or
(2) A minimum three foot high landscaped berm may be provided within the buffer area.

c. Landscape buffers adjacent to public rights of way or road easements shall maintain line-of-sight visibility subject to the review and approval of the Department of Transportation. No foliage or structural feature between the height of 30 inches and seven feet above grade (Figure 1.6.A) shall extend into the cross-visibility area (CVA) defined in Section 17.30.050.B.5 (Fences, Walls, and Retaining Walls):

Figure 1.6.A



2. Property Lines.

   a. The required buffer along property lines shall be a minimum of five feet in width.

   b. Where multiple lots are developed as a single project under common ownership, the landscape buffers shall only be required along the perimeter of the project.

   c. Should two or more adjoining lots under separate ownership be designed as a single project with shared uses of access and parking, the required five foot landscape buffer adjacent to the common property line shall not be required when a shared parking covenant and reciprocal easement is recorded between all concerned parties in a form approved by the County.

   d. Where industrial, research and development, commercial, civic, or utility uses adjoin residentially zoned lots, either of the following shall be required:
      (1) A 30 foot-wide landscape buffer with a minimum of eighteen trees and 72 shrubs per 100 feet of length; or
      (2) A ten foot landscape buffer with an ornamental masonry wall not less than six feet in height installed at the property line and extending to within 15 feet of any road right-of-way or easement. Within the buffer, a row of evergreen conifer trees shall be planted to provide continuous screening.

B. General Landscape Requirements.

1. On-site landscaped areas designed for compliance with either the Western El Dorado County or Lake Tahoe Basin Storm Water Management Plan requirements for storm water retention and bio-filtration purposes can be used to satisfy landscaping requirements under this Chapter providing the minimum buffer, shade, and oak tree replacement requirements are met.

1. A minimum of six trees and 24 shrubs shall be provided per each 100 linear feet of required landscape buffer along the property boundaries and public roads, with the exceptions under Paragraph A.2.d, above.

2. All shrubbery and at least 50 percent of required trees shall be evergreen.

3. Where street lights exist or are proposed to be installed, the size, location, and variety of trees shall be reviewed by the Department of Transportation and designed to minimize conflict between the lighting needs and landscaping requirements.

4. No landscaping or tree planting shall be installed or maintained in such a manner that the expected growth of the plant or tree material at 15 years will cast a shadow between the peak solar collection hours of 10 a.m. to 2 p.m. on more than ten percent

of the solar absorption panels of an existing solar energy device located on site or on adjoining lots. Trees planted before the installation of affected solar panels or their replacement plantings shall be exempt from this requirement.

5. A minimum of 50 percent drought-tolerant plant species shall be used in all landscape plans required by this Section. Shade trees and drought-tolerant plant species shall be selected from the Director-approved lists in Appendices B and C. Plant species similar to those on the lists may be considered providing they conform to the intent of this Subsection for drought tolerance and adaptability to the area. Species selection shall be based on site elevation in accordance with the lists.

6. To ensure plant diversity, the following standards shall apply to any plant material required to meet the regulations of this Chapter:

    a. Between eight and 23 trees, a minimum of three different species must be used. For 24 trees or more, a minimum of four different species must be used. Existing trees may be included in the calculations.

    b. For 25 shrubs or more, a minimum of three different species must be used.

7. Lawn or turf grasses shall constitute no greater than 10 percent of the required landscaping and shall not be planted on slopes greater than 25 percent where the toe of the slope is adjacent to an impermeable hardscape.

8. Bark, decorative rock, and similar organic materials, when used to enhance the required plant material, shall be replenished on a routine basis in order to maintain a neat and consistent appearance.

9. Any outdoor form of sculpture or other artwork, as well as any water feature such as a fountain, cascade, stream, or reflection pond can be substituted in place of living plant material, with the exception of the buffer and shade requirements, providing:

    a. Artwork or water feature(s) are publicly visible and accessible at the main pedestrian entrance to the building(s) or along a perimeter sidewalk or pedestrian connection;

    b. Artwork or water feature does not contain a corporate name, logo, or slogan in its form or appearance, or it will be counted as a sign;

    c. Substitution will be at a 1:1 ratio based on the square footage of the footprint of the artwork or water feature. When a water efficient landscape plan is required, the square footage of the surface area of a water feature will be included in estimated water use calculations, in compliance with Section 17.33.100 below;

d. Water features use a recirculating water system and, when available, reclaimed water;

e. Water features are maintained in a clean and non-contaminated condition;

f. Water remains in motion and/or is aerated during hours of operation; and

g. The manner and extent to which artwork or water features replace landscaping shall be reviewed and approved by the Director or appropriate review authority.

11. The size of plant material shall be the following pot size or equivalent container, such as tree pot, slip, or bare root packaging, as certified by the preparer of the landscape plan:

Trees……..5 gallon minimum
Shrubs……1 gallon minimum

12. The use of landscape fabric shall be prohibited to allow the rejuvenation and self-sufficiency of the underlying soil.

13. A minimum two inch layer of mulch shall be applied on all exposed soil surfaces of planting areas except in turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is contraindicated. The mulching portion of the seed/mulch slurry in hydro-seeded applications shall meet the mulching requirement. Stabilizing mulching products shall be used on slopes.

14. Landscaping within the 100-year flood plain of the South Fork of the American River shall be consistent with Element 6.5.2.1 of the El Dorado County River Management Plan.

15. For phased projects, or projects for which only a portion of a lot is proposed to be developed, landscaping may be deferred for areas surrounding the undeveloped phases or portions, providing temporary erosion and dust control measures are implemented as required by the County.

C. Parking Lot Landscaping.

1. Landscaping shall be provided in paved parking lots of five spaces or more and shall provide shade over 50 percent of all paved parking areas, as set forth below:

a. Shade calculations shall assume the sun is directly overhead;

b. Shade shall be calculated by using the expected diameter of the tree crown at 15 years.

c. The percentage of area required to be shaded shall be based on the total square footage of all aboveground and uncovered pavement.

d. Solar panel grids, canopies, and other structures that can be utilized as shade structures and meet the 50 percent shade requirements for the paved parking areas can be substituted for living tree material, providing they are architecturally compatible with the structure(s) on site and the minimum buffer requirements of Paragraph B.1 are met.

2. In addition to the required landscape buffers, landscaping areas within a parking facility shall have a minimum width of five feet and a minimum area of 25 square feet, exclusive of any curbs.

3. Wheel stops or similar devices shall be installed three feet from landscape areas, as measured from the far side of the wheel stop to the edge of curb, to prevent vehicle damage or encroachment onto landscape materials. In lieu of wheel stops, concrete curbing used to separate the landscape area from the parking lot may serve as the wheel stop provided that the planting area width, exclusive of curbing, is increased by a minimum of 2.5 feet for each side adjoining the vehicular encroachment. Plant material designed to grow no higher than six inches shall be planted within the increased planting area.

4. Walkways and/or sidewalks shall be required to provide pedestrian circulation across landscaped areas where necessary to prevent pedestrian traffic from destroying plant material.

1.7 Irrigation Standards

Landscape areas shall be provided with a permanent automatic irrigation system(s) coordinated to meet the needs of various planting areas/hydrozones and water efficiency in compliance with the manufacturers' recommendations. The irrigation system and its related components shall be planned and designed to allow for proper installation, management, and maintenance subject to the following:

A. An irrigation plan shall be submitted with the Landscape Plan application. The irrigation system shall be designed to prevent runoff, low head drainage, overspray, or other similar conditions where irrigation water flows onto non-targeted areas, such as adjacent property, nonirrigated areas, hardscape, roadways, or structures.

B. When reclaimed water is available within the region containing the project lot(s), or when a reclamation master plan indicating the availability of reclaimed water in the future has been adopted by either the local water district or the County, the applicant shall incorporate the use of reclaimed water into the project design subject to public health and safety regulations.

C. Domestic graywater systems for subsurface landscape irrigation can be utilized subject to the provisions of the Department of Water Resources California Graywater Standards, the Uniform Plumbing Code (UPC), and the building code.

D. Temporary irrigation systems that will be utilized to establish native, drought tolerant landscaping or xeriscaping, or other alternative irrigation methods, shall be subject to the review and approval of the Director.

1.8 Maintenance and Protection

All landscaping shall be maintained in accordance with the approved landscape plan, as set forth below:

A. All plant materials shall be maintained in a healthy and attractive manner and kept free from weeds, debris, and undesirable materials for fire safety as well as aesthetic purposes. Plant materials showing damage from insects, disease, or lack of maintenance shall be replaced in accordance with the approved landscape plan.

B. Plant materials shall not be allowed to become overgrown, so as to compromise the CVA (cross-visibility area), pedestrian or vehicular circulation, or public safety.

C. All existing plant material to be retained on site shall be subject to the protection measures set forth in the Design and Improvement Standards Manual during grading and construction activities.

D. The Director may cause an inspection of landscaping at any time following the installation of said landscaping to determine compliance with this Section. Any costs associated with said inspection or to insure compliance shall be paid by the property owner.

E. If loss of landscaping occurs due to lack of water during a declared water shortage, or due to other mandatory water conservation measures, all plants shall be replaced within a reasonable time after the water shortage has ended.

F. Any Low Impact Development (LID) measures installed to satisfy Western El Dorado County or Lake Tahoe Basin Storm Water Management Plan shall be maintained in order to remain effective under the Municipal Phase II Permit's Operations and Maintenance Verification Program.

1.9 Non-conforming Landscaping

When a change in use occurs on a site that contains landscaping that is non-conforming to the standards of this Chapter, the following shall apply:

A. When a proposed new use requires no expansion of the parking area, the Department shall verify that the existing landscaping is maintained consistent with the requirements of the site when the previous use was established. Replacement landscaping consistent with minimum

plant material, plant diversity, and shade requirements in compliance with Section 17.33.050 may be required if the landscaping has not been properly maintained.

B. Whenever additional parking is required due to an intensification of use or expansion of a structure that does not exceed the thresholds under Section 17.33.090, the landscaping for the entire site shall be consistent with minimum plant material, plant diversity, and shade requirements in compliance with Paragraphs 17.33.050.B.1, B.4, B.6, and C.1-3.

C. Whenever the structure(s) on a site are enlarged, modified, or redeveloped to the level of thresholds under Subsection 17.33.090.A below, the provisions of this Chapter shall apply to the entire site.

1.10 Water Efficient Landscape Plan

A. A Water Efficient Landscape Plan is required for the following:

1. New construction and rehabilitated landscapes requiring a permit with a landscape area equal to or greater than 2,500 square feet for industrial, research and development, commercial, civic, or utility uses, and developer-installed landscaping in single- and multi-unit residential development.

2. New construction landscapes that are homeowner-provided and/or homeowner-hired in single- and multi-unit residential projects, with a total landscape area equal to or greater than 5,000 square feet and only when a building or grading permit is required for said landscaping installation.

3. New and rehabilitated cemeteries limited to a Water Efficient Landscape Worksheet (Appendix A), landscape and irrigation maintenance schedule, irrigation audits or surveys, and irrigation water use analysis by the local water district.
4. Existing cemeteries and landscapes limited to irrigation audits or surveys and irrigation water use analysis by the local water district addressing water waste prevention.

B. The following shall be exempt from this Section:

1. Registered local, state, or federal historical sites.

2. Ecological restoration projects where the site is intentionally altered to establish a defined, indigenous, historic ecosystem and that do not require a permanent irrigation system.

3. Mining reclamation projects that do not require a permanent irrigation system.

4. Plant collections, as part of public arboretums and botanical gardens.

5. Commercial agricultural operations.

1.11 Water Efficient Landscape Plan Requirements

In addition to the submittal requirements set forth in Section 17.33.040, additional information related to water use and efficient application shall be submitted as follows:

A. Landscape Documentation Package. A Landscape Documentation Package, as provided in Subsection B, shall be submitted to the Department for review and approval prior to permit issuance. A copy of the approved Landscape Documentation Package shall be provided to the property owner or site manager along with any other information normally forwarded to the property owner or site manager as part of the permit process.

B. Elements of the Landscape Documentation Package.

1. Project Information:

a. Applicant/owner names and contact information;

b. Site address and Assessor's Parcel Number (APN);

c. Total landscape area (in sq ft);

d. Project type, such as new, rehabilitated, public, private, cemetery, homeowner-installed;

e. Water type, such as potable, reclaimed, well; and

f. Applicant signature and date with statement, "I agree to comply with the requirements of the water efficient landscape ordinance."

2. Water Efficient Landscape Worksheet. A project applicant shall complete the Water Efficient Landscape Worksheet for the project, as follows:

a. A hydrozone information table (Appendix A, Section A); and

b. A water budget calculation (Appendix A, Section B). Water budget calculations shall adhere to the following requirements:

(1) For the calculation of the Maximum Applied Water Allowance (MAWA) and Estimated Total Water Use (ETWU), a project applicant shall use the Reference Evapotranspiration (ETo) value of 47.3 inches per year for El Dorado County (CIMIS Reference Evapotranspiration Zones Map, Department of Water Resources, 1999).
(2) The plant factor used (Appendix A, Section B.2) shall be from the Water Use Classification of Landscape Species (WUCOLS). For purposes of this Ordinance, the plant factor shall range from 0 to 0.3 for low water use plants, from 0.4 to 0.6 for moderate water use plants, and from 0.7 to 1.0 for high water use plants.

(3) All surface area of water features, as defined in Article 8, shall be included in the high water use hydrozone and temporarily irrigated areas shall be included in the low water use hydrozone.
(4) All Special Landscape Areas (SLA), as defined in Section 17.33.030, shall be identified and included in calculating the MAWA. A statement shall be included with the landscape design plan designating recreational areas to be used for such purposes.

3. Landscape Design Plan. For the efficient use of water, a landscape shall be carefully designed and planned for the intended function of the project. A landscape design plan meeting the following requirements shall be submitted as part of the landscape documentation package:

a. Plant Selection and Grouping. Plant selection shall be in compliance with Section 17.33.040 (Landscape Standards) providing the recommended ETWU does not exceed the Maximum Applied Water Allowance and the plants meet the following specifications:

(1) Plants having similar water use shall be grouped together in distinct hydrozones with the exception of hydrozones with plants of mixed water use, in compliance with Subparagraph 4.d.(1) below.
(2) Plants shall be selected appropriately based upon their adaptability to the climatic, geologic, and topographical conditions of the site, as well as their horticultural attributes, such as size and invasiveness, in order to minimize damage to property or infrastructure.
(3) Fire-prone plant materials and highly flammable mulches shall be avoided.
(4) Soil amendments shall be incorporated according to recommendations of the soil management report and what is appropriate for the plants selected.

b. Landscape Design Plan Requirements. The landscape design plan shall be drawn on a base project or permit site plan sheet at a scale that accurately and clearly delineates, labels, and identifies, at a minimum:

(1) Square footage of the total landscaped area.
(2) Existing and proposed trees, shrubs, ground cover, turf, and other vegetation. Existing vegetation shall be clearly distinguished between what is to be retained and what is to be removed. Planting symbols shall be clearly drawn and vegetation shall be labeled by botanical name, common name, container size, spacing, and quantities of each group of plant material indicated;
(3) Each hydrozone by number, letter, or other method;
(4) Each hydrozone as low, moderate, high, or mixed water use for calculating the water budget;
(5) Where reclaimed water is used for plant irrigation or water features;
(6) Special landscape areas and their type;
(7) Type and surface area of water features;

(8) Location and installation details of any applicable stormwater best management practices (BMPs) used for on-site retention and infiltration of stormwater. Stormwater BMPs are not subject to water budget calculations.
(9) Hardscape areas and type (pervious and impervious);
(10) Tree staking, plant installation, soil preparation details to include amendment types and quantity, mulch types and application depth, and any other applicable planting and installation details.
(11) The following statement bearing the signature of a licensed landscape architect, licensed landscape contractor, or any other person authorized to design a landscape: "I have complied with the criteria of the ordinance and applied them for the efficient use of water in the landscape design plan".

4. Irrigation Plan. For the efficient use of water, an irrigation system shall meet all the requirements listed in this Section and the manufacturers' recommendations. The irrigation system and its related components shall be planned and designed to allow for proper installation, management, and maintenance.

a. Irrigation Plan Requirements. An irrigation plan shall be drawn on project or permit site plan base sheets. It shall be separate from, but shall use the same format as the landscape design plan. The scale shall be the same as that used for the landscape design plan described in Subparagraph 3.b above, and shall contain:
(1) Location and size of separate water meter(s) for landscaping.
(2) Separate hydrozone areas designated by number, letter, or other designation.
(3) Location, type, and size of all components of the irrigation system, including controllers, main and lateral lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, pressure regulators, and backflow prevention devices. Designation of the areas irrigated by each valve, and a number assigned to each valve. This valve number shall be used in the Hydrozone Information Table as part of the water efficient landscape worksheet. The table can also assist with the irrigation audit and programming the controller.
(4) Static water pressure at the point of connection to the public water supply.
(5) Flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (pressure per square inch) for each station.
(6) Reclaimed water or domestic graywater irrigation systems, if applicable.
(7) Date and signature of a licensed landscape architect, certified irrigation designer, licensed landscape contractor, or any other person authorized to design an irrigation system after the following statement: "I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the irrigation design plan".

b. Design Requirements. The following design requirements shall be included in the irrigation system, as appropriate:

(1) Automatic irrigation controllers utilizing either evapotranspiration or soil moisture sensor data for scheduling in all irrigation systems.
(2) If the static pressure is above or below the required dynamic pressure of the irrigation system, pressure-regulating devices such as inline pressure regulators, booster pumps, or other devices installed to meet the required dynamic pressure of the irrigation system within the manufacturer's recommended pressure range for optimal performance.
(3) Sensors (rain, freeze, wind, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions customary for the climate area.
(4) Manual shut-off valves, such as a gate valve, ball valve, or butterfly valve, as close as possible to the point of connection of the water supply to minimize water loss in case of an emergency, such as a main line break, or for routine repair.
(5) Backflow prevention devices to protect the water supply from contamination by the irrigation system.
(6) Sprinkler heads and other emission devices having matched precipitation rates, unless otherwise directed by the manufacturer's recommendations.
(7) Sprinkler spacing designed to achieve the highest possible distribution uniformity using the manufacturer's recommendations.
(8) Swing joints or other protection components on all risers adjacent to high traffic areas that are subject to damage.
(9) Check valves or anti-drain valves.

c. Design Standards. The irrigation system must be designed and installed to meet or exceed the irrigation efficiency criteria used in calculating the MAWA. The following design standards shall be included in the irrigation system, as appropriate:

(1) Narrow or irregularly shaped areas less than eight feet in width in any direction, including turf, shall be irrigated with subsurface irrigation or a low volume irrigation system.
(2) Overhead irrigation shall not be permitted within 24 inches of any non-permeable surface. Allowable irrigation within the setback from non-permeable surfaces may include drip, drip line, or other low flow non-spray technology. The setback area may be planted or unplanted. The surfacing of the setback may be mulch, gravel, or other porous material. These restrictions may be modified if:
(a) The landscape area is adjacent to permeable surfacing and no runoff of water beyond the landscape area occurs;
(b) The adjacent non-permeable surfaces are designed and constructed to drain entirely to landscape areas; or
(c) The irrigation designer specifies an alternative design or technology, as part of the Water Efficient Landscape Plan, and clearly demonstrates strict adherence to irrigation system design criteria in Subsection 17.33.060.A. Prevention of overspray delivered beyond the target area and runoff must be confirmed during the irrigation audit.

(3) Slopes greater than 25% shall not be irrigated with an irrigation system with a precipitation rate exceeding 0.75 inches per hour. This restriction may be modified if the landscape designer specifies an alternative design or technology, as part of the Water Efficient Landscape Plan, and clearly demonstrates no runoff or erosion will occur. Prevention of runoff and erosion must be confirmed during the irrigation audit.
(4) Incorporation of relevant information from the soil management plan, such as soil type and infiltration rate.
(5) Static water pressure, dynamic or operating pressure, and flow reading of the water supply measured at the point of connection. Pressure and flow reading measurements shall be conducted at the design stage. If the measurements are not available at the design stage, the measurements shall be conducted at installation.
(6) Conformance to the hydrozones of the landscape design plan.
(7) The use of low volume irrigation in mulched planting areas to maximize water infiltration into the root zone.

d. Hydrozones.
(1) Each valve shall irrigate a hydrozone with similar site, slope, sun exposure, soil conditions, and plant materials with similar water use subject to the following exceptions:
(a) Individual hydrozones that mix plants of moderate and low water use, or moderate and high water use, may be allowed if:
i. Plant factor calculation is based on the proportions of the respective plant water uses and their plant factor; or
ii. The plant factor of the higher water using plant is used for calculations.
(b) Individual hydrozones that mix high and low water use plants shall not be permitted.
(2) Sprinkler heads and other emission devices shall be selected based on what is appropriate for the plant type within that hydrozone.
(3) Where feasible, trees shall be placed on separate valves from shrubs, groundcovers, and turf.

e. Irrigation Scheduling. For implementation of the irrigation schedule, total annual applied water shall be less than or equal to MAWA. Irrigation schedules shall meet the following criteria:
(1) Irrigation scheduling shall be regulated by automatic irrigation controllers using current reference evapotranspiration data (e.g., CIMIS) or soil moisture sensor data.
(2) Overhead irrigation shall be scheduled between 8 p.m. and 10 a.m. unless weather conditions prevent it. If allowable hours of irrigation differ from the requirements of the local water district, the stricter of the two shall apply. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.

(3) Parameters used to set the automatic controller shall be developed and submitted for the plant establishment period, the established landscape, and any temporarily irrigated areas.
(4) Each irrigation schedule shall consider for each station all of the following that apply:
(a) Irrigation interval (days between irrigation);
(b) Irrigation run times (hours or minutes per irrigation event to avoid runoff);
(c) Number of cycle starts required for each irrigation event to avoid runoff;
(d) Amount of applied water scheduled to be applied on a monthly basis;
(e) Application rate setting;
(f) Root depth setting;
(g) Plant type setting;
(h) Soil type;
(i) Slope factor setting;
(j) Shade factor setting; and
(k) Irrigation uniformity or efficiency setting.

f. Landscape and Irrigation Maintenance Schedule. Landscapes shall be maintained to ensure water use efficiency. A regular maintenance schedule shall be submitted with the Certificate of Completion to include, but not be limited to:
(1) Routine inspection; adjustment and repair of the irrigation system and its components; aerating and dethatching turf areas; replenishing mulch; fertilizing, pruning, and weeding in all landscape areas; and removing obstruction to emission devices.
(2) Repair of all irrigation equipment with the originally installed components or their equivalents.

g. Irrigation Audit Report or Survey. For new construction and rehabilitated landscape projects under Section 17.33.090.A, the applicant shall submit the following:
(1) An irrigation audit report, conducted by a certified landscape irrigation auditor, to the local water district for their review and approval. The irrigation audit report may include, but not be limited to irrigation schedule, inspection report, system tune-up schedule, system test with distribution or emission uniformity, and method of reporting overspray or run off that causes overland flow.
(2) Where an irrigation survey is allowed in lieu of an audit report in compliance with this Section, or as determined by the local water district, it shall include, but not be limited to inspection, system test, and written recommendations to improve performance of the irrigation system.
(3) A filed copy of the approved irrigation audit report or survey, or other form of documentation indicating approval by the local water district, to the Department with the Certificate of Completion.

5. Grading Plan. For the efficient use of water, grading of a project site shall be designed to minimize soil erosion, runoff, and water waste. As part of a grading permit, the grading plan shall be separate from, but at the same scale as the landscape design plan and shall indicate finished configurations and elevations of the landscape area and stormwater retention improvements, if applicable.

   The grading plan shall contain the following statement: "I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the grading design plan" and shall bear the signature of a licensed professional as authorized by law.

6. Soil Management Report. In order to reduce runoff and encourage healthy plant growth, a soil management report shall be completed by the project applicant prior to grading, as follows:

   a. Soil samples shall be submitted to a laboratory for analysis and recommendations in accordance with laboratory protocol, including protocols regarding adequate sampling depth for the intended plants.

   b. The project applicant shall submit the soil management report to the Department as part of the Landscape Documentation Package.

   c. The project applicant shall make the soil management report available to the professionals preparing the landscape design plans and irrigation plans to allow them to make any necessary adjustments to the design plans in a timely manner.

   d. The project applicant shall submit documentation verifying implementation of the soil management report recommendations to the Department with the Certificate of Completion.

7. Certificate of Completion. The signer of the landscape design plan, the signer of the irrigation plan, or the licensed landscape contractor shall conduct a final field observation and provide a Certificate of Completion to the Department (see Appendix A, Section C), as follows:

   a. The Certificate shall specifically indicate that the landscape project has been installed in compliance with the approved Landscape Documentation Package. Where there have been significant changes made in the field during construction, these "as-built" drawings shall be included with the certification.

   b. The project applicant shall submit the signed Certificate to the Department for review.

   c. The Department shall approve or deny the Certificate. If the Certificate is denied, the Department shall provide information to the project applicant regarding reapplication, appeal, or other assistance.

d. The project applicant shall ensure that copies of the approved Certificate are submitted to the local water district and property owner or his or her designee.

C. Provisions for Existing Landscapes.

1. All existing landscaped areas, one acre or more in size, to which a local water district provides water, including golf courses, green belts, common areas, multi-unit residential development, schools, businesses, parks, cemeteries, and publicly owned landscapes, shall have a landscape irrigation audit at least once every five years. An audit shall not be required if the local water district determines, based on an irrigation water use analysis of meter readings and billing data, that the existing landscape area does not exceed the MAWA for the project site.

2. The audit shall be in accordance with the California Landscape Water Management Program, as described in the Landscape Irrigation Auditor Handbook version 5.5 (Dept. of Water Resources: Water Conservation Office), or with criteria established through a local water district program, whichever is stricter.