Draft California Environmental Quality Act Initial Study
Big Break Solar Project

March 2017

Submitted to:
City of Antioch
Community Development Department
200 "H" Street
Antioch, CA 94509

Submitted by:

9685 Research Drive
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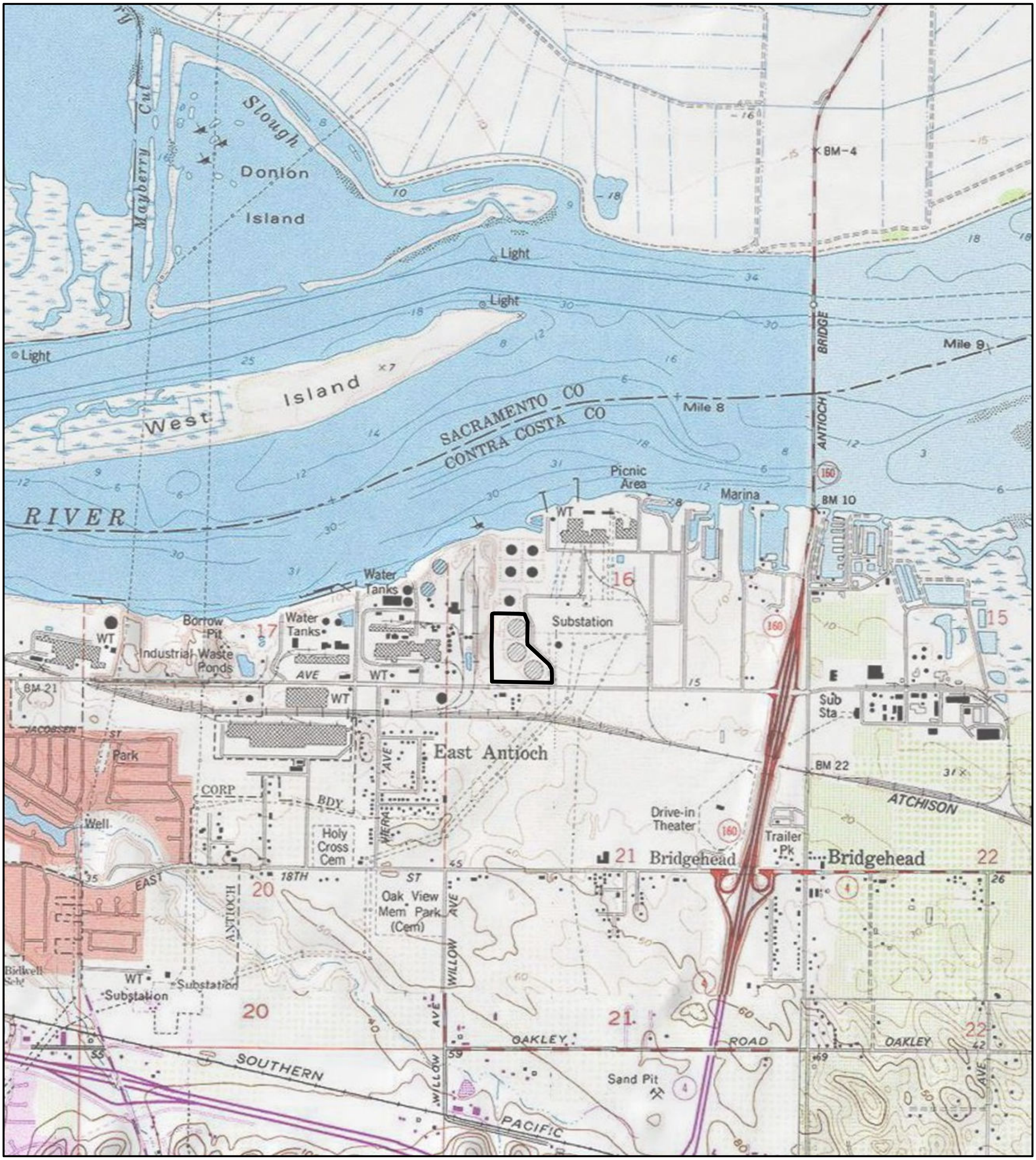
1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

The Big Break Solar Project (Project) is a proposed 2-megawatt solar photovoltaic (PV) power generation development located on an approximately 16-acre site (Site) on the north side of Wilbur Avenue in the City of Antioch, California. The Site location is shown in Figure 1, Site Location. The Site is owned by NRG Delta LLC and will be leased by the Project for a 25-year period. The proposed Project is located on a portion of an approximately 86-acre parcel (Parcel) within the retired Contra Costa Generating Station's property and was formerly host to three aboveground oil storage tanks for the now-retired power plant units. The Site is adjacent to an operating natural gas power plant, the Marsh Landing Power Plant. The Site and adjacent lands are zoned Heavy Industrial (M-2).

Construction of the Project is expected to take approximately six months and construction mobilization is expected to begin in April 2017, subject to receipt of required permits and approvals. Construction would create an estimated 40 direct jobs during peak construction activity and an estimated 20 direct jobs on average over approximately 6 months during the field portion of construction work. Once constructed, the facility would passively generate electric output from the sun during daylight hours. Project output would be delivered to an existing PG&E 21 kilovolt (kV) distribution line located on the north side of Wilbur Avenue through a generation tie line that would be constructed by PG&E.

The Project will require Design Review by the City under Zoning Ordinance Section 9-5.2607. This Initial Study addresses potential environmental impacts of the Project under consideration in the City's Design Review including the construction and operation of the proposed generation tie line.



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Project Site

Big Break Solar Project
Site Location
Figure 1

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0 1,000 2,000 Feet

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1.2 CALIFORNIA ENVIRONMENTAL QUALITY ACT

The proposed Project constitutes a "project" as defined by the California Environmental Quality Act (CEQA) (Public Resources Code, Section 21000 et seq.) and the "CEQA Guidelines" (California Code of Regulations, Title 14, Section 15000 et seq), and is thereby subject to the requirements of CEQA. For purposes of CEQA, the term "project" refers to the whole of an action which has the potential to result in a direct physical change or a reasonably foreseeable indirect physical change in the environment (CEQA Guidelines Section 15378). As the principal public agency responsible for approving the Project, the City of Antioch is the "lead agency" overseeing and administering the CEQA environmental review process.

As set forth in the provisions of CEQA Guidelines Section 15126.4, before deciding whether to approve a project, public agencies must consider the potential significant environmental impacts of the project and must identify feasible measures to minimize these impacts. Pursuant to CEQA Guideline Section 15064, if any aspect of the proposed project, either individually or cumulatively, may cause a significant effect on the environment, regardless of whether the overall effect of the project is adverse or beneficial, an Environmental Impact Report (EIR) must be prepared.

This Initial Study is a factual document, prepared in conformance with CEQA, and written for the purpose of making the public and decision-makers aware of the potential environmental consequences of the project. For any project impact that is considered "significant," the Initial Study identifies mitigation measures, where feasible, to reduce or avoid the significant effect. Before any action can be taken to approve the Project based on conclusions of this Initial Study, the City of Antioch must certify that it has reviewed and considered the information herein and that this document has been completed in conformity with the requirements of CEQA. Certification of conformity with CEQA does not approve or deny the Project.

1.3 ENVIRONMENTAL REVIEW

Consistent with CEQA, this Initial Study is a public information document for use by governmental agencies and the public to identify and evaluate potential environmental consequences of the Project and to recommend mitigation measures and/or standard conditions of approval to lessen or eliminate adverse impacts.

This Initial Study/Proposed Mitigated Negative Declaration is available for public review for thirty days, during which time written comments on the Initial Study may be submitted to:

Alexis Morris
Senior Planner
City of Antioch
Community Development Department
200 "H" Street
Antioch, CA 94509
amorris@ci.antioch.ca.us

2.0 PROJECT DESCRIPTION

The Project would inject up to approximately 2 megawatts of alternating current electricity into the PG&E grid, the entirety of which would be consumed by the City via a remote net metering system. Once constructed, the facility would typically be unattended and would passively generate electric power from the sun during daylight hours. Routine monitoring and maintenance is anticipated to be needed once a month or less for the life of the project.

2.1 PURPOSE

The purpose of the Project is to repurpose unused NRG acreage to provide economic and reliable renewable energy to the City via PG&E's Renewable Energy Self-Generation Bill Credit Transfer Program. The Project would generate substantial annual savings for the City by reducing electricity bills and providing savings that would be passed along to tax payers.

2.2 PROJECT LOCATION AND SURROUNDINGS

An aerial photograph showing the Site location and surrounding lands is provided in Figure 2, Site Vicinity Aerial Photograph. The Site is located on a portion of Contra Costa County Assessor's Parcel Number 051-031-020. The parcel is bounded to the south by Wilbur Avenue. Vacant land exists to the west. The Marsh Landing Power Plant property and a PG&E substation occur to the north and northeast of the Site. The area to the east is a depressed area that was used as a drainage catchment basin providing secondary containment for the aboveground storage tanks formerly occupying the Site. Lands south of Wilbur Avenue in the site vicinity are primarily agricultural with some commercial use.

Access to the Site would occur via an existing paved road located along the east side of the Site that is currently gated at Wilbur Avenue.

Views of the Site are limited due to surrounding private lands to the east, north, and west; agricultural fields to the south; and the generally flat topography. The primary opportunity for public view of the Site is from passersby on Wilbur Avenue. Figure 3, Location of Site Photographs, provides the locations for representative photographs of the Site and surrounding lands provided in Figures 4, 5, 6, and 7, Representative Site Photographs.

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Project Site

Big Break Solar Project
Site Vicinity Aerial Photograph
Figure 2

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Sources: Image courtesy of USGS © 2016 Microsoft Corporation

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Location and Direction of Photo View

Project Site

Big Break Solar Project
Location of Site Photographs
Figure 3

Sources: Image courtesy of USGS © 2016 Microsoft Corporation

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0 100 200 Feet

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Photo 4A: Looking east along the concrete wall at the north edge of the Site. The asphalt surface of the northermost tank pad is evident at right. The wall (left and center) provided secondary containment for the former tank farm and will be removed.

Photo 4B: Looking southeast over the northermost tank pad. The asphalt surface will be removed by grading. Due to the presence of existing asphalt and concrete surfaces, the proposed project development will reduce the impermeable area onsite compared to existing conditions.

Big Break Solar Project
Representative Site Photographs
Figure 4
Sheet 1 of 2

TRC

Photo 4C: Looking south-southwest over the west edge of the northermost tank pad. The earthen dike (right and center) provided secondary containment for the former tank farm and will be regraded. Trees in background are inside the Site boundary and will be removed.

Photo 5A: Looking north along the east edge of the Site. The low concrete walls at far right middleground are wing walls for the existing drainage structures shown in the Preliminary Design Drawings and will remain in place.

Photo 5B: Looking west over the northern edge of the middle tank pad. The earthen dike in the background will be regraded. The asphalt tank pad is covered by a thin veneer of soil and gravel. Trees dominant in background are the same as those shown in Photo 4C and will be removed.

Big Break Solar Project
Representative Site Photographs
Figure 5
Sheet 1 of 3

TRC

Photo 5C: Looking south. Middle tank pad is just outside the field of view to the right.

Photo 5D: Looking southeast. Existing paved road to remain in place and to be used for project access is visible outside the existing Site fence line.

Big Break Solar Project
Representative Site Photographs
Figure 5
Sheet 2 of 3

TRC

Photo 5E: Looking east-northeast. Existing paved road to remain in place for project access is visible outside the existing Site fence line and gate.

Photo 6A: Looking north toward the Site from Wilbur Avenue. The paved driveway and trees in this view will be removed inside the fence line. Screening landscape including trees and shrubs will be planted where there is room outside the fence line toward the left-center of this view (See Figure 7 and Landscape Plan). The existing driveway to be used for the Site entrance is located approximately 300 feet to the east.

Photo 6B: Looking northwest toward the Site from Wilbur Avenue. Existing site perimeter fence in middleground will remain in place with slats installed to provide 100 percent screening. Trees inside fence line will be removed.

Big Break Solar Project
Representative Site Photographs
Figure 6

Photo 7: Looking east along the Wilbur Avenue frontage from outside the southwest corner of the site. Trees inside fence line will be removed and screening landscape, including trees and shrubs, will be planted between the fence line and existing sidewalk (See Landscape Plan).

2.3 PROJECT FACILITIES

2.3.1 General

The primary components of the proposed Project include:

- Solar PV module arrays;
- Inverters;
- Transformers, circuit breakers, and switchgear; and
- A short generation tie line to the existing 21 kilovolt (kV) PG&E distribution grid located adjacent to the Site on Wilbur Avenue.

The solar PV module arrays are the predominant feature of the Project and would encompass most of the Site. The PV panels utilize anti-reflective technology and absorb and convert sunlight directly into DC electricity. They do not require fossil fuels to operate and produce no air emissions. The PV modules would be laid out on a uniform grid pattern with access roads provided at the Site perimeter and intermittently within the arrays to facilitate routine maintenance and access. The preliminary layout and conceptual design details of the Project are shown in Attachment 1, Preliminary Design Drawings. The final design drawings would be subject to approval by the City prior to construction.

2.3.2 Generating Technologies

The Project would utilize crystalline silicon technology PV panels on single-axis tracker supports. Typical elevation details are provided in the Preliminary Design Drawings. The PV modules would be arranged in rows and would be connected by a drive shaft to drive motors that would rotate the solar panels from east to west to follow the sun throughout the day. The panels would have a maximum height of approximately 10 feet above the ground when fully tilted.

2.3.3 Energy Delivery

Underground wiring would deliver DC electricity from the solar panels to an electrical equipment pad or an integrated skid on drilled or driven piers with inverters to convert the DC current to alternating current (AC) and transformers to step up the voltage of the AC current for compatibility with the existing PG&E distribution system. The inverters and transformers would be supported on a concrete footing approximately 10 feet by 50 feet in size located onsite near the offsite PG&E distribution grid interconnection point. The enclosures for the electrical equipment would be 15 feet or fewer in height.

The preliminary design calls for two 1,000 kV inverters and one transformer for each of the inverters. The transformers would step up the AC voltages from the inverters to a grid interconnect voltage of 21 kV. The power then would be conveyed through the proposed 21 kV generation tie line for interconnection to PG&E's distribution system. The generation tie line would be one short segment from the onsite electrical equipment pad to the adjacent 21 kV transmission line on the north side of Wilbur Avenue. One existing pole may need to be replaced at the interconnection point. An example pole configuration, if pole replacement is needed, is shown on the Details sheet of the Preliminary Design Drawings. One riser pole may also be located onsite near the electrical equipment pad. Poles installed would be approximately 30 to 50 feet in height.

2.3.4 Ancillary Facilities and Requirements

Access to the Site would be via an existing paved road that is located along the east edge of the Site and gated at the southeast corner of the Site at Wilbur Avenue. Within the Site, 20-foot-wide internal access roads would provide for all-weather passage and adequate turning radii in accordance with Contra Costa County Fire Protection District (CCCFPD) requirements. Onsite roads would consist of a compacted subgrade that will be treated to be dustless and durable or covered with an aggregate surface.

The Site is currently secured with existing 7-foot-high fencing consisting of 6-foot-high chain-link fence with a 1-foot-high security wire top. Fencing is in good condition and would be retained. Fencing would be inspected and repaired where needed. A gate would be installed in the existing fence at the location shown on Sheet C-4.1 of the Preliminary Design Drawings to provide access to the Site from the existing paved road.

Water would be required during operations for panel washing, fire protection, and landscaping. Panel washing would be infrequent (e.g., annual) and would require approximately 2,200 gallons per event.. A 10,000 gallon fire water storage tank will be provided near the Site entrance to provide for fire protection. The tank would be dedicated for fire water reserve and the system would be designed to deliver 10,000 gallons of fire water to the hydrant in accordance with CCCFPD requirements. The tank would be filled initially and following periodic testing. Landscaping would be required to use low-water plantings over an approximately 7,600 square foot minimum landscape area at the frontage to Wilbur Avenue in accordance with City requirements. The location and conceptual plan for landscaping is shown on Sheet C-6.1 of the Preliminary Design Drawings. Water for operations will be trucked to the Site from the existing power plant water supply system or obtained from the City. Water supply infrastructure exists on the north side of Wilbur Avenue and would be used for operations if water is obtained from the City.

No permanent buildings are proposed as part of the Project. Secured, intermodal-type storage containers may be brought onsite temporarily to store parts and equipment during construction activities or periodic maintenance activities. A trailer may be brought onsite for temporary construction offices. Construction staging would occur onsite. Lighting installed for the Project would be for security purposes around the perimeter fence. All lights would be hooded and downward facing.

The Project would include one or more meteorological monitoring stations to track insolation, irradiance, temperature, wind direction, and wind speed. These stations are typically 6 to 8 feet tall and may include a taller (up to 30 feet) anemometer for measuring wind speed. These stations are typically mounted on one or more poles or towers. Photographs of example pole and tower mounted stations are shown in Figure 8, Example Meteorological Stations.

2.3.5 Drainage

Mean annual rainfall is approximately 13 inches. The area surrounding the Site slopes gently northward. The Site has remains of the aboveground storage tanks formerly occupying it, including piping, asphalt, and earthen containment berms that will be regraded for Project development. Evaluation of historic drainage in the area conducted for the Project indicate that no substantial drainage courses impact the Site. Site grading would be designed to avoid ponding and to retain existing drainage conditions. A preliminary grading plan is provided in Attachment 1, Preliminary Design Drawings. Runoff from the Site would be directed to the east into a depressed area previously used as a secondary containment area for the aboveground storage tanks. The cumulative impermeable area footprint of the PV module piles and other proposed equipment would be negligible compared to the existing tank foundation material that would be removed for development. Considering the former tank foundations and other impermeable areas that would be removed, there would be a substantial net decrease in impermeable area onsite. Therefore, no increase in runoff would occur.

Most of the Site is located outside of the 0.2 percent annual chance (500-year) flood area. Limited portions of the Site near its northern and eastern boundaries are mapped by the Federal Emergency Management Agency as Shaded Flood Zone X, which denotes areas of 0.2 percent annual chance flooding (500-year) and 1 percent annual chance (100-year) flood depths averaging less than 1 foot or with drainage areas less than 1 square mile. Piles would be extended where needed so that panels are elevated a minimum of 1 foot above the 1 percent annual chance flood elevation.

Big Break Solar Project
Example Meteorological Stations
Figure 8

2.4 CONSTRUCTION

Field construction activities are scheduled to begin in April 2017, and would take up to six months to complete. Construction crews would generally work during daylight hours on weekdays. Heavy equipment and construction noise would adhere to City construction noise limits (Antioch Code of Ordinances Title 7 Chapter 17). Construction parking, offices, and laydown areas would be located onsite inside the existing fence line.

Construction would occur under the State General Permit for stormwater discharges from construction sites. The Project would file a Notice of Intent and Storm Water Pollution Prevention Plan (SWPPP) and would be required to comply with the General Permit until construction disturbances are stabilized and a Notice of Termination is accepted by the Regional Water Quality Control Board. The SWPPP must be developed by a Qualified SWPPP Developer and include Best Management Practices (BMPs) for controlling erosion and preventing impacts to water quality consistent with the California Storm Water Quality Association BMP handbook for construction sites. To prevent an increase in the potential to emit dust during construction, disturbed surfaces would be stabilized with water as necessary and in accordance with Bay Area Air Quality Management District (BAAQMD) guidelines. To prevent an increase in wind or water erosion following grading, the design includes stabilizing disturbed areas as soon as practical.

The design of the Project includes controlling dust and other emissions during construction via measures consistent with BAAQMD guidelines and the Northeast Antioch Area Reorganization Mitigation Monitoring and Reporting Program (City of Antioch, 2013), as follows.

- Exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) would be watered two times per day.
- Haul trucks transporting soil, sand, or other loose material offsite would be covered.
- Visible mud or dirt track-out onto adjacent public roads would be removed using wet power vacuum street sweepers at least once per day.
- Vehicle speeds on unpaved roads would be limited to 15 mph.
- Roadways, driveways, and sidewalks to be paved would be completed as soon as possible. Building pads would be laid as soon as possible after grading unless seeding or soil binders are used. Gravel would be used to stabilize road surfaces as needed to meet CCCFPD requirements. Areas that are not graveled or occupied by foundations would be stabilized by re-vegetation, application of a non-toxic soil binder, or other means of stabilization.
- Idling times would be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne taxies control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage would be provided for construction workers at all access points.
- Construction equipment and haul trucks would be maintained and properly tuned in accordance with manufacturer's specifications. Construction equipment and haul trucks

would be checked by a certified mechanic and determined to be running in proper condition prior to operation.

- A publicly visible sign would be posted with the telephone number of the Construction Manager and BAAQMD to report dust complaints. This person would respond and take corrective action within 48 hours. The BAAQMD complaint line telephone number would also be visible.
- Exposed surfaces would be watered at a frequency adequate to maintain minimum soil moisture of 12 percent.
- Excavation, grading, and/or demolition activities would be suspended when average wind speeds exceed 20 mph on an hourly average. The average wind speed determination would be on a 15-minute average, taken over 4 consecutive 15-minute periods at the nearest meteorological station or by wind instrument onsite.
- Minimize the idling time of diesel-powered construction equipment to two minutes.
- The project would develop a plan for submittal with the grading permit application demonstrating that the off-road equipment (more than 50 horsepower) to be used in the construction project would achieve a project-wide fleet-average 20 percent NOx reduction and 45 percent PM reduction compared to the most recent ARB fleet average. Acceptable options for reducing emissions include the use of late-model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after treatment products, add-on devices such as particulate filters.
- Diesel-power construction equipment would use low-sulfur diesel fuel pursuant to requirements of Title 13 of the California Code of Regulations §2281.

Water use for dust control and soil compaction during construction is expected to total approximately 12 acre feet over the six months of field construction work. Construction equipment would include a dedicated water truck and a portable elevated storage tank. Construction water would be obtained from the existing power plant water supply system or from the City. Sanitary facilities for construction would be provided with self-contained portable units maintained by a licensed contractor.

The grading plan and project facilities are designed to avoid disturbance within a 25-foot buffer zone of an Antioch Dune evening primrose plant located at the northwest corner of the Site. No other significant sensitive environmental resources occur on the Site.

It is anticipated that PG&E would construct the generation tie line. One pole on the north side of Wilbur Avenue may need to be replaced at the point of interconnection.

The Project would be responsible for construction of the PV generation facilities, which would include three types of activities: grading and ground preparation, assembly/installation, and commissioning/testing.

2.4.1 Grading and Ground Preparation

Grading would occur following a final grading plan approved by the City Engineering and Development Services Division. The Site is relatively flat-lying and suitable for solar array development with removal of trees, tank footings, piping, berms, and other remnants of the former tanks. Additional limited vegetation that occurs within the fence line would also be removed with the exception of the buffer zone around the Antioch Dune evening primrose plant. Existing onsite monitoring wells, sewer clean-outs, and other onsite utilities would be protected by high-visibility fencing or flagging during grading. Existing tank foundations would be excavated and removed from the Site as required for placement of solar infrastructure. Following removal of vegetation, tank foundations, and other debris, the area within the fence line and outside of the buffer zone would be smoothed, scarified, and re-compacted to facilitate construction. Onsite roads would be constructed with a scarified and compacted subgrade and coated to create a dustless or durable surface or surfaced with compacted gravel. At the footing for the inverter pad and switchgear, existing soil would be scarified and recompacted following recommendations of the geotechnical report. A soil management plan would be prepared and provided to the City for review prior to issuance of a grading permit for implementation in the unexpected event that soils are encountered that have been impacted by potential past hazardous materials releases at the Site.

Typical types and quantities of equipment anticipated to be needed for grading and preparation onsite could include:

TYPE	QUANTITY
Bulldozer (e.g., CAT D7)	2
Grader (e.g., CAT D7)	1
Scraper (15-30 CY)	1
Water Truck (3,000- 5,000 gal)	1
Self-Propelled Compactor	1
Quad Carts	2
Bobcat	2
Dump Truck	2

2.4.2 Equipment Assembly/Installation

Upon completion of ground preparation, the pile foundations, PV modules, footings, inverters, transformers, and other equipment would be installed. The design is presently contemplated to use embedded foundations (e.g., driven piles) to secure the PV racks to the ground. These types of footings would typically extend 5 to 10 feet below the ground surface. The final footing design and related engineering evaluations would be subject to approval in conjunction with building permit issuance.

Racks would be assembled on the pile foundations and PV Panels installed on the racks. The footing for the inverters and other equipment would be poured on a compacted engineered fill subgrade described in Section 2.4.1. Pre-mixed concrete would be delivered to the Site and no onsite batching is anticipated. Trenching for underground installations is not expected to encounter saturated soils but could require dewatering in the event of rain. Trenching would be backfilled and compacted upon completion.

Typical types and quantities of construction equipment that could be needed for equipment assembly and installation include:

TYPE	QUANTITY
Rough Terrain Forklift	2
Hydraulic Ram Pile Driver	1
Tractor	2
Water Truck (3,000- 5,000 gal)	1
Quad Carts	2
Bobcat	1
Crane	1

2.4.3 Commissioning/Testing

Plant systems would be checked, tested, and adjusted before being placed into commercial operation. This phase of construction would primarily utilize light vehicles for personnel and equipment transport, including light trucks and quad carts.

2.4.4 Waste Management

Construction would generate scrap metal, concrete, wood, plastic, paper materials, and rubbish. Construction management practices would include designated collection areas at the construction offices and staging locations. Recyclable materials would be separated and managed for recycling to the extent practical. Wastes and recyclable materials would be shipped offsite by licensed haulers to waste management and recycling facilities permitted to accept the materials. Trash consisting of food and products that potentially attract animals would be stored in closed collection containers and removed from the Site regularly. Construction wastes and recyclable materials would be shipped offsite regularly. Construction debris would be managed onsite with BMPs to prevent the pollution of stormwater runoff. If hazardous waste is generated, it would be managed in accordance with California Code of Regulations Title 22 Division 4.5 requirements.

2.4.5 Construction Workforce and Trip Generation

The onsite construction workforce would consist of laborers, craftspeople, supervisory personnel, and support personnel. The onsite assembly and construction workforce is expected to reach a peak of approximately 40 workers; the average number of workers onsite is anticipated to be approximately 20. On average it is anticipated that each worker will generate one round trip to the Site per workday.

During grading and ground preparation, removal of tank foundations, soil, and debris, and import of soil and aggregate construction materials would generate up to approximately 20 truck round trips per day. An estimated maximum of 10 truck deliveries per week would be required during assembly and installation work to supply equipment, materials, and components.

2.5 OPERATION AND MAINTENANCE

The Project would passively generate electric power during daylight hours and would not have onsite staff. Most monitoring would be conducted remotely, and only occasional maintenance is expected to be required following commissioning. An intermittent workforce of one to two individuals is anticipated. Initially, personnel would likely visit the Project weekly, but it is anticipated that eventually maintenance visits would be reduced to once a month or less. Operations activities would include monitoring of plant performance, performing periodic equipment maintenance, and responding to needs for plant adjustment. As necessary, additional temporary or contract personnel would be utilized for services such as security or specialized maintenance. The expected maintenance would generate little traffic during operations. The areas surrounding the inverters and switchgear would be graveled and would have adequate space for parking several vehicles.

Operation and maintenance of the Project would generate minimal noise, primarily from fans used to cool electrical equipment and transformers. Maximum audible noise levels for equipment are expected to be approximately 70 dBA at a 5-meter distance. Considering the distance to nearest sensitive receptors, it is not expected that fans or transformers would be audible from any residential area, park, or other sensitive receptor location.

O&M vehicles would include light duty trucks (e.g., pickup, flatbed) and other light equipment for maintenance and module washing. Heavy equipment would not be utilized during normal operation. Large or heavy equipment may be brought to the facility infrequently for equipment repair or replacement or vegetation control.

Minimal amounts of water would be required for panel washing activities and general maintenance. The need for panel washing would be infrequent (e.g., annual) and determined based on operating considerations, including actual soiling of the PV panels and any expected benefit from cleaning. Should cleaning be necessary, water would be sprayed on the PV panels to remove dust. An estimated 2,200 gallons of water would be necessary for each wash event. This water would be obtained from the existing power plant or supplied by the City.

Sanitary facilities for operations would be provided with self-contained portable units maintained by a licensed contractor. The periodic hauling of sanitary waste offsite by a licensed contractor is the only anticipated routine waste generation during operations. Other wastes from equipment replacement or other work would be removed from the Site at the end of the day.

3.0 ENVIRONMENTAL CHECKLIST FORM

1.	**Project Title:**	Big Break Solar Project
2.	**Lead Agency Name and Address:**	City of Antioch 200 "H" Street, Antioch, CA 94509
3.	**Contact Person & Phone Number:**	Alexis Morris, 925-779-6141
4.	**Project location:**	3201 Wilbur Avenue, Antioch, CA 94509
5.	**Project Sponsor Name and Address:**	NRG Solar DG LLC 100 California Street, Suite 400 San Francisco, CA 94111 Attention: Joe Corning 415 627 1636 Joe.Corning@nrg.com
6.	**General Plan Designation:**	Focus Area
7.	**Zoning:**	Existing: Heavy Industrial (M-2) Proposed: No Change
8.	**Description of project:**	Ground mounted solar photovoltaic electric generating arrays. See Section 2.0 of this Initial Study for details.
9.	**Surrounding Land uses and setting:**	Adjacent parcels are zoned Heavy Industrial. Adjacent uses are the existing power plant and electric substation, vacant land, and Wilbur Avenue. South of Wilbur Avenue, are agriculture and commercial uses.
10.	**Other public agencies whose approval is required:**	The project will not impact sensitive natural resources including protected species, waters, or riparian and wetland areas; therefore, no authorizations are required from natural resource agencies. The Project design would be reviewed by the Contra Costa County Fire Protection District for adherence to the fire code.

3.1 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would potentially be affected by this Project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

□	Aesthetics	□	Agriculture and Forest Resources
□	Air Quality	■	Biological Resources
■	Cultural Resources	□	Geology and Soils
□	Greenhouse Gas Emissions	□	Hazards and Hazardous Materials
□	Hydrology/Water Quality	□	Land Use/Planning
□	Mineral Resources	■	Noise
□	Population and Housing	□	Public Services
□	Recreation	□	Transportation/Traffic
□	Utilities/Service Systems	■	Mandatory Findings of Significance

3.2 DETERMINATION (To be completed by the Lead Department.)
On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there would not be a significant effect in this case because mitigation measures would be required that would reduce impacts to a less than significant level. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature: [signature] Date: 3/9/17

Title: Planning Manager

3.3 EVALUATION OF ENVIRONMENTAL IMPACTS:

A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources the Lead Department cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to Project like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project would not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

Once the Lead Department has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

"Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level. (Mitigation measures from Section XVII, "Earlier Analyses," may be cross-referenced.)

Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA processes, an effect has been adequately analyzed in an earlier EIR or negative declaration. (State CEQA Guidelines § 15063(c)(3)(D).) In this case, a brief discussion should identify the following:

a) Earlier Analysis Used. Identify and state where they are available for review.
b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of, and adequately analyzed in, an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

The explanation of each issue should identify: the significance threshold, if any, used to evaluate each question, and; mitigation measures identified, if any, to reduce the impact to less than significance. Sources of thresholds include the General Plan, other planning documents, and City ordinances. Some thresholds are unique to geographical locations.

Climate Change Impacts: When determining whether a project's impacts are significant, the analysis should consider, when relevant, the effects of future climate change on: 1) worsening hazardous conditions that pose risks to the project's inhabitants and structures (e.g., floods and wildfires), and 2) worsening the project's impacts on the environment (e.g., impacts on special status species and public health).

1. AESTHETICS

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
<u>**No Impact:**</u> The Site area is not designated as being within a scenic vista or scenic resources area in the City or County General Plan, and is not within view from any State Scenic Highway or Scenic Route. The closest state-designated eligible or Scenic Route is Route 24 which is designated by Caltrans as Scenic (Caltrans, 2016) approximately 18 miles to the southwest of the site and out of the Project viewshed. The Site is located adjacent to the existing Marsh Landing Power Plant and PG&E switchyard. Surrounding lands are relatively flat terrain with limited opportunity for view of the Site. Existing views of the surrounding area include a mix of mostly industrial use, previous industrial use cleared to foundations, disturbed open space, commercial, and agricultural development. Considering these factors, the Project would not impact any scenic vista.				
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
No Impact: No designated or eligible State scenic highways are near the Development Area. The nearest State scenic highway is State Route (SR) -24, located approximately 18 miles southwest of the Site. The Site is not visible from SR 24. Therefore, the Project would not affect scenic resources within a State scenic highway corridor.				
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐
Less than Significant Impact: The Site and surrounding lands consist primarily of a mix of mostly industrial use, previous industrial uses cleared to foundations, disturbed open space, commercial, and agricultural development. There are no rock outcrops or historic buildings on the Site. The proposed Project would redevelop the currently vacant former tank farm property and remove existing tank foundations, piping, and other tank remnants and improve the site to an orderly appearance. The Site frontage on Wilbur Avenue would be improved with landscaping in accordance with City requirements. These changes would have a beneficial impact to views of the Site. The Project would remove the predominantly non-native tree stands in the southern portions of the Site. Considering the presence of the non-native tree stands in their highly disturbed and primarily industrial setting they are not considered a significant visual resources. Removal of the trees would be a potentially noticeable visual change, such as for passers-by on Wilbur Avenue; however, the presence or absence of the trees would not change the visual characteristic of the Site as predominantly industrial. The Site is located adjacent to the existing Marsh Landing Power Plant and PG&E switchyard. The arrays would be located on graded vacant lands in relatively flat terrain where opportunity for public view is limited. The maximum height of the panels would be approximately 10 feet above the ground. This height would not create a significant view obstruction or be out of scale or character with other existing land uses in the area. The arrays would be located 0.2 mile from the San Joaquin River, which is considered a scenic waterway in the Contra Costa County General Plan (Contra Costa County, 2015). Considering the manmade				

primarily industrial features dominating the landscape in the area, and considering the existing disturbed condition of the Site and the low height of proposed facilities, the Project facilities would not substantially degrade views from the San Joaquin River. Considering these factors, the Project would not substantially degrade the visual character or quality of the Site or its surroundings.				
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐
Less than Significant Impact: The solar arrays and other equipment would be relatively low to the ground and therefore, would not create substantial shadows offsite. The proposed photovoltaic technology uses non-reflective panels to convert solar energy into electric energy. The panels are specially designed with anti-reflective coatings to absorb as much of the sun's energy as possible so as to maximize efficiency. They reflect much less of the sun's energy than normal glass because the panels are intended to absorb, not reflect, sunlight in order to convert it to electrical current. The panels are designed with an anti-reflective coating for solar energy conversion efficiency and the Project would not be a substantial source of glare. Construction is not planned to occur during the nighttime. In addition, no permanent night lighting is proposed. Considering these factors, shadows, light and glare would have a less than significant impact on daytime and night time views in the area.				

2. AGRICULTURE / FOREST

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
No Impact: There are no farmlands on or adjacent to the Site. Therefore, no impact would occur to agricultural land conversion.				
b) Conflict with existing zoning for agricultural use, or with a Williamson Act contract?	☐	☐	☐	☒
No Impact: There are no Williamson Act Contracts on the Site, as the Site is not used for agricultural production. The Site is zoned Heavy Industrial. Therefore, no impact would occur.				
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒
No Impact: There are no farmlands or forest land on the Site. The Site is currently unused and zoned heavy Industrial. Therefore, no impact would occur.				

3. AIR QUALITY

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations.

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Conflict with or obstruct implementation of applicable air quality plan?	☐	☐	☐	☒

No Impact: The Site is located within the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The Project would not conflict with or obstruct implementation of any applicable air quality plan. Due to the nature of the Project being a solar generating plant that will create negligible emissions once construction is complete, the primary consideration for air quality is construction emissions which will be below BAAQMD significance thresholds as discussed further below. The Project would not add dwelling units or structures that would generate operational emissions, or add full-time employees that would commute to and from the Project on a daily basis. An intermittent work force of one or two individuals is anticipated and, therefore, the project would not create a substantial number of long term jobs that could result in any material population, housing or employment growth. Initially, personnel would likely visit the Site weekly, but it is anticipated that over the long term visits would be reduced to once per month or less. Operations maintenance would result in exhaust and particulate emissions from vehicle use. These emissions would be minor considering the small and infrequent level of activity.

Construction would also result in dust and fuel-burning emissions during the approximately six month period of field construction. Project construction emissions were calculated using the California Emissions Estimator Model (CalEEMod) version 2013.2.2 as described in Appendix A The BAAQMD significance thresholds for construction activities and estimated project emissions are:

Criteria Pollutant	BAAQMD Significance Threshold (pounds/day)	Peak Project Emissions (pounds/day)	Significant?
Oxides of Nitrogen (NOx)	54	51.6	Less than Significant
Reactive Organic Gasses (ROGs)	54	3.0	Less than Significant
Exhaust Particulate Matter (PM10)	82	1.8	Less than Significant
Exhaust Particulate Matter (PM2.5)	54	1.8	Less than Significant

Source: BAAQMD CEQA Air Quality Guidelines, Updated May 2011.

The CalEEMod results indicate that construction emissions from the Project would be less than the BAAQMD significance thresholds. It should be noted that the BAAQMD's thresholds of significance identified above were adopted in 2010 and were challenged in a lawsuit. On March 5, 2012 the Alameda County Superior Court found that the BAAQMD had failed to comply with CEQA when adopting the thresholds, although it did not rule on the validity of the thresholds based on merit. The Court mandated that BAAQMD set aside the thresholds and cease dissemination of them until they had complied with CEQA. Despite this, the 2010 significance thresholds can still be used for comparison purposes.

The design of the Project includes controlling dust and other emissions during construction via measures consistent with BAAQMD guidelines and the Northeast Antioch Area Reorganization Mitigation Monitoring and Reporting Program, as follows.

- Exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) would be treated with a dust-controlling substance or watered two times per day.
- Haul trucks transporting soil, sand, or other loose material offsite would be covered.
- Visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- Vehicle speeds on unpaved roads shall be limited to 15 mph.
- Roadways, driveways, and sidewalks to be paved would be completed as soon as possible. Building pads would be laid as soon as possible after grading unless seeding or soil binders are used. Gravel would be used to stabilize road surfaces as needed to meet CCCFPD requirements. Areas that are not graveled or occupied by foundations would be stabilized by re-vegetation, application of a non-toxic soil binder, or other means of stabilization
- Idling times would be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne taxies control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage would be provided for construction workers at all access points.
- Construction equipment and haul trucks would be maintained and properly tuned in accordance with manufacturer's specifications. Construction equipment and haul trucks would be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- A publicly visible sign would be posted with the telephone number of the Construction Manager and BAAQMD to report dust complaints. This person would respond and take corrective action within 48 hours. The BAAQMD complaint line telephone number would also be visible.
- Exposed surfaces would be watered at a frequency adequate to maintain minimum soil moisture of 12 percent.
- Excavation, grading, and/or demolition activities would be suspended when average wind, speeds exceed 20 mph on an hourly average. The average wind speed determination would be on a 15 minute average, taken over 4 consecutive 15-minute periods at the nearest meteorological station or by wind instrument on site.
- Minimizing the idling time of diesel powered construction equipment to two minutes.
- Diesel-power construction equipment would use low-sulfur diesel fuel pursuant to requirements of Title 13 of the California Code of Regulations §2281.

The facility would generate electricity year-round displacing the need for generation from power plants that burn fossil fuel. Considering that construction emissions would be short-term and operations emissions would be minor, the Project would be expected to result in a long-term net reduction of emissions to air through displacement of fossil fuel-fired electric generation.

b) Violate any applicable federal or state air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐
Less than Significant Impact: As described in Response 3a, construction emissions would be temporary and are not expected to exceed BAAQMD construction-related significance thresholds. Further, the operational components of the Project would not add residential or non-residential dwelling units or be growth-inducing. The Project would not diminish an existing air quality rule or future compliance requirement. As a result, the Project would not violate any applicable federal or state air quality standards or contribute substantially to an existing or projected air quality violation.				
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
Less than Significant Impact: BAAQMD is state and/or federal nonattainment for ozone and fine particulate matter (PM-2.5) and state nonattainment for coarse particulate matter (PM-10). The Project would be solar electric generating facilities that would reduce the demand for fossil fuel generated electric power and thereby result in a long-term reduction in emissions of oxides of nitrogen (NOx) and volatile organic compounds (VOCs) that are precursors to ozone. The facilities would generate electricity without particulate emissions. The particulate emissions from maintenance during operations (anticipated monthly or less over the long term) would be too negligible to result in a cumulative net increase in PM-10 or PM-2.5 concentrations. Construction emissions would not exceed BAAQMD's 2010 construction-related significance thresholds (see Section 3a, above). These thresholds were designed to establish the level at which the BAAQMD believes emissions could cause significant environmental impacts under CEQA when considered in conjunction with other sources. The Project would not conflict with any air quality plan, regulation or rule and would provide a long-term air quality benefit by displacing electric demand from fossil fuel fired generation. Considering these factors, the Project would not result in a cumulatively considerable net increase of any non-attainment criteria pollutant.				

d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐

Less than Significant Impact: Sensitive receptors include members of the population that are particularly sensitive to the effects of air pollution such as children, the elderly and people with illnesses. Examples include residences, hospitals, schools, or convalescent homes. The nearest sensitive receptor is a residential community approximately 1,000 feet southwest of the Site. The Project would be solar PV generating facilities that would convert solar energy to electric energy without pollutant emissions. Construction emissions would be less than significant as described in Response 3a above. Considering these factors, the Project would not expose sensitive receptors to substantial pollutant concentrations.

e) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐

Less than Significant Impact: The Project would not be a significant source of odors. A potential source of odor is diesel engine emissions during construction. However, these short term impacts related to odor during construction would be less than significant due to the considerable distance between the array locations where most construction would occur and nearest offsite receptors. During operation, the solar PV generating facilities would convert solar energy to electric energy without odor emissions.

4. BIOLOGICAL RESOURCES

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife (CDFW) or U.S. Fish and Wildlife Service (USFWS)?	☐	☒	☐	☐

Less Than Significant Impact With Mitigation Incorporated: The Site is located on vacant, formerly developed industrial land that is mostly flat. Most of the Site is disturbed with imported fill material, riprap and gravel, access roads, and foundations. In addition, the Site is subjected to regular land management activities. The limited vegetation in these disturbed areas consists mostly of non-native weedy species such as short podded mustard (*Hirschfeldia incana*), prickly lettuce (*Lactuca serriola*), and ripgut brome (*Bromus diandrus*). The southern portion of the Site includes a grove of ornamental, primarily non-native trees and a 1.49-acre common tarweed field is located along the northern portion of the Site's west boundary. The Site does not contain critical habitat for wildlife listed as threatened or endangered by state or federal agencies. A biological resource assessment for the Site is provided in Appendix B of this Initial Study.

One sensitive plant, an Antioch Dunes evening primrose (*Oenothera deltoides* ssp. *howellii*) plant, has been identified on the Site. The one individual plant was identified in the northwestern portion of the Site during the 2011 focused plant survey and was again identified in 2015. The two surveys conducted have only identified the one individual plant. This species is federal- and state-listed as endangered with a CNPS ranking of 1B.1. To avoid impact to the Antioch Dunes evening primrose, Mitigation Measure BIO-1 would require a pre-construction survey and a 25-foot avoidance buffer around the known plant and additional primrose identified, if any. No other sensitive plants were observed onsite and none were identified during the literature review as having potential to occur. The Site is highly disturbed and thus unsuitable for most sensitive plant species.

Common tarweed fields meet state criteria for a sensitive community. While the 1.49 acre tarweed field would be impacted by proposed grading, the field is not a significant resource because of the absence of associated vernally wet habitat typical of these fields, the already developed nature of the Site, the high number of non-native/invasive species, and the small area involved.

No sensitive wildlife species have been identified as occurring or having a high potential to occur onsite. The biological resources assessment in Appendix B concludes that six sensitive species having a moderate potential to occur within the Site: silvery legless lizard (*Anniella pulchra pulchra*) burrowing owl (*Athene cunicularia*), Swainson's hawk (*Buteo swainsonii*), white-tailed kite (*Elanus leucurus*), loggerhead shrike (*Lanius ludovicianus*), and western red bat (*Lasiurus blossevillii*).

Silvery legless lizard is considered a Species of Special Concern by CDFW. The silvery legless lizard has a spotty distribution ranging from the Coast Ranges in Contra Costa County, California southward. This burrowing species is associated with sandy or loose loamy substrates that retain some soil moisture conducive to burrowing. Suitable habitat includes beaches, dunes, chaparral, pine-oak woodland, and stream terraces and washes where suitable substrates occur. Legless lizards are often found under surface objects that lie barely covered in loose soil, such as logs and rocks. Because legless lizards are dependent on loose soil and soil moisture, their habitat can be greatly degraded by urbanization and agriculture. Additionally, their presence is more common around native shrubs than non-native grasses and forbs (WRA, 2017). The primary source of food for this species is spiders and insects. While the Site does contain sandy soils, the presence of such soils is restricted to the northwestern corner of the Site where a relatively small area of wind-blown deposits has developed over the disturbed landscape. Soil moisture in this location is largely absent and few native plants are present. No native shrubs typically found in association with silvery legless lizard (e.g., bush lupine, mock heather) were found by biological resource surveys (WRA, 2017). The majority of the Site is disturbed and consists of engineered surfaces. Based on the poor-quality habitat, the silvery legless lizard is not likely to occur on the Site, though it is considered in this document due to the proximity of suitable habitat west of the site and a related moderate potential for an individual to wander onto the Site. Based on the absence of soil moisture and predominantly engineered surfaces, it is unlikely the species would burrow on the Site and thus unlikely it would be impacted by the Project. If individuals were to wander onto the Site, use would likely be limited to the upper soil layer. As a precautionary measures, Mitigation Measure BIO-2 would require a preconstruction survey be conducted including use of cover boards and gentle raking of shallow soil, and exclusion fencing be installed to prevent individuals from wandering onto the Site. Implementation of mitigation measure BIO-2 would ensure that the Project does not have a significant adverse impact on this species.

Burrowing owl is considered a Species of Special Concern by CDFW and a USFWS Bird of Conservation Concern. Typical burrowing owl habitat is flat or low-lying open and sparsely vegetated areas of California. They are often closely associated with ground squirrels and other burrowing mammals. The burrows of these animals are used for nesting and refuge. Individual owls often forage in open areas where they seek invertebrates and small mammals. Burrowing owl has a moderate potential to occur based on the sparse vegetation and presence of a few ground squirrel burrows onsite. To limit impacts to burrowing owl, Mitigation Measure BIO-3 would require a pre-construction survey for burrowing owls and protection measures if burrowing owl are present that would limit impacts to a less then significant level. Mitigation Measure BIO-4 would prevent staged materials from being a potential attractant to burrowing owls during construction.

Swainson's hawk is state-listed as threatened, and is a USFWS Bird of Conservation Concern. Swainson's hawk is a summer resident and migrant in California's Central Valley and scattered portions of the Southern California interior. Nests are constructed of sticks and placed in trees located in otherwise largely open areas such as the edges of narrow bands of riparian vegetation, isolated patches of oak woodland, lone trees, and planted or natural trees associated with roads, farmyards, and adjacent residential areas. While breeding, adults feed primarily on rodents; large insects comprise most of their diet during the remainder of the year. In many areas, Swainson's hawks have adapted to foraging in and around agricultural plots. The larger trees within the grove in the southern portion of the Site provides potential nesting habitat for this species and suitable foraging habitat (i.e. agricultural fields) is present to the south. Mitigation Measure BIO-5 would require a Swainson's hawk survey prior to construction and protection measures to limit impacts to a less than significant level of occupied Swainson's hawk nests occur within 0.25 mile. Implementation of mitigation measure BIO-5 would ensure that the Project does not have a significant adverse impact on this species.

White-tailed kite is a State Fully Protected species. This species generally is a year-round resident of California coastal and valley lowlands with open habitat and is rarely found away from agricultural areas. This species preys primarily on voles and other small mammals and occasionally on birds, insects, reptiles and amphibians. Preferred foraging habitat consists of grasslands, meadows, farmland and emergent wetlands. This species nests at the top of dense oak, willow and other tree stands located near open foraging habitat. The trees within the grove at the southern portion of the Site provide potential nesting habitat for white-tailed kite and foraging habitat is located in adjacent areas. Mitigation Measure BIO-6 would require a nesting bird survey prior to work if removal of trees or initiation of construction is to occur during the bird nesting season, and protection measures to limit impacts to a less than significant level if active nests are identified on or near the Site. Mitigation measure BIO-6 would ensure that the Project does not have a substantial adverse impact on White-tailed kite or any other nesting bird species protected under the Migratory Bird Treaty Act.

Loggerhead shrike is considered a Species of Special Concern by CDFW and is a USFWS Bird of Conservation Concern. This species generally is a year-round resident and winter visitor of California lowlands and foothills. This species is associated with open habitat with short vegetation and scattered trees, shrubs, fences, utility lines and other perches. This species preys on a variety of invertebrates and vertebrates. Preferred foraging habitat consists of grasslands, meadows, farmland and emergent wetlands. This species nests in trees and large shrubs with nests usually placed three to ten feet off the ground. The trees within the grove at the southern portion of the Site provide potential nesting habitat for white-tailed kite and foraging habitat is located in adjacent areas. Mitigation measure BIO-6 would ensure that the Project does not have a substantial adverse impact on this species.

Western red bat is considered a Species of Special Concern by CDFW and a WBWG High Priority species. This species is highly migratory and broadly distributed, ranging from southern Canada through much of the western United States. Day roosts are commonly in edge habitats adjacent to streams, open fields, or orchards. They are typically solitary, roosting primarily in the foliage of trees or shrubs. The larger trees within the grove in the southern portion of the Site may provide potential roosting habitat. However, as this species rarely breeds in tree foliage, maternity roosts are unlikely. Mitigation Measure BIO-7 would require a work window for tree removal or bat surveys and avoidance measures if tree removal must occur outside of the work window to ensure that the Project does not have a substantial adverse impact on this species.

The conversion of the Site from a tank site to a solar array will have negligible effect on the surface hydrology entering the depressional seasonal wetland to the east. It appears that the wetland was created to contain potential spills from the tanks that formerly occupied the Site, and the area of the Site to be converted from impervious surface to open ground is a small fraction of the wetland's total watershed. Using a conservative estimate, the total drainage area to the wetland is approximately 77 acres. The area of the Site, and upslope areas draining through the Site, that were used in the preliminary hydrology study prepared for the Site total 27.7 acres. In the study, the runoff draining through and from the Site entering the wetland will decrease by an average of 24 percent for the 5, 10, 25, 50 and 100-year storm events modeled. Based on the conservative total watershed area estimate of 77 acres, this represents a net reduction in runoff of an average of 8.7 percent. Taking into account that surface runoff normally only accounts for a portion of the hydrology supporting a wetland (the other potential inputs being groundwater and shallow subsurface flow), the reduction of less than nine percent is negligible.

The existence of salt-tolerant plants in the wetland suggests that conditions are poor for most species of branchiopods. Based on review of historical photos, aerial signatures suggest no vernal pool was present in the location of the current pool and that this pool is man-made. While branchiopods can occupy man-made wetlands, this typically occurs only when there is suitable contiguous habitat to the man-made pool. Currently no such contiguous habitat exists and therefore, branchiopods are unlikely to be present. Additionally, no significant indirect impacts are expected given that the reduction in surface water runoff to the wetland would be minimal and would have a negligible effect to the overall hydrologic system of the wetland.

The following mitigation measures would limit potential impacts to sensitive biological resources to a less than significant level and ensure the project is consistent with the Northeast Antioch Area Reorganization Mitigation Monitoring and Reporting Program.

Mitigation Measure BIO-1:

A 25-foot avoidance buffer shall be maintained around the existing evening-primrose plant, within which no surface disturbance shall occur. The buffer shall be clearly marked with durable high visibility fencing during construction and shall be permanently fenced, barricaded, or otherwise securely protected from disturbance for life of the project. In addition, prior to construction in the 0.7 acre portion of the Site identified in the Biological Resources Assessment as potentially suitable habitat for the Antioch Dunes evening-primrose, a qualified biologist shall perform a focused survey for the Antioch Dunes evening-primrose during the blooming period of March through September. If any additional Antioch Dunes evening-primrose are identified, a 25-foot avoidance buffer shall be established around each identified evening-primrose.

Mitigation Measure BIO-2:

Exclusion fencing, comprised of silt fence or similar non-pass through material, shall be installed along the western edge of the Site where silvery legless lizard has been recorded to exclude dispersal onto the Site. Exclusion fencing shall be trenched into the soil a minimum of eight inches based on site-specific soil conditions. Fencing shall be placed so that it rounds back towards itself to discourage lizards from going around either end. Following installation of exclusion fencing and within 30 days prior to construction, a preconstruction survey for silvery legless lizard shall be performed by a qualified biologist. The preconstruction survey shall encompass the area of loose sandy soils at the northwestern corner of the Site and shall include use of two to three cover boards placed on soils suitable for this species as well as gentle raking of suitable shallow soils to observe for potential presence. If silvery legless lizard individuals are found, CDFW shall be contacted and the individual(s) shall be relocated on an area outside the exclusion fence or ad directed by CDFW personnel.

Mitigation Measure BIO-3:

No more than 14 days prior to the start of ground-disturbing construction activities, a preconstruction burrowing owl survey in accordance with CDFW guidelines shall be conducted to determine if burrowing owls are present within or adjacent to the Project Site. If an occupied burrow is observed within or adjacent to the Site during the nesting season (February 1-August 31) and is determined to contain an active nest, then a buffer shall be established surrounding the nest by a qualified biologist dependent on nest location, baseline disturbance levels, and in accordance with CDFW guidelines (CDFW 2012). No work can occur in the buffer area until the nest is determined to be inactive by a qualified biologist or that the proposed work would not constitute a disturbance to the nesting owls based on a CDFW-approved protocol. If occupied burrows are observed within or adjacent to the Site during the non-nesting season (September 1-January 31) or if an occupied burrow is determined to not be a nest burrow during the nesting season, then a buffer shall be established around the burrow by a qualified biologist dependent on nest location, baseline disturbance levels, and in accordance with CDFW guidelines. If an occupied non-nesting burrow cannot be avoided (i.e., is within the limits of disturbance), a burrowing owl exclusion plan shall be written and approved by CDFW and the owl shall be passively relocated. Passive relocation procedures include installation of one-way doors in burrow entrances. These doors shall be in place for 48 hours prior to excavation. Burrows shall be excavated using hand tools and refilled to prevent reoccupation. Plastic tubing or a similar structure shall be inserted in the tunnels during excavation to maintain an escape route for any owls inside the burrow.

Mitigation Measure BIO-4:

To avoid a possible attractant to burrowing owls, ducting and other open-ended pipe materials staged at the construction site three 3 inches in diameter or greater shall be capped.

Mitigation Measure BIO-5:

If construction is to be initiated or tree removal is to occur during nesting season (March 1 – September 15), a preconstruction survey shall be conducted by a qualified biologist no more than 14 days prior to tree removal or ground disturbance to establish whether occupied Swainson's hawk nests occur within 0.25 mile of the Site. If any potentially occupied Swainson' hawk nest are identified within 0.25 mile of the site, then a qualified biologist shall observe for Swainson's hawk occupation from the Site or public roads and other points of public access. No tree removal or construction activities shall occur during the nesting season within 0.25 mile of an occupied nest, unless a qualified biologist determines a smaller buffer would be sufficient based on environmental conditions and the nature of work activities. Any construction activity within the buffer zone that may cause nest abandonment or forced fledging shall be monitored by a qualified biologist. Construction activities may proceed normally prior to September 15 if the biologist determines that the young have fledged. If construction is halted for more than 14 days during the site-clearing period, including tree-removal activities, then an additional survey shall be completed within 14 days prior to re-initiating this type of work within the nesting season.

Mitigation Measure BIO-6:

If construction is to be initiated or tree removal is to occur during bird nesting season (February 1 – August 31), a preconstruction nesting bird survey shall be conducted by a qualified biologist no more than 14 days prior to ground disturbance within the Site and a 300-foot buffer. If an active nest (i.e., egg-laying, incubating, nestling, fledgling stages) is located, then a qualified biologist shall establish a non-disturbance buffer surrounding the active nest. Work shall not occur in the buffer area until the biologist determines the young have fledged or the nest is otherwise inactive. The buffer size shall be determined by a qualified biologist in cooperation with USFWS and CDFW and shall be based on consideration of the species, anticipated levels of noise or disturbance, ambient levels of noise and other disturbances. If buffers are established and it is determined that project activities are resulting in nest disturbance, work shall cease immediately and USFWS and CDFW shall be contacted for further guidance. If construction is halted for more than 14 days during the site-clearing period, including tree-removal activities, then an additional nesting bird survey shall be completed within 14 days prior to re-initiating this type of work within the nesting season.

Mitigation Measure BIO-7:

To avoid the potential to impact the western red bat, tree removal shall occur between October 1 and March 1 when western red bat is not present in the region, and until tree removal is completed grading within 100 feet of the remaining tree stands at the south end of the Site shall be avoided except between October 1 and March 1. As an alternative to limiting these work activities to the October 1 to March 1 work window, a dusk emergence bat survey may be conducted by qualified biologists with experience surveying for western red bat to determine if western red bat is present, and a 100-foot no-work buffer area shall be established around any identified western red bat roost until October 1 to avoid direct or indirect disturbances related to noise or dust. Because western red bats are foliage-roosting, multiple surveyors shall be used as needed to adequately survey the tree stands. Surveys should begin one half hour before sunset and continue until at least one hour after sunset or until it is otherwise too dark to see emerging bats. Surveys shall not be considered conclusive if conducted if: (1) temperatures fall below 50 degrees Fahrenheit; (2) rain or fog exceeds 30 minutes or continues intermittently during the survey period; or (3) sustained wind speeds are greater than 9 miles per hour. Additionally, if tree removal occurs outside of the October 1 to March 1 work window, whenever a large tree is felled (diameter at breast height

greater than 16 inches), the tree shall be allowed to lay undisturbed overnight before processing to allow any potential undetected roosting bats within the tree to leave during the night before the tree is processed.				
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFG or USFWS?	☐	☐	☒	☐
Less Than Significant Impact: No riparian habitat occurs on the Site and there is no local or regional habitat conservation plan encompassing the Site area. No sensitive natural communities occur onsite with the exception of a 1.49 acre common tarweed field. While tarweed field is considered a sensitive vegetation community by CDFW, the tarweed field within the Site does not appear to be a high quality representation. There are abundant non-native and invasive plant species such as yellow star thistle and species typical of this community are absent. In addition, the surrounding areas within the Site are disturbed and there is no vernally wet habitat associated with this tarweed field. Considering the disturbed nature of the site, the low quality representation, and limited area, impact to the 1.49 acre tarweed field would be less than significant.				
c) Have a substantial adverse effect on federally protected wetlands (including marshes, vernal pools, and coastal wetlands) or waters of the United States, as defined by § 404 of the Clean Water Act through direct removal, filling, hydrological interruption, or other means?	☐	☐	☒	☐
Less than Significant Impact: No wetlands or jurisdictional waters occur on the Site. A seasonal wetland community is located east of the Site adjacent to the existing access road that will be used for the Project. The wetland community is off of the Site and separated from the proposed limits of grading by two existing chain link fence lines and the existing road. Construction would occur under the State General Permit with a SWPPP implementing BMPs for erosion and sediment control. The General Permit would require that construction SWPPP be prepared by a Qualified SWPPP Developer and implemented by a Qualified SWPPP Practitioner (QSP). Standard BMPs from the California Stormwater Quality Association (CASQA, 2012) or their equivalents would be required such as scheduling to minimize the term of disturbances (Standard BMP EC-1), stabilization of disturbed surfaces (Standard BMPs EC-3 through -7), and silt fences (Standard BMP SE-1). The SWPPP would be required to address erosion control until it is demonstrated to the Regional Water Quality Control Board that disturbed surfaces are stabilized and a Notice of Termination is accepted. With construction occurring in compliance with the State General Permit, there would not be significant transport of sediment offsite to the seasonal wetlands. In addition, as described in Section 2.3.5, Drainage, grading would be designed to retain existing drainage patterns so the seasonal wetland areas would continue to receive runoff similar to existing conditions. Considering these factors, the impact to the seasonal wetland community will be less than significant.				
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☒	☐	☐
Less Than Significant Impact with Mitigation Incorporated: There are no perennial surface				

waters on or adjacent to the Site. Therefore, no fish habitat would be affected. The Site and adjacent lands have been completely disturbed by past development and current uses. The terrain is relatively featureless with no substantial natural geographic barriers or corridors. There are no identified wildlife migratory corridors on the Site, and surrounding lands are generally similar. The grove of trees located in the southwestern portion of the Site may provide nesting habitat. As described in Response 4a above, the Applicant would be required to conduct pre-construction surveys that would include surveys for potential burrowing owls and nesting birds. If determined present by pre-construction surveys, then avoidance and monitoring as described in Mitigation Measures BIO-3, BIO-4, BIO-5, and BIO-6 would be required as necessary to limit impacts to these resources to a less than significant level. Mitigation Measures BIO-2 and BIO-7 would limit impacts to other sensitive species that could potentially occur on the Site. By implementing these Mitigation Measures, project impacts to the movement of any wildlife species or with established native resident or migratory wildlife corridors, or impediment of the use of native wildlife nursery sites would be less than significant.				
e) Conflict with any local policies or ordinances, protecting biological resources, such as tree preservation policy or ordinance?	☐	☐	☒	☐
Less than Significant Impact: The Site is subject to the City of Antioch Tree Removal and Protection Ordinance. A tree survey conducted as part of the biological resource assessment identified 12 trees onsite that are considered protected by this ordinance. Of the 12 trees, four also meet the criteria to be considered a landmark/heritage tree. Approval from the City of Antioch would be obtained prior to the removal of the 12 protected trees. Following City requirements, the Project would not conflict with the Tree Removal and Protection Ordinance or any other local biological policy or ordinance.				
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒
No Impact: The Parcel is within the City of Antioch which is not a participating entity in the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan. Therefore, the Project would not conflict with that Plan. No other local, regional or state habitat conservation plan encompasses the Site. Therefore no impacts would occur.				

5. CULTURAL RESOURCES

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines § 15064.5?	☐	☐	☐	☒
No Impact: The Site is located within the Contra Costa Power Plant Historic District. The Site is currently vacant with no buildings or structures. Tank foundations and secondary containment from the former tanks remain. The former tanks that were on the proposed project were not a contributing element in the historic district as described in the nomination. The proposed project is energy related and would have no impact on any of the contributing elements of the Historic District.				
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines § 15064.5?	☐	☒	☐	☐
Less than Significant Impact With Mitigation Incorporated: A cultural resources field survey was not conducted for this Project. A cultural resource records search was conducted through the Northwest Information Center (CHRIS, 2016). The record search indicated that the Project area was included in a previous cultural resource report. Review of the report did not provide evidence that the Site had been surveyed. However, because the three tanks formerly occurring on the Site are identified in the nomination for the Contra Costa Power Plant Historic District (Quivik, 2000) it appears that the Site has been surveyed. The nomination indicated that there were three tanks on the proposed project area that dated from the 1970's. Those tanks have since been demolished. Most of the proposed Project Site is extensively disturbed from grading associated with the former tanks. The record search additionally revealed that there is one known prehistoric archaeological site within a one-half mile radius of the proposed project, this site is a small lithic scatter of five small obsidian flakes that is not located on the Project Site. A search of the Native American Heritage Commission (NAHC) Sacred Lands File failed to indicate the presence of Native American cultural resources in the Site area (NAHC, 2016). Outreach to Native American representatives to date failed to indicate the presence of Native American cultural resources on the Site. As part of the City's compliance with Assembly Bill 52 (AB 52), the Wilton Rancheria requested to open consultation for this project with the City of Antioch. The City of Antioch provided the Wilton Rancheria with the results of the cultural resources records search and made several attempts to meet with the Wilton Rancheria. After 30 days of attempting to open consultation, the City of Antioch informed the Wilton Rancheria that consultation was closed for the current project. The City of Antioch has invited the Wilton Rancheria to provide comments on the final draft of this ISMND. Appendix C, NAHC and Native American Correspondence, provides copies of correspondence, including a request for tribal consultation, the record of communication with the Wilton Rancheria, and the Consultation Termination Letter. Considering the results of the records search, previous ground disturbance, and Tribal contact to date, there are no archaeological resources known on the Site. Mitigation Measures CUL-1 and CUL-2 would ensure impacts are mitigated to a less than significant level in the event that unknown cultural resources are encountered during construction.				

Mitigation Measure CUL-1: Construction shift foremen, excavation equipment operators and other construction workers with responsibility for observing construction excavations shall be instructed by a representative of the Owner or its contractor to be observant for the potential occurrence of archaeological resources in the geologic materials encountered, and shall be instructed and authorized to halt excavation in the area immediately and notify the Project Owner's representative if such resources are discovered. **Mitigation Measure CUL-2:** In the event of a cultural resource discovery, the City shall be promptly notified and work in the area shall cease until the discovery is evaluated by a qualified cultural resource specialist. If evaluation by a qualified cultural resource specialist indicates that the discovery may be significant, then excavation in the area shall be continued only as directed by a qualified cultural resource specialist and in a manner allowing for collection of significant resources and information that may otherwise be affected by the Project, including development of a Research Design and Data Recovery Program if needed to mitigate impacts. If cultural artifacts are collected they shall be cataloged and curated with an appropriate institution. A final monitoring report shall be prepared if significant cultural resources are discovered.				
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
No Impact: Surface geology at the Site and in the surrounding area has been mapped as Holocene Epoch dune sand deposits (Helley et al., 1979). The Holocene Epoch is the youngest geologic epoch. It is generally accepted that the Holocene extends from approximately 11,500 to 12,000 years before present up through present day. Site grading, trenching and other excavations for construction generally would not exceed five feet in depth. Considering the Holocene age of the mapped geology in the vicinity and the shallow depth of grading and excavation, soils that may be encountered are too young for discovery of important paleontological resources to be reasonably foreseeable. There are no unique geologic features in the vicinity. Considering these factors, no impact is anticipated.				
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐
Less than Significant Impact With Mitigation Incorporated: A cultural resource records search was conducted through the California Historical Resources Information System (CHRIS) Northwest Information Center and did not indicate any known burials within one-half mile of the Site (CHRIS, 2016). A search of the Native American Heritage Commission (NAHC) Sacred Lands File failed to indicate the presence of Native American cultural resources in the area (NAHC, 2016). Outreach to Native American representatives to date failed to indicate the presence of Native American cultural resources on the Site. Records of cultural resources outreach to NAHC and Tribes is provided in Appendix C. Given that there is no evidence of human remains at the site, no impact to human remains is anticipated. Mitigation Measure CUL-3 would ensure that impacts are mitigated to a less than significant level in the event that human remains are encountered unexpectedly during construction. **Mitigation Measure CUL-3:** Construction shift foremen, excavation equipment operators and other construction workers shall be instructed by a representative of the Owner or its contractor to halt work immediately if human remains are observed in the geologic materials encountered. In the event of a discovery, the County coroner shall be notified immediately and work in the area shall cease until the discovery is evaluated and removed in accordance with applicable laws and requirements.				

6. GEOLOGY AND SOILS

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mine and Geology Special Publication 42.	☐	☐	☐	☒
No Impact: No active faults underlie the Site; therefore, no impacts associated with the potential rupture of a known fault exist. The Site is not located in an Alquist-Priolo Earthquake Fault Zone (Terracon, 2015)				
ii) Strong seismic ground shaking?	☐	☐	☒	☐
Less than Significant Impact: California is seismically active area and earthquakes occur in the Site region. Strong ground shaking can occur. The Maximum Considered Earthquake (MCE) peak ground acceleration at the Site is expected to be about 0.50g (Terracon, 2015). Strong seismic ground shaking would be a potentially substantial seismic hazard if structures are not appropriately designed. The potential for seismic ground motions to damage structures is typically mitigated through proper design and construction to withstand predicted ground motions. The California Building Code seismic standards are designed to mitigate the potential for people or structures to be exposed to substantial risks from seismically-induced ground motions. Conformance with this code would be assured through the Building Permit process. Adherence to City and California building code requirements would limit the risk of damage or injury from seismic ground shaking to level that is less than significant.				
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐

Less than Significant Impact: Liquefaction can occur when there is a loss of shear strength in saturated granular soils cause by seismically-induced pore water pressures. The loss of shear strength in soils can reduce the ability of the soil to support overlying loads. If liquefaction occurs, the surface structures may settle into the ground or tilt and spread rigid footings or foundations can be damaged. The liquefaction potential of a site is dependent on characteristics of ground shaking, soil type, soil density, and depth-to- groundwater. The potential for impacts to a project from liquefaction is dependent on the potential for liquefaction at the site, the nature of structures present, and the term of presence. The Site area is shown as having a "moderate to high" liquefaction susceptibility on maps published by the Bay Area Association of Governments but is not within a potential liquefaction hazard zone as designated by the California Geological Survey (Terracon, 2015). These are regional studies that do not take in to account site-specific conditions nor the term of a given project. A geotechnical study was completed for the Project's site-specific conditions under the supervision of a licensed civil engineer and licensed geotechnical engineer. The geotechnical study for the Project identifies the liquefaction potential as moderate based on silt and clay content of the Site soils and available maps (Terracon Consultants, Inc. 2015). The geotechnical study report documents that soils are poorly sorted with some dense layers and 25 to 35 percent silt and clay content. The density and partial size gradation limit the potential for liquefaction, and risk is further limited by the term of the Project. Moreover, the Project does not propose occupied structures that could pose a significant risk to people in the event of a liquefaction and the types of facilities proposed including solar modules, inverters, transformers, switchgear and the generation tie line are not as susceptible to damage from liquefaction as large rigid foundation structures such as buildings. Because project facilities would be unoccupied and not highly susceptible to damage from liquefaction, and considering the soil particle size gradation and project term, the potential for liquefaction does not pose a significant risk under CEQA. California State Mining and Geology Board adopted the "Guidelines for Evaluating and Mitigating Seismic Hazards in California" in 1997 in accordance with the Seismic Hazards Mapping Act of 1990. The Guidelines sets forth the requirement for the requirements in evaluating seismic hazards and recommends mitigation measures as required by Public Resources Code Section 2695(a). In this document, a "project" is defined by the Seismic Hazards Mapping Act as any structure for human occupancy, or any subdivision of land that contemplates the eventual construction of structure for human occupancy. In addition, based on the stated definitions of "mitigation" and "acceptable risk", the Seismic Hazards Mapping Act and related regulations establish a statewide minimum public safety standard for mitigation of earthquake hazards. This means that the minimum level of mitigation for a project should reduce the risk of ground failure during an earthquake to a level that does not cause the collapse of buildings for human occupancy, but in most cases, not to a level of no ground failure at all. Since the Proposed Project does not entail human occupancy, mitigation of liquefaction risk is not required under the Seismic Hazards Mapping Act.				
iv) Landslides?	☐	☐	☐	☒
No Impact: The area is nearly flat-lying. There are no substantial slopes on or adjacent to the Site that could result in a landslide hazard.				
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐

Less Than Significant Impact: Most of the site was graded for the former tanks use so there would be limited new soil disturbance. The project would remove existing tank foundations and other impermeable features onsite so there would be an overall increase in infiltration and no increase in runoff. Construction would occur under the State General Permit with a SWPPP implementing BMPs for erosion control. The General Permit would require that construction SWPPP be prepared by a Qualified SWPPP Developer and implemented by a Qualified SWPPP Practitioner (QSP). Standard BMPs from the California Stormwater Quality Association (CASQA, 2012) or their equivalents would be required such as scheduling to minimize the term of disturbances (Standard BMP EC-1), stabilization of disturbed surfaces (Standard BMPs EC-3 through -7), and silt fences (Standard BMP SE-1). The SWPPP would be required to address erosion control until it is demonstrated to the Regional Water Quality Control Board that disturbed surfaces are stabilized and a Notice of Termination is accepted. With construction occurring in compliance with the State General Permit, erosion impacts would be less than significant.				
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
Less than Significant Impact: There are no substantial slopes on or adjacent to the Site. Therefore, the Project does not have the potential to result in landslides. Lateral spreading is a phenomenon that can occur from seismic shaking or other lateral loading when the ground surface is not laterally supported on one or more sides, for example, on ridge tops or near edges of terraces or cliff faces. The Site vicinity does not have laterally unsupported conditions susceptible to lateral spreading. Soil collapse occurs when loosely compacted soils are disturbed by seismic shaking, rewetting, or other activities. Most of the Site consists of previously graded and compacted soils eliminating the risk of soil collapse for most of the site. Furthermore, soils will be scarified and compacted beneath the electrical equipment pad and site roads in accordance with recommendations of the Project geotechnical report (Terracon, 2015) limiting the risk of soil collapse on structures to less than significant level. The Site does not include any structures that could pose a significant risk to people in the event of a large earthquake and liquefaction. Subsidence can occur when pore pressures are reduced in unconsolidated geologic materials below a valley floor due to the withdrawal of fluids. The Project would not increase groundwater extraction or other withdrawal of fluids from unconsolidated geologic deposits. Therefore, the Project does not have potential to create subsidence.				
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
No Impact: Expansive soils are clayey soils that have a high plasticity index. Typical shallow reinforced concrete spread footing foundations, such as those for buildings and other foundations covering a considerable area of ground, can be affected by expansive soils if such soils are present close to the ground surface. Soils at the Site do not have a high plasticity index. The geotechnical study completed for the Project concludes that onsite soils are suitable for use as engineered fill for the Project. No impact from expansive soils is anticipated.				

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
No Impact: Self-contained portable sanitary facilities would be used during construction and operation and would be pumped periodically by a licensed contractor. No septic tanks or other waste water disposal systems are planned.				

7. GREENHOUSE GAS EMISSIONS

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Generate greenhouse gas (GhGs) emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
Less than Significant Impact: The proposed solar PV generating facilities would convert solar energy into electric energy without GhG emissions, with the primary exception being CO2 that would be generated from vehicle and equipment emissions for construction and maintenance activities. Construction would use a small equipment fleet (refer to Section 2.4) and would be short in duration, thereby limiting the generation of GhGs to a relatively small quantity. Once constructed, the electric energy produced by the Project would reduce the dependency on fossil fuel-produced electric energy thereby providing a long-term GhG benefit. Considering that the proposed development would operate as an unmanned facility and would require little maintenance vehicle trips, and considering that limiting climate change is the focus of California's goals for implementing solar PV and other renewable energy technologies, GhG emissions would be less than significant both individually and cumulatively.				
b) Conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒
No Impact: The Project would not conflict with any applicable plan, policy, or regulation adopted to reduce GhG emissions. The proposed solar PV generating facilities would convert solar energy into electric energy without GhG emissions. Once constructed, the electric energy produced by the Project would reduce the dependency on fossil fuel-produced electric energy thereby providing a long-term GhG benefit.				

8. HAZARDS AND HAZARDOUS MATERIALS

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, storage, production, use, or disposal of hazardous materials?	☐	☐	☒	☐

Less than Significant Impact: Construction would require the short-term transport, use and disposal of hazardous materials such as fuels, lubricants, adhesives, solvents and paints. Storage and use of hazardous materials onsite during construction could create a significant hazard to construction workers, the public or the environment if such materials are not properly contained. Construction would be required to occur under a comprehensive hazard communication program in accordance with 29 CFR 1910 to ensure that construction workers are knowledgeable in the identification and proper handling of hazardous materials to prevent unsafe exposure and to avoid spills. Furthermore, the Site would not be open to the public. With these measures, the routine use of hazardous materials for construction would not create a significant hazard to the public or the environment.

Deliveries of bulk fuels, lubricants and other hazardous materials to the Site would be subject to Department of Transportation (DOT) regulations at 49 CFR 172 and 173 for hazardous materials transport. These regulations include requirements for hazardous material transport licensing, packaging and containment standards, labeling and other protection measures to prevent hazardous materials incidents during transport and to facilitate response in the event of a hazardous material accident. Hazardous wastes produced would be minimal and would be transported away from the Site in accordance with these same DOT regulations as well as requirements of California Code of Regulations Title 22 Division 4.5 for worker training, shipping and disposal of hazardous waste. With these existing regulations in place, and considering the short term of construction activities, the transport, production, and disposal of hazardous materials associated with facility construction would not create a significant hazard to the public or the environment.

The primary hazardous material that would be present at the Site for operations would be oil in oil-filled electrical equipment (e.g., transformers). This use of oil for dielectric in oil-filled electric equipment is not a consumptive use so there is no need for routine transport or handling of oil. The oil filled equipment is operated normally closed and sealed. On infrequent occasions, oil-filled equipment may require filtering or replacement of oil if it becomes contaminated. Used oil would be recycled. Transport and handling of used oil and any other hazardous waste generated would be subject to regulation under California Code of Regulations Title 22 (22 CCR) Division 4.5. Considering these factors this use would not create a significant hazard to the public.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials or waste into the environment?	☐	☐	☒	☐

Less than Significant Impact: Construction would require the short-term use of hazardous materials such as fuels, lubricants, adhesives, solvents and paints. Workers would be trained to properly identify hazardous materials and to handle them in accordance with applicable regulatory requirements to minimize the potential for a release. The general public would be excluded from the construction Site. Construction would occur under the State General Permit with a SWPPP implementing BMPs for water quality, including good housekeeping measures for hazardous materials and proper management and covering of soil stockpiles including impacted soil if encountered, limiting the risk of an accidental release migrating offsite. The General Permit would require that a construction SWPPP be prepared by a Qualified SWPPP Developer and implemented by a Qualified SWPPP Practitioner (QSP). Standard BMPs from the California Stormwater Quality Association (CASQA, 2012) or their equivalents would be required for sediment and other potential pollutants. The General Permit requires construction discharges to not violate water quality standards. Considering these factors, construction would not create a significant hazard to the public or the environment due to reasonably foreseeable upset or accident conditions.

The Project would not require the storage of bulk fuels, lubricants, or chemical reagents. Hazardous waste would not routinely generated or managed onsite. The primary hazardous material that would be present at the Site would be oil in oil-filled electrical equipment (e.g., transformers). The facility would be remotely monitored and periodically maintained during operations to minimize the risk of an upset. Considering the passive nature of solar energy conversion by PV technology, the risk of a reasonably foreseeable upset or accident scenario creating a hazard to the public or the environment during operations is less than significant.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒

No Impact: There is no existing or proposed school within one-quarter mile of the Site. Furthermore, the proposed development is a solar PV generating facility that would convert solar energy into electric energy without hazardous emissions. The primary hazardous air emissions generated by operation of the Project would be emissions from vehicle and equipment exhaust for construction and maintenance activities. Construction emissions would be short-term and are expected to remain below the BAAQMD's significance thresholds (see Response 3a, above).

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐

Less than Significant Impact: Lists of hazardous materials release sites compiled pursuant to Government Code Section 65962.5 include the California Department of Toxic Substances Control (DTSC) Envirostor database (http://www.envirostor.dtsc.ca.gov/) and the State Water Resources Control Board Geotracker database (http://geotracker.waterboards.ca.gov/). The Site is not located on any site identified on the State Water Resources Control Board Geotracker database. The Site occurs on a portion of an approximately 169 acre property identified as being under an active Corrective Action on the DTSC Envirostor database. The Envirostor Database indicates that metals, petroleum, polychlorinated byphenyls and polynuclear aromatic hydrocarbons from aboveground storage tanks and waste water ponds have affected soil, surface water and ground water within the 169 acre property. A number of investigations and evaluations have occurred in consultation with DTSC (e.g., Amec Foster Wheeler Environment & Infrastructure, Inc. 2016; Ch2M 2016) to assess the constituents of potential concern (COPCs) and related risks and, most recently (July 2016), Ch2M performed a screening-level human health risk evaluation for the portion of the 169 acre property that comprises the Big Break project Site (see Attachment 2, Risk Evaluation for NRG Big Break Solar Project Area). The purpose of the risk evaluation was to determine if soil concentrations remaining in the Big Break project area present an unacceptable human health risk to current or future commercial or industrial workers or construction workers for the project or potential future construction work. Soil risk-based concentrations (RBC) for industrial land uses were used to evaluate potential risks. The risk evaluation was conducted in accordance with DTSC and U.S. Environmental Protection Agency guidance.

The screening-level risk evaluation did not identify significant risk to construction workers from concentrations of COPCs in soils at depths that could be exposed during project construction or operations. Chromium is the only COPC with a maximum concentration that exceeds a construction worker exposure RBC. While the maximum chromium concentration exceeds the construction worker exposure carcinogenic RBC (maximum concentration of 78 mg/kg compared to a carcinogenic RBC of 40.8 mg/kg), the maximum exposure point concentration calculated as the 95% upper confidence level concentration is below the RBC and yields a cancer risk estimate of 9.3×10^{-7} which is below the EPA point of departure of 1×10^{-6}. The analysis conservatively assumes all of the chromium present is chromium VI. Considering past site activities at the site and the unstable nature of chromium VI in non-reducing environments, it is unlikely that all or any of the chromium detected in the project area is chromium VI. Therefore, even this low risk from chromium is likely substantially overstated. For all COPCs combined, the screening level risk assessment for construction workers calculates the cumulative hazard index as 0.2 which does not exceed the EPA target value of 1, and the cumulative estimated cancer risk as 1×10^{-6} which does not exceed the acceptable EPA point of departure of 1×10^{-6}.

Data used for the screening-level analysis show that above average levels of arsenic and chromium are naturally occurring in soils in the area. The screening-level risk assessment identified exposure point concentrations of arsenic and chromium in existing surface soils (to a depth of one foot) to exceed commercial/industrial worker exposure RBCs, which are lower than construction worker RBCs due to the potential for exposure over a very long period of time. Deeper soils that could be exposed by project grading also contain concentrations of naturally occurring arsenic and chromium that exceed commercial/industrial worker exposure RBCs. The maximum exposure point concentrations for both surface and deeper soils for arsenic and chromium are 2.99 mg/kg and 37.8 mg/kg, respectively. Commercial/industrial worker exposure pathways for these COPCs are incidental soil ingestion, dermal contact with soils, and inhalation of dust generated from wind. Following construction, the proposed project will typically be unoccupied except for short periods of time for periodic maintenance. Furthermore, project features include stabilizing disturbed surfaces as soon as practical to minimize windblown dust. Considering that the above average concentrations of arsenic and chromium are naturally occurring, the concentrations present, the unoccupied nature of project operations, and ground stabilization measures included in the project design, the levels of arsenic and chromium present at the site are not considered to pose a significant health hazard.

Total petroleum hydrocarbons as diesel (TPH-d) is the only additional COPC with a maximum concentration exceeding a commercial/industrial worker RBC. The TPH-d concentrations exceeding the commercial/industrial worker RBC were identified in a small area of the gravelly subgrade directly below the asphalt pad of the southernmost former tank that may be exposed during construction of the project. The gravelly soil layer appears to be part of the tank pad construction and the concentrations of TPH-d are likely from construction material and not a spill

or release. TPH-d in itself is not a known carcinogen and the maximum exposure point concentration identified is 2,050 mg/Kg compared to a non-cancer RBC for commercial/industrial workers of 1,100 mg/kg. Commercial/industrial worker exposure pathways for this COPC are incidental soil ingestion, dermal contact with soils, and inhalation of ambient vapors or dust generated from wind. Considering the small area affected, the concentrations present, the unoccupied nature of project operations, and ground stabilization measures included in the project design, TPH-d is not considered to pose a significant health hazard. Considering the outcome of the screening-level risk assessment and factors previously described, remaining concentrations of COPCs on the Site do not likely pose significant risk to construction or operations workers.				
e) For a project located within an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
No Impact: The Site is not located within any airport land use plan identified in the City or County general plan. Based on the Caltrans Aviation GIS Database (Caltrans, 2016) and Google Earth aerial photo review, there is no evidence of an airport within two miles of the site. Therefore, no impact would occur.				
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
No Impact: Based on the Caltrans Aviation GIS Database (Caltrans, 2016) and Google Earth aerial photo review, there is no evidence of a private airstrip within two miles of the site. Therefore, no impact would occur.				
g) Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
No Impact: The Project would not affect emergency response planning or implementation. The Project would occur on an existing unused privately owned parcel and would not affect access on any existing public or private through-way. The Project would not present a material hazard that could affect emergency response planning and Site access roads would adhere to CCCFPD requirements. Considering these factors, the Project would not impact or physically interfere with emergency plans.				
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☒	☐

Less than Significant Impact: The Site is not located in an identified Very High Fire Hazard Severity Zone (VHHSZ) as mapped by Cal Fire (2016). Vegetation would be cleared for construction of the proposed facilities. Pursuant to California Fire Code Section 304.1.2, the owner would be required to maintain the Site free of vegetation capable of being ignited or endangering property. In addition, the facility would be designed for fire prevention and a fire water supply would be provided. Considering these factors, the risk of wildland fire from the Project would be less than significant.

9. HYDROLOGY AND WATER QUALITY

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☒
No Impact: Lands surrounding the Site slope gently northward and there are no substantial drainages contributing run-on to the Site. The proposed development would remove existing tank foundations and other impermeable remnants of the former tanks so after development there will be a reduction in impermeable area. As described in Section 2.3.5, Drainage, grading would be designed to retain existing drainage patterns. Construction excavations such as those for conduits and footings would not extend deeper than five feet; therefore, groundwater is not expected to be encountered. Operations of the Project would not require storage of hazardous materials, with the exception of oil-filled equipment in transformers. These transformers would be designed to be compliant with applicable spill control regulations. Construction and operations workers would be trained to properly identify hazardous materials and to handle them in accordance with applicable regulations to minimize the potential for a release Construction would occur under the State General Permit with a SWPPP implementing BMPs for water quality. The General Permit would require that a construction SWPPP be prepared by a Qualified SWPPP Developer and implemented by a Qualified SWPPP Practitioner (QSP). Standard BMPs from the California Stormwater Quality Association (CASQA, 2012) or their equivalents would be required for sediment and other potential pollutants. The SWPPP would be required to address water quality BMPs until it is demonstrated to the Regional Water Quality Control Board that disturbed surfaces are stabilized and a Notice of Termination is accepted. The General Permit requires construction discharges to not violate water quality standards. With adherence to the permit and BMPs, no violation of any water quality standard or waste discharge requirement would be expected.				
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☒	☐

Less than Significant Impact: Construction water demand for dust control and soil compaction would be a short-term demand totaling approximately 12 acre-feet over the six-month period of field construction. During operations, the Project would not typically use any water except for minor water use for panel washing and water-efficient landscaping on the Wilbur Avenue frontage. The proposed facilities would have a fire fighting water supply conforming to CCCFPD requirements, typically with no consumptive use except occasional flushing of lines to ensure proper reliability. The Project would obtain water from the City supply either directly or from existing power plant water supply infrastructure. The primary source of City water supply is surface water. The Project would not interfere with groundwater recharge. The Site is suitable for PV array construction with minimal grading required, and the impermeable area that would be created by facility construction would be negligible in comparison to the impermeable ground features that would be removed. Considering these factors, the Project would not have any measurable effect on groundwater level in the region.				
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
Less than Significant Impact: The Project would not alter the course of a stream or river. A hydrology report is provided in Appendix D, Hydrology Report. The Site is on high ground relative to surrounding areas; thus, there is no run-on. Most of the Site drains to a depressed area to the east, which was previously used as a secondary containment area for the aboveground storage tanks. The preliminary grading plan is designed to maintain these drainage conditions. The final grading and drainage plan would be subject to approval by the City's Building Division. Considering existing and proposed drainage conditions, the Project would not substantially alter the existing drainage pattern.				
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☒	☐
Less than Significant Impact: As described in the Response to 9c, above, considering existing and proposed drainage conditions, the Project would not substantially alter the existing drainage pattern. Furthermore, the impervious area that would be removed for the Project would far exceed the impervious area to be constructed so there would be no increase in runoff. Considering these factors, the Project would not substantially alter existing drainage patterns or substantially increase the rate or amount of surface runoff. Therefore, the impact would be less than significant.				
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐

Less than Significant Impact: A hydrology report (Bonadiman & Associates, 2017) is provided in Appendix D, Hydrology Report. As described in the responses to c and d above, proposed grading would be designed to maintain existing drainage patterns. Furthermore, impervious area that would be removed for the Project, including approximately 200,000 square feet of asphalt, would far exceed the impervious area to be constructed so there would be no increase in runoff. Considering these factors, the Project would not create or contribute impacts to existing or planned Stormwater drainage capacity. The Project also would not contribute substantial additional sources of polluted runoff because BMPs are required to be implemented during construction under the State General Permit. BMPs for erosion control and non-sediment pollutants would be required until construction disturbances are stabilized and a Notice of Termination is accepted by the RWQCB. Following construction, the facilities would operate passively. Operation and maintenance would not typically require hazardous materials other than sealed oil-filled transformers. Typical operation and maintenance would not be a source of polluted runoff. The Project would not be subject to New Development and Redevelopment requirements of the East Contra Costa County Municipal NPDES Permit due to the fact that it will not create 5,000 square feet or more of impervious surface.				
f) Otherwise substantially degrade water quality?	☐	☐	☒	☐
Less than Significant Impact: The potential to degrade water quality is addressed in Responses 9a and 9e, above. As described in those responses, the Project would be required to comply with the General Permit including implementation of BMPs to prevent violation of any water quality standard. With BMPs to prevent violation of water quality standards, impacts to water quality would be less than significant.				
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
No Impact: The Project does not involve placement of housing; therefore, no impact would occur.				
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☒	☐
Less than Significant Impact: Most of the Site is located outside of the 0.2% annual chance (500-year) flood area. Limited portions of the Site near its northern and eastern boundaries are mapped by the Federal Emergency Management Agency as Shaded Flood Zone X which denotes areas of 0.2 percent annual chance flooding (500-year) and 1 percent annual chance (100-year) flood depths averaging less than one foot or with drainage areas less than 1 square mile. Where arrays are located within Shaded Flood Zone X, piles would be extended so that panels are elevated a minimum of one foot above the 1 percent annual chance flood elevation. The panels would be supported by piles that would not impede or redirect flood flows due to their very limited area. Therefore, the impact would be less than significant.				
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☒	☐

Less than Significant Impact: The Site is outside of the State-mapped dam inundation area (Solano County, 2008). No impact on the Project is anticipated from dam inundation. The Project would not be reliant on protection from any levee for the 100-year flood. Most of the Site is located outside of the 0.2% annual chance (500-year) flood area. Limited portions of the Site near its northern and eastern boundaries are mapped by the Federal Emergency Management Agency as Shaded Flood Zone X which denotes areas of 0.2 percent annual chance flooding (500-year) and 1 percent annual chance (100-year) flood depths averaging less than one foot or with drainage areas less than 1 square mile. Where arrays are located within Shaded Flood Zone X, piles would be extended so that panels are elevated a minimum of one foot above the 1 percent annual chance flood elevation. Considering the low potential for flooding, the shallow depth of potential flooding for the 1 percent annual chance flood event, and the design of the Project including panels elevated above the 1 percent annual chance flood level, the Project would not expose people or structures to significant risk from flooding. Therefore, the impact would be less than significant.				
j) Place structures in areas subject to inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒
No Impact: The Site is unlikely to be affected by seiche or tsunami due to elevation and distance from the San Joaquin River and Pacific Ocean (CEMA, 2009). The area surrounding the Site is nearly flat-lying and is not susceptible to mudflows. No impacts are anticipated.				

10. LAND USE AND PLANNING

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
No Impact: The Project occurs on an existing private parcel that does not have public access. The Project would not block any existing access or otherwise divide any established community. Therefore, there would be no impact from construction, operation, or maintenance of the Project.				
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
No Impact: The Site and surrounding area were not within the City at the time the General Plan was adopted but were included in the Planning Area boundary and identified (City of Antioch, 2003) as the Eastern Waterfront Employment Focus Area. The General Plan describes the policy direction for this Focus Area to be providing employment opportunities to assist Antioch in achieving its goal of a balance between local housing and employment. The area is described in the General Plan as needing revitalization of former heavy industrial lands, including transition to other uses, and designates the area for General Industrial development. The Project would be consistent with General Plan policies through provision of an economically beneficial source of energy to support the Eastern Waterfront Employment Focus Area development envisioned by the General Plan. The Site and surrounding lands were annexed into the City in July 2013 by Resolution No. 2013/42. . Resolution No. 2013/42 also adopted an Initial Study and Mitigated Negative Declaration for pre-zoning the annexed area and mitigation measures therein have been incorporated as applicable in this Initial Study. Antioch City Council adopted Ordinance No. 2071-C-S in August 2013 approving the prezoning for the annexed area. The Site is located on a portion of a parcel zoned Heavy Industrial (M-2) by Ordinance No. 2071-C-S. Adjacent parcels also are zoned M-2. Power generation plants are identified in Zoning Ordinance Section 9-5.301(M) as an allowable land use in an M-2 zone.				
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒
No Impact: The Parcel is outside the area of the East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan. The Parcel is not within any habitat conservation plan or natural community conservation plan. Therefore, no impact would occur.				

11. MINERAL RESOURCES

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
No Impact: The California Department of Conservation identifies mineral resources of the State and classifies significant known mineral resource areas as Mineral Resource Zone 2 (MRZ-2). The Site is not within a MRZ-2 area (California Department of Conservation, 1996). Therefore, construction of the Project would not result in the loss of availability of a known mineral resource.				
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒
No Impact: No mineral resources are identified in the Site vicinity in either the City or County General Plan. Therefore, no impact would occur.				

12. NOISE

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project result in:				
a) Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐

Less Than Significant Impact with Mitigation Incorporated: Applicable noise standards for the Project consist of Cal OSHA regulations for workers, City General Plan Noise Element Objective and Policies, and City ordinances related to noise control. OSHA standards require all facility noise levels be limited to 85 dBA to protect worker safety. If workers frequent areas of a facility that exceed 85 dBA, than a hearing conservation program must be implemented by the employer. The City General Plan Noise Objective is to achieve and maintain exterior noise levels for specified land uses. Since there are no schools, hospitals, libraries, or residences in the Site vicinity, the General Plan Noise Objective level relevant to the Project is a limit of 70 dBA for Commercial/Industrial use measured at the front setback.

The Project, once constructed, would not be a substantial source of noise and the Site is not located adjacent to any noise sensitive use. Considering this, one General Plan Noise Element Policy is relevant to the Project:

- Require that construction equipment utilize noise reduction features (e.g., mufflers and engine shrouds) that are no less effective than those originally installed by the manufacturer.

Construction would generate noise on the Site consistent with typical construction activities. Most construction activities would occur within an approximately six month period of field work. Heavy equipment and other mechanized equipment and vehicles would be used. Internal combustion engines, mechanized equipment, grading, material handling and other activities would generate noise. The noise levels from construction activities would vary during the different construction tasks, depending upon the activity locations and number and types of activities. Antioch Code of Ordinances Title 5 Chapter 17 provides limits on the hours of operation for Heavy Construction Equipment and construction work that must be adhered to unless a waiver is granted. Because there are no occupied dwellings within 300 feet of the Site, allowable hours of operation would be 7 am to 6 pm on weekdays and 9 am to 5 pm on weekends and holidays. Compliance with these requirements, along with implementation of mitigation measure NOISE-1, would ensure that noise is controlled consistent with the General Plan Policies and noise ordinances. Considering these requirements, construction noise levels would be less than significant.

Operation of the Project would generate minimal noise, primarily from fans used to cool electrical equipment and transformers. Noise is attenuated by distance and ground effects. Accounting only for distance attenuation in open air and ignoring ground effect attenuation, there is generally a 6 dB decrease in noise for every doubling of distance from the source. That is, a piece of equipment meeting the anticipated design specification of no more than 70 dBA at 5 feet distance, would generate a sound level of 64 dBA at 10 feet, 58 dBA at 20 feet, 52 dBA at 40 feet, and so on. Equipment would be more than 100 feet from the closest receptors, which are commercial properties on the south side of Wilbur Avenue. A 70 dBA noise level at 5 feet would be attenuated

<table>
<tr><td colspan="5">to a very low level at this distance and would not be significant. The distance to the nearest residences is over 1,000 feet. No residences would be affected. Considering these factors, routine operations noise impacts would be less than significant.

The facility would typically be unmanned. Operations maintenance and monitoring would typically consist of crews of one or two people testing and monitoring equipment for proper performance. Over the long term, maintenance visits are anticipated to occur monthly or less. Occasionally, mobile equipment and power tools may be used. Noise generated by maintenance crews, when present, would have peak levels that would be short-term and consistent with typical building construction work. Maintenance staff would work under a hearing conservation program as required by CalOSHA. Mitigation measure NOISE-1 would ensure that noise from construction equipment, if used for maintenance, would be controlled consistent with the General Plan Noise Element Policies. Implementation of NOISE-1 and adherence to the Antioch Code of Ordinances Title 5 Chapter 17 when applicable would limit maintenance noise impacts to a less than significant level.

<u>Mitigation Measure NOISE-1:</u>

Construction equipment shall utilize noise reduction features (e.g., mufflers and engine shrouds) that are no less effective than those originally installed by the manufacturer.</td></tr>
<tr><td>b) Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td></tr>
<tr><td colspan="5">Less Than Significant Impact: Construction activities such as grading may generate localized ground borne vibration and noise. Heavy equipment operation is not anticipated to result in excessive ground borne vibration and there are no sensitive adjacent land uses. The driven pile supports for the PV array would be relatively small and shallow (e.g., typically 0.5 foot in diameter and approximately 10 feet or less in depth), hence they would not require a large amount of energy to drive. Considering the size of the piles and that there ae no receptors nearby, ground-borne vibration from pile driving would not be noticeable by receptors offsite. Therefore, ground-borne vibration impacts would be less than significant.</td></tr>
<tr><td>c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td></tr>
<tr><td colspan="5">Less than Significant Impact: Construction noise impacts would be short term and, therefore, would not result in a permanent increase of ambient noise. Operation of the facility would generate low noise levels during the daytime. Sources of potential operational noise from the Project are anticipated to be primarily limited to the inverters and transformers, which will be de-energized at night. The voltage of the proposed grid interconnection line (21 kV) is not high enough to result in audible corona noise. Routine maintenance activities such as vegetation management and cleaning of the solar PV array are not expected to be significant sources of noise. Considering these factors, the Project would not result in a substantial permanent increase in ambient noise levels.</td></tr>
<tr><td>d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?</td><td>☐</td><td>☒</td><td>☐</td><td>☐</td></tr>
</table>

Less Than Significant Impact With Mitigation Incorporated: Construction would result in a temporary increase in ambient noise levels as described in Response 12a above. In addition, operations would result in periodic increases in ambient noise when maintenance crews are utilizing power tools or other noise-generating equipment as described in Response 12a above. Mitigation measures NOISE-1 would ensure that noise from equipment used by construction and maintenance crews is controlled consistent with the General Plan Noise Element Policies. In addition, facility construction, operations and maintenance would be required to comply with City noise protection ordinances. Because noise levels would be consistent with City standards, the impact would be less than significant.				
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
No Impact: The Project not located within an airport land use plan nor within two miles of a public airport or public use airport.				
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
No Impact: The Project not located in the vicinity of a private airstrip. Therefore, construction of the Project would result in no impact.				

13. POPULATION AND HOUSING

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
No Impact: The Project would not generate population growth, either directly or indirectly. The Project does not propose any housing or commercial development, nor extension of roads or expansion of infrastructure. Construction jobs would be short term and are expected to be filled by the existing workforce without relocation. During operations, the facility would typically be unmanned. Maintenance operations are expected to require a crew of one or two persons once per month or less over the long term. It is expected that maintenance staff positions would be filled with the existing workforce without relocation. Therefore, no growth is anticipated.				
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
No Impact: Existing housing would not be displaced by the construction, operation, or maintenance of the Project. The Site is on land that is currently unused and zoned Heavy Industrial. Therefore, no impacts would occur.				
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
No Impact: No people would be displaced by the construction, operation, or maintenance of the Project. The Site is on land that is currently unused and zoned Heavy Industrial. Therefore, no impacts would occur.				

14. PUBLIC SERVICES

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☐	☒
No Impact: The Project would be designed and constructed to follow CCCFPD requirements for access, fire water supply, and vegetation management. The final design would be subject to CCCFPD review and approval. The presence of oil in transformers onsite would require submittal of a Hazardous Materials Business Plan on the California Environmental Reporting System with an emergency response plan with emergency coordinator contact information and mechanisms for emergency access to the unmanned Project. Onsite roads would be constructed with a compacted subgrade and compacted gravel surface and would be maintained in a drivable condition for the duration of construction and operations. Access/egress gates would be constructed in compliance with specifications of Contra Costa County Fire Prevention Regulations. California Fire Code Section 304.1.2 would require the Project to be maintained free of vegetation capable of being ignited or endangering property. All electrical systems for the Project would be required to be constructed in accordance with applicable codes. With adherence to these requirements, the Project poses a low fire hazard and would not create a capacity or service level problem. CCCFD has three fire stations within the City, with the closest being Station No. 81 located on west 10^{th} approximately 2.4 miles west of the Site. No new or modified government facilities are needed to provide fire protection for the Project.				
Police protection?	☐	☐	☐	☒
No Impact: The Site is located in the City of Antioch which provides police protection and public safety within the City limits. Construction and operation of the Project would not generate a material demand on police services. The Site occurs on a parcel that is fenced with controlled access gates that would avoid the need for routine police protection services. Construction and operation of the Project would not generate population growth. The solar generation facility would be typically unmanned during operation. As such, the Project would not result in an adverse impact on City of Antioch Police Department response times, service ratios, or other performance objectives, nor would the Project result in the need for new or modified police facilities to serve the Site. The City's main police station is located on L Street approximately three miles west of the Site. No new or modified government facilities are needed to provide police protection for the Project.				
Schools?	☐	☐	☐	☒

No Impact: As described in Response 13a, above, the Project would not generate population growth. Therefore, no new demands on school facilities are expected. Therefore, there would be no impact on school capacities, service levels or performance objectives. The Project would not require new or physically altered school facilities.				
Parks?	☐	☐	☐	☒
No Impact: As described in Response 13a, above, the Project would not generate population growth. Therefore, no new demands on park facilities are expected. Therefore, there would be no impact on park capacities, service levels or performance objective. The Project would not require new or physically altered park facilities.				
Other public facilities?	☐	☐	☒	☐
Less than Significant Impact: As described in Response 13a, above, the Project would not generate population growth, extend roads, or increase the need for public infrastructure. The Project would not require new or physically altered public facilities. The Project would not create new demands on public facilities other than the less-than-significant demands for fire protection and protection services previously described and minor use of City water as previously described.				

15. RECREATION

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
No Impact: As described in Response 13.a, above, the Project would not generate population growth. Therefore, no increase is expected in the use of any park or recreational facility. Therefore, there would be no impact on park capacities, service levels or performance objective. The Project would not require new or physically altered park facilities.				
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒
No Impact: The Project does not include recreational facilities. Furthermore, as described in Response 13.a, above, the Project would not generate population growth that would increase demand for recreational facilities. Therefore, the Project would not require the construction or expansion of any recreational facility.				

16. TRANSPORTATION/TRAFFIC

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☒	☐

Less Than Significant Impact: Vehicles would access the Site via an existing paved road that is gated at Wilbur Avenue. Wilbur Avenue adjacent to the site is a two lane paved Arterial road with 12-foot wide travel lanes and paved shoulders three or more feet wide within an 87-foot-wide ROW. On the north side of Wilbur Avenue there is a six-foot wide concrete sidewalk extending the length of Parcel 051-031-020.

Construction field work for the Project would occur over a six month period during which the peak and average number of construction workers is expected to be approximately 40 and 20, respectively. Workers would arrive inbound to the Site during an approximately one-hour period in the morning and depart during an approximately one hour period in the afternoon, potentially during peak commute hours. In addition, deliveries during construction would average approximately two per day. With the relatively small size of the construction workforce needed and short term of each phase of construction (e.g., grading, equipment installation and commissioning/testing) it is anticipated that the construction workforce would primarily be from the existing regional construction labor pool currently using regional commuting routes on a regular basis. Therefore, construction would not materially add to regional commuting traffic. Construction traffic would incrementally add to existing local traffic on local roads, in particular, Wilbur Avenue. The Average Daily Traffic (ADT) on Wilbur Avenue was 6,780 (total for traffic in both directions) in November 2014. Based on an estimated 3% annual increase, the current ADT is estimated to be approximately 7,200. The addition of up to 40 construction workers arriving and departing the site would not be a significant traffic impact. The threshold used by the City for a potential significant construction traffic impact requiring traffic modeling is 50 or more cars during a peak traffic hour (Filson, 2017).

Facility operations would typically be unattended, with routine monitoring and maintenance by a crew of one to two people once per month or less over the long term. This would be a negligible traffic impact. Considering the negligible number of trips generated by the Project operations, this impact would be less than significant.

b) Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the congestion management agency for designated roads or highways?	☐	☐	☐	☒
No Impact: As described in Response 16a above, the proposed Project would have minimal impact on traffic circulation during construction and operation. Minimal traffic would occur during operations as a result of routine monitoring and maintenance consisting of a one to two people once a month or less over the long term. This traffic would be negligible. Therefore, there would be no impact or conflict with an applicable congestion management plan.				
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
No Impact: The Project would not affect any air traffic patterns or levels. There are no airports nearby.				
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
Less than Significant Impact: Wilbur Avenue in the Project vicinity is straight. The Project does not include any new construction or realignment of existing road facilities. The Site is within an existing parcel and the Project would not require new or modified streets or intersections. Some construction deliveries to the Site could be oversized or overweight. Vehicles providing deliveries would be subject to size, weight, and load restrictions pursuant to the California Vehicle Code Division 15, including permits for oversize or overweight loads as required by the California Vehicle Code Section 35780 and California Code of Regulations Title 21 Section 1411.1 et seq. Considering existing laws and regulations for limiting hazards of oversize loads, oversize loads during the short duration of construction would not be an incompatible use. During operations, the Site would typically be unattended. Considering the low volume of traffic that would be generated by Site visits, the Site entrance at the existing gate from Wilbur Avenue would not be a significant hazard or incompatible use. Considering these factors, neither construction nor operation would substantially increase hazards due to a design feature or incompatible use.				
e) Result in inadequate emergency access?	☐	☐	☐	☒
No Impact: The Project would not result in inadequate emergency access. It would not obstruct existing access routes, and access roads would be provided in accordance with CCCFPD requirements. The CCCFPD would be given gate access via either a key or a rapid entry system such as a Knox Box. The Project design includes access roads meeting CCCFPD design specifications at the site perimeter and on regular intervals throughout the PV array.				

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒
No Impact: Construction, including parking and staging, would be off-street on private property where it would not affect access to any road, bike lane, pedestrian facility, public transit facility, or other public right-of-way. The Project would be on private property that is part of the existing fenced power plant parcel. The Project would not impact alternative transportation or conflict with any alternative transportation policy, plan or program.				

17. UTILITIES AND SERVICE SYSTEMS

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
No Impact: The Project would not discharge wastewater. No wastewater treatment requirements are applicable. Portable sanitary facilities would be provided on the Site and maintained by a licensed contractor for the term of construction and operations.				
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
Less than Significant Impact: The Project would truck water to the Site from the existing power plant water system if water is obtained from that source. If water is obtained directly from the City supply during construction it may be trucked to the Site from an offsite City hydrant or obtained from existing City water supply infrastructure at the Site frontage on Wilbur Avenue. The City Public Works department would determine the temporary supply location for pickup from a hydrant. The total water demand over the approximately 6 months of field construction is estimated to be 12 acre feet. This demand would be a short term use and would not require new or expanded facilities. The minor water needs for operations would either be trucked to the Site from the existing power plant or obtained from existing City water infrastructure at the Site frontage on Wilbur Avenue. Water for fire protection is not typically a consumptive use; only minor consumption would typically be required for occasional flushing of the system to ensure reliability. Panel washing would consume approximately the 2,200 gallons of water per year considering washing annually on average. Landscaping would be required to utilize low-water plantings over an approximately 7,600 square foot area to meet minimum City requirements. There would be no need for new or expanded water supply infrastructure (Connelly, 2016). The Project would not discharge wastewater. Portable sanitary facilities would be used onsite for construction and operations with regular pumping and maintenance by a licensed contractor. Considering these factors, the Project would not create any capacity problems for water or wastewater or require expansion of existing water or wastewater facilities.				
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒

No Impact: As described in the Response to 9c, above, considering existing and proposed drainage conditions, the Project would not substantially alter the existing drainage pattern. Furthermore, the impervious area that would be removed for the Project would far exceed the impervious area to be constructed so there would be no increase in runoff. Therefore, there would be no impact to drainage system capacity. A hydrology report is provided in Appendix D, Hydrology Report. Impervious area that would be removed for the Project, including approximately 200,000 square feet of asphalt, would far exceed the impervious area to be constructed. Considering these factors, the Project would not require new Stormwater drainage facilities or expansion of existing facilities.				
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are there new or expanded entitlements needed?	☐	☐	☒	☐
Less than Significant Impact: As described in Response 17b, approximately 12 acre feet of water would be required during the 6 month construction period. This water would be obtained from the existing power plant water supply or the City water supply. Long term water demand for the Project would be minimal and would consist of water for annual fire hydrant testing, maintenance of approximately 7,600 square feet of water efficient landscaping required by the City along the Wilbur Avenue frontage, and occasional panel washing. Panel washing, if needed, would likely occur annually or less (i.e., about 2,200 gallons of water per year on average). Water for these uses would be obtained from the City's municipal water supply either directly from the City or via the existing power plant water supply. Considering the limited water use by the Project and proposed water supply sources, The City's existing supply is adequate to serve the Project's construction and operations needs with no new entitlements and City water supply is available at the Site frontage on Wilbur Avenue (Shaun Connelly, Water Supervisor, 2016).				
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
No Impact: The Project would be unattended and would not need waste water services. Portable sanitary facilities would be used onsite for construction and operations with regular pumping and maintenance by a licensed contractor.				
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☒	☐

Less than Significant Impact: Most construction debris would consist of recyclable materials such as wood pallets, plastic and paper packaging and scrap metal that can be taken to a waste recycling center. Recyclable materials would be separated and managed for recycling to the extent practical. Wastes and recyclable materials would be shipped offsite by licensed haulers to waste management and recycling facilities permitted to accept the materials. Construction would only generate waste for a short period of time. The Project would be required to submit a waste management plan under the City Sanitation and Health Ordinance (Title 6 Chapter 3, Article 2) in order to get a building permit. The generation facilities would convert solar energy into electric energy without substantial waste generation during operations. Quantities of non-hazardous and hazardous waste generated by routine operations would be negligible.				
g) Comply with federal, state, and local statues and regulations related to solid waste?	☐	☐	☒	☐
Less than Significant Impact: The Project would be required to comply with applicable federal, state and local statues and regulations related to solid waste. Wastes and recyclable materials would be shipped offsite regularly by licensed haulers to waste management and recycling facilities permitted to accept the materials. The Project would be required to submit a waste management plan under the City Sanitation and Health Ordinance (Title 6 Chapter 3, Article 2) in order to get a building permit. The generation facilities would convert solar energy into electric energy without substantial waste generation during operations. Quantities of waste generated by routine operations would be negligible. If hazardous waste is generated, it would be managed in accordance with California Code of Regulations Title 22 Division 4.5 requirements.				

18. MANDATORY FINDINGS OF SIGNIFICANCE

	Potentially Significant Impact	*Less Than Significant Impact with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
Less than Significant Impact With Mitigation Incorporated: The Site occurs on a portion of a parcel that was formerly encumbered by aboveground oil tanks where the tanks have been removed. The Site does not contain significant sensitive plant resources with the exception of one individual Antioch Dune primrose plant that will be avoided (see Section 4, Biological Resources). Adjacent lands also are highly disturbed. Mitigation Measures BIO-1 through BIO-7 are proposed to avoid significant impacts to sensitive species that might occur onsite. No fish habitat is present onsite. Considering the absence of sensitive habitat and mitigation measures incorporated to avoid significant impacts to sensitive species, the Project would not have the potential to degrade the quality of the environment, substantially reduce the habitat of any fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, nor reduce the number of restrict the range or a rare or endangered plant or animal. There are no structures onsite and no significant historic or prehistoric resources are known to occur onsite based on a records search and Tribal input (see Section 5 in this Initial Study checklist). Therefore, the Project would not eliminate any identified important example of the major periods of California history or prehistory. Mitigation Measures CUL-1, CUL-2, and CUL-3 would ensure that impacts to cultural resources would be less than significant in the event of an unexpected cultural resource discovery.				
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past Project, the effects of other current Project, and the effects of probable future projects)?	☐	☒	☐	☐

Less Than Significant Impact With Mitigation Incorporated: As described in preceding sections of this Initial Study checklist, the Project would have no impact on agricultural or forest lands, land use, mineral resources, growth, population, housing, schools, parks, libraries or recreation. The project would have a negligible impact on utilities and public services. The Project would not conflict with biological resource conservation plans, air quality protection plans, traffic congestion management plans, or other established environmental plans or policies. Because the Project would have no impact or conflict in these topic areas, there is no potential for the Project to have a cumulative effect in these topic areas with other past, current or probable future Project.

The Project would not affect any designated scenic vista nor would it damage any scenic resources. The proposed Project would be located on Industrial zoned land in an industrial zoned area. Considering these factors, the cumulative impact on aesthetic resources would be less than significant.

Air quality cumulative impacts are addressed in Section 3 of this Initial Study checklist and are less than significant.

As described in Section 4 of this Initial Study checklist, impacts to biological resources would be limited due in part to the Site occurring on a highly disturbed parcel. The Site does not contain any significant plant resources except for one individual Antioch Dune primrose that would be avoided (see Section 4, Biological Resources, in this Initial Study checklist). Mitigation measures BIO-1, through BIO-7 would prevent impacts to nesting birds, burrowing owl and other sensitive species that could occur onsite, thereby preventing cumulative impacts. With these measures, there would be no significant cumulative impacts to protected species.

No significant cultural resources are known to occur. Mitigation Measures CUL-1, CUL-2, and CUL-3 would ensure that impacts to cultural resources are mitigated in the event of an unexpected cultural resource discovery so that there are no cumulative impacts.

The Project would have no cumulative impact related to geology or soils. The Project would not impact important mineral resources or unique geologic features. Geologic hazards, by nature, are facility-specific and do not have the potential for cumulative effects. The Project would have no impact on seismic hazards at other locations, and no other reasonably foreseeable project could affect seismic hazards at the site. Therefore, there is no cumulative impact related to seismic shaking.

As described in Section 7 of this Initial Study checklist, once constructed, the electric energy produced by the Project would reduce the dependency on fossil fuel-produced electric energy, thereby providing a long-term GhG benefit helping to reduce the rate of climate change impacts. Considering that the Project would operate as unattended facilities and would require relatively minimal maintenance vehicle trips (monthly or less over the long term), and considering that limiting climate change is the focus of California's goals for implementing solar PV and other renewable energy technologies, Project GhG emissions would be less than significant both individually and cumulatively.

As described in Section 8 of this Initial Study checklist, impacts of the Project related to hazards and hazardous materials would be less than significant. Construction of the Project would require the use of fuels, lubricants and other hazardous materials typical of construction sites and would be short term. No cumulative impact is anticipated. Operations would require few hazardous materials, primarily insulating oil in electric equipment. No cumulative impact is anticipated.

The Project would not violate any water quality standard or waste discharge requirements or affect water quality. Therefore, there would be no cumulative effect in these areas. The grading plan would be subject to review by the City's Building Division and would be designed to smooth existing contours and avoid changes to watershed areas. The total impermeable surface area on the Site would be reduced. The PV modules in the flood zone would be mounted on pile foundations that would not materially affect flood flows. Module panels would be designed with an elevation at least one foot above the 100-year flood elevation. Therefore, cumulative effects to flood conditions would be less than significant.

Mitigation measure NOISE-1 would ensure that equipment uses proper mufflers to avoid excessive noise during construction. During operations, the project would generate low levels of noise. With Mitigation measure NOISE-1, noise from the project would not be perceptible at closest sensitive receptors. Therefore, there would be no potential for cumulative noise impact.

As described in Section 16 of this Initial Study checklist, the Project would generate insignificant long-term traffic. Operations would typically be unattended, with routine monitoring and maintenance by a crew of one to two staff once per month or less over the long term, which would be a negligible traffic impact. The Project would not involve new construction or realignment of any roads. The Project would be developed in conformance with all applicable plans, policies, programs, and ordinances related to transportation. Considering these factors, cumulative traffic impacts would be less than significant.

Considering the factors addressed above, the Project would not have significant cumulative impacts on the environment.

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

<u>Less Than Significant Impact With Mitigation Incorporated:</u>

The Project does not have the potential for environmental effects that could cause substantial adverse effects on human beings, either directly or indirectly, other than those addressed in preceding sections of this Initial Study checklist. As described in preceding sections of this Initial Study checklist, the Project would have no impact on agricultural or forest lands, mineral resources, growth, population, housing, schools, parks, libraries, recreation, or public services, and the Project would not conflict with zoning, land use, biological resource conservation plans, air quality protection plans, energy plans or policies, transportation, traffic and congestion management plans, or other established environmental plans or policies. The Project would not have substantial adverse effects related to aesthetics, air quality, cultural resources, energy consumption, GhGs, geology and soils, hazards or hazardous materials, hydrology, utilities or transportation. With recommended mitigation measures BIO-1 through BIO-7, CUL 1 through CUL-3, and NOISE-1 identified in Sections 4, 5, and 12, respectively, of this Initial Study checklist, it would have less than significant impacts related to biological resources, cultural resources, and noise. There would be no significant direct, indirect or cumulative impacts with these mitigation measures. The Project involves development of renewable energy sources that would produce electric energy from solar energy without emissions to help to satisfy California's legislated goals to reduce GhG emissions to mitigate anthropogenic climate change. The Project is anticipated to provide an overall environmental benefit to human beings through reduction of direct and indirect effects of climate change.

3.4 REFERENCES

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3.5 PREPARERS

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(949) 727-9336

Joseph Stenger, PG, QSD, Project Director
Susan Underbrink, RPA, Senior Archaeologist
Cara Snellen, Senior Biologist
Joshua Taylor, Lead Planner
Tim Henggeler, Environmental Engineer
Kathleen Cooney, Environmental Scientist

ATTACHMENT 1
PRELIMINARY DESIGN DRAWINGS

DESIGN REVIEW APPLICATION
PRELIMINARY DESIGN DRAWINGS
BIG BREAK SOLAR PROJECT
ANTIOCH, CALIFORNIA

VICINITY MAP
NOT TO SCALE

N

PROJECT APPLICANT

NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
ATTENTION: JOE CORNING
PH: (415) 627-1636
JOE.CORNING@NRG.COM

DRAWING SCHEDULE

LEGEND:

- PROPERTY/PARCEL LINE
- EXISTING EASEMENT
- 6 — EXISTING TOPOGRAPHIC CONTOUR (1-FOOT MINOR INTERVAL)
- 10 — EXISTING TOPOGRAPHIC CONTOUR (5-FOOT MAJOR INTERVAL)
- 6 — PROPOSED GRADING TOPOGRAPHIC CONTOUR (1-FOOT MINOR INTERVAL)
- 10 — PROPOSED GRADING TOPOGRAPHIC CONTOUR (5-FOOT MAJOR INTERVAL)
- PROJECT SITE
- FLOOD ZONE X, HATCHED ON FLOOD SIDE
- TRIBUTARY DRAINAGE AREA (PRE-DEVELOPMENT)
- TRIBUTARY DRAINAGE AREA (POST-DEVELOPMENT)
- FLOW PATH (PRE-DEVELOPMENT)
- 2.0% — FLOW PATH AND SLOPE (POST-DEVELOPMENT)
- PROPOSED SWALE
- PROPOSED GENERATION TIE LINE
- FENCE
- WOODED AREA
- GRAVEL AREA
- ASPHALTIC CONCRETE (AC)
- CONCRETE
- AC TO BE REMOVED.
- W — EXISTING WATER LINE
- SS — EXISTING SEWER LINE

SYMBOLS:

BFP	BACK FLOW PREVENTOR	PIV	POST INDICATOR VALVE
BOL	BOLLARD	PP	POWER POLE
CB	CATCH BASIN	SL	STREET LIGHT
℄	CENTERLINE	SDMH	STORM DRAIN MANHOLE
DCV	DOUBLE CHECK VALVE	SSCO	SANITARY SEWER CLEANOUT
EB	ELECTRICAL BOX	SSMH	SANITARY SEWER MANHOLE
EC	ELECTRICAL CABINET	TMH	TELEPHONE MANHOLE
EM	ELECTRICAL METER	TVT	TELEPHONE VAULT
EV	ELECTRICAL VAULT	TRANS	TRANSFORMER
FDC	FIRE DEPARTMENT CONNECTION	TSB	TRAFFIC SIGNAL BOX
FH	FIRE HYDRANT	UB	UTILITY BOX
FND	FOUND MONUMENT	VT	UTILITY VAULT
GV	GAS VALVE	WM	WATER METER
MH	MANHOLE	WV	WATER VALVE
MW	MONITORING WELL	YL	YARD LIGHT

SITE INFORMATION:

GROSS PARCEL AREA:	±3,762,100 SF / ±86.37 AC
NET PARCEL AREA:	±3,762,100 SF / ±86.37 AC
SITE AREA:	±660,033 SF / ±15.15 AC (AREA WITHIN FENCE)
DISTURBANCE AREA:	±660,033 SF / ±15.15 AC (AREA WITHIN FENCE)
TOTAL EXISTING IMPERVIOUS AREA:	±59,400 SF
TOTAL POST-CONSTRUCTION IMPERVIOUS AREA:	±530 SF
PROPOSED LANDSCAPED AREA:	±7,600 SF
EXISTING ZONING:	M2 (HEAVY INDUSTRIAL)
PROPOSED ZONING:	M2 (HEAVY INDUSTRIAL)
GENERAL PLAN LAND USE:	FOCUS AREA
EXISTING LAND USE:	POWER PLANT
PROPOSED LAND USE:	PHOTOVOLTAIC SOLAR POWER PLANT / POWER PLANT

EARTHWORK QUANTITIES:

CONSTRUCTION MAY VARY.

CUT: 25,900 CUBIC YARDS
FILL: 25,900 CUBIC YARDS

SHEET SIZE 22"x34" - SCALE ACCORDINGLY

NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	BY	CHKD	APP.
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS
1	03/03/17	REVISED/REISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

TITLE: COVER SHEET

DRAFT

PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

ENGINEER:
TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

TRC Results you can rely on

APPLICANT:
NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

SHEET NO. CS

BOUNDARY NOTE:

INFORMATION SHOWN ON THIS SHEET IS BASED ON THE ALTA/ACSM LAND TITLE SURVEY BY SLOOTEN CONSULTING INC. BASED ON FIELD SURVEY ON SEPTEMBER 23, 2015 AND PROVIDED WITH THE APPLICATION.

N

200 ft 0 200 ft 400 ft

SHEET SIZE 22"x34" - SCALE ACCORDINGLY

NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	BY	CHKD	APP
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

TITLE: EXISTING BOUNDARIES

PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

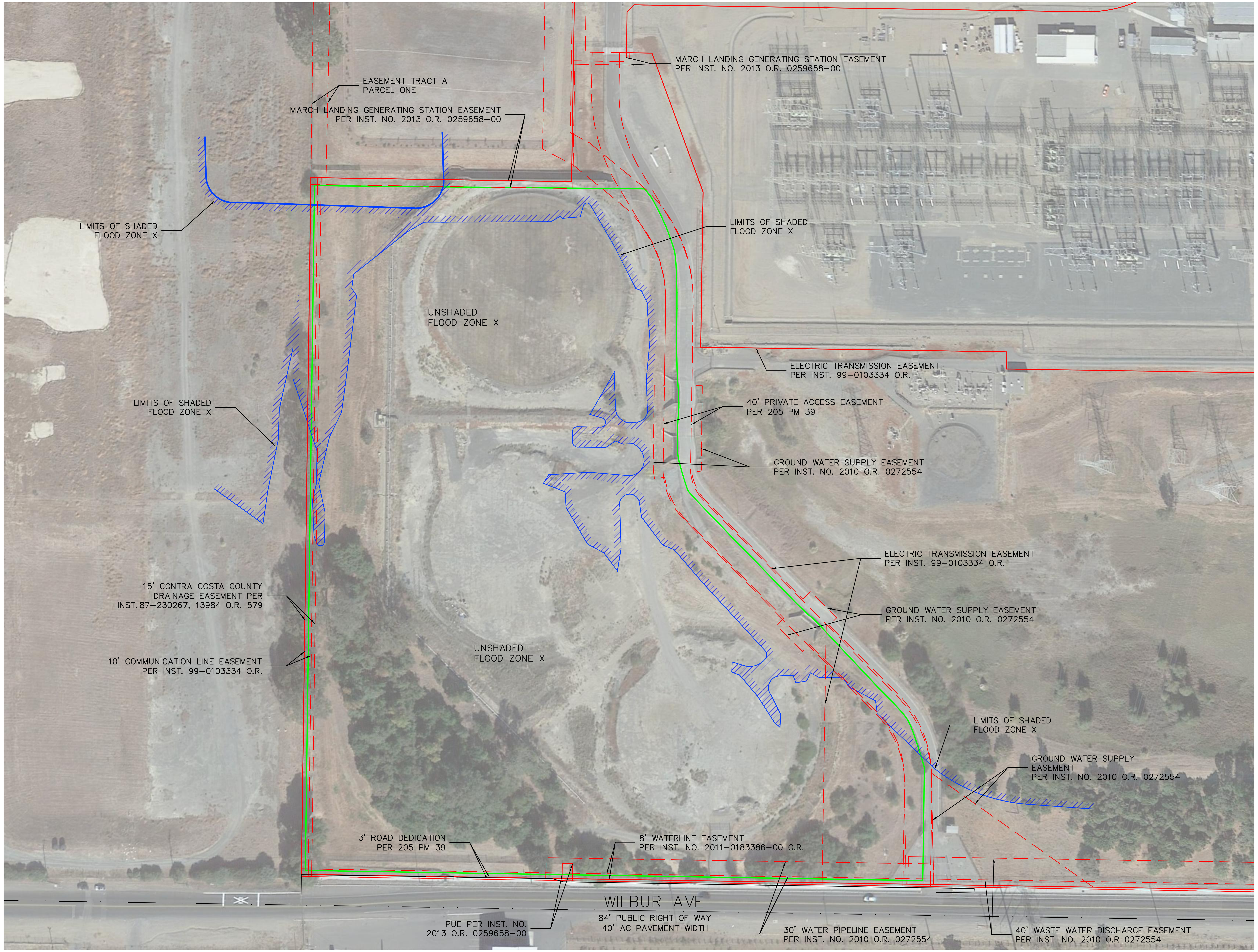
DRAFT

ENGINEER:
TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

TRC Results you can rely on

APPLICANT:
NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

SHEET NO. C-1.1



NOTES:

1. BY GRAPHIC PLOTTING ONLY, THIS PROPERTY IS LOCATED IN ZONE "UNSHADED X & SHADED X" OF THE FLOOD INSURANCE RATE MAP (COMMUNITY PANEL NO. 06013C0144G, WHICH BEARS AN EFFECTIVE DATE OF 9/30/2015) AND IS NOT IN A SPECIAL FLOOD HAZARD AREA.

   ZONE "UNSHADED X" DENOTES AREAS OF MINIMAL FLOOD HAZARD, USUALLY ABOVE THE 500-YEAR FLOOD LEVEL. "SHADED X" DENOTED AREAS OF 0.2% ANNUAL CHANCE FLOOD (500-YEAR), AREAS WITH 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS LESS THAN 1 FOOT OR WITH DRAINAGE AREAS OF LESS THAN 1 SQUARE MILE. NO FIELD SURVEYING WAS PERFORMED TO DETERMINE THE ACTUAL LOCATION OF THE FLOOD ZONE.

2. EASEMENT INFORMATION SHOWN ON THIS SHEET IS BASED ON THE ALTA/ACSM LAND TITLE SURVEY BY SLOOTEN CONSULTING INC. BASED ON FIELD SURVEY ON SEPTEMBER 23, 2015 AND PROVIDED WITH THE APPLICATION.

N

80 ft 0 80 ft 160 ft

SHEET SIZE 22"x34" - SCALE ACCORDINGLY

NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	BY	CHKD	APP
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

TITLE: EXISTING EASEMENTS & FLOODING

DRAFT

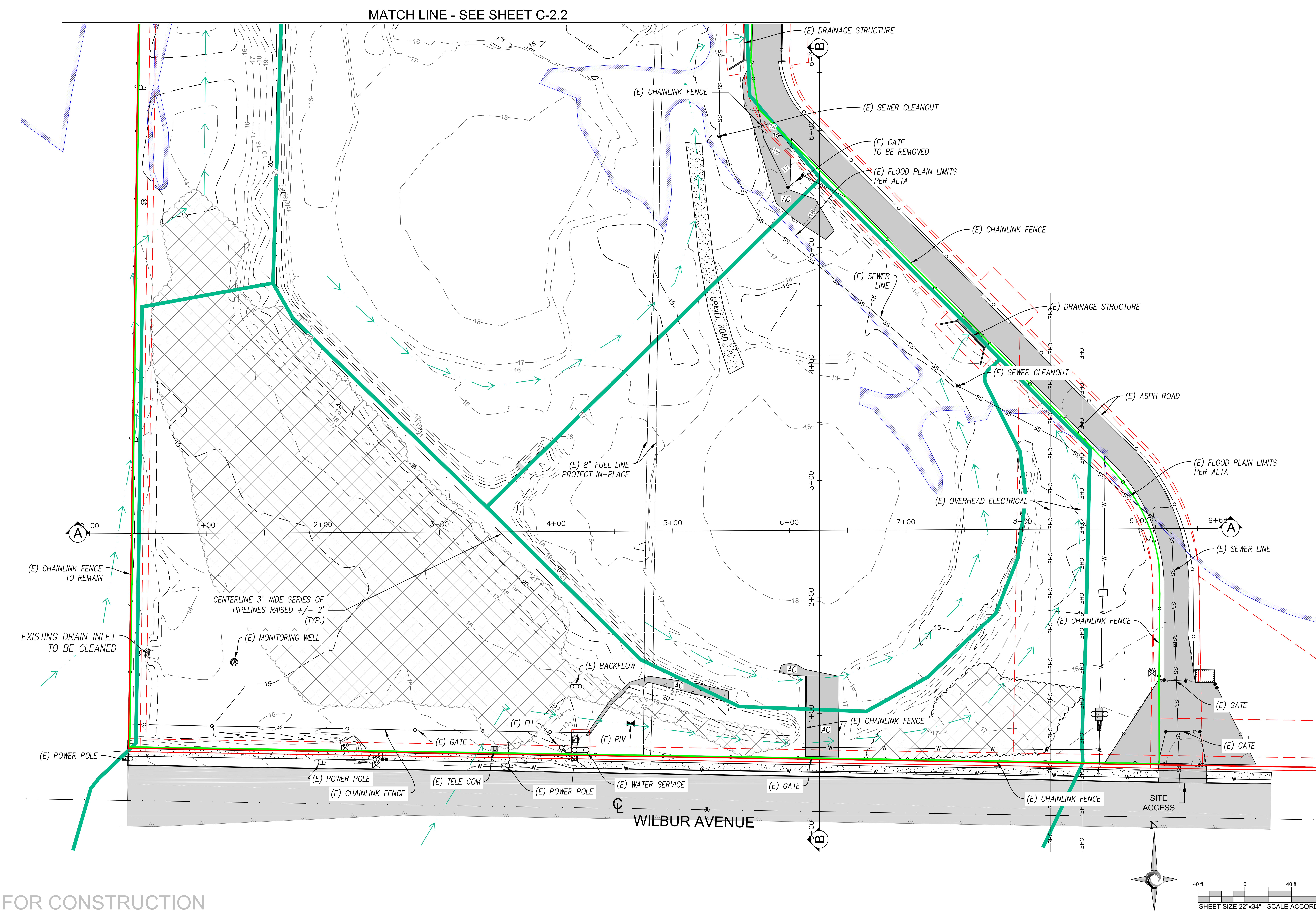
PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

ENGINEER:
TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

TRC
Results you can rely on

APPLICANT:
NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

SHEET NO. C-1.2



NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	BY	CHKD	APP
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS
1	03/03/17	REVISED/REISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

TITLE: EXISTING TOPOGRAPHY (SOUTH)

DRAFT

PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

ENGINEER: TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
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TRC Results you can rely on

APPLICANT: NRG SOLAR DG LLC
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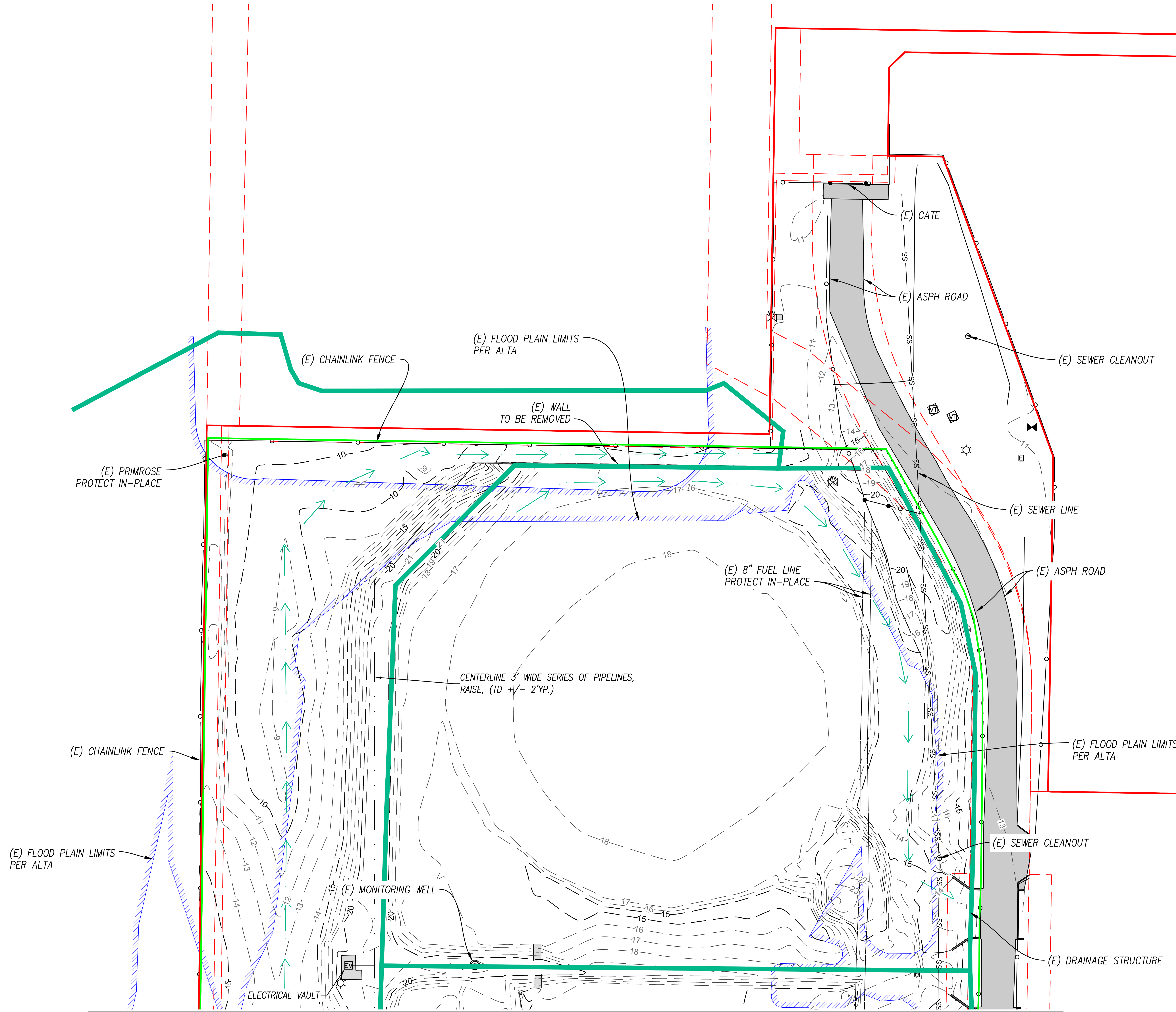
SHEET NO. C-2.1



MATCH LINE - SEE SHEET C-2.1

40 ft 0 40 ft 80 ft

SHEET SIZE 22"x34" - SCALE ACCORDINGLY

NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	BY	CHKD	APP
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

TITLE: EXISTING TOPOGRAPHY (NORTH)

DRAFT

PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

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TRC Results you can rely on

APPLICANT: NRG SOLAR DG LLC
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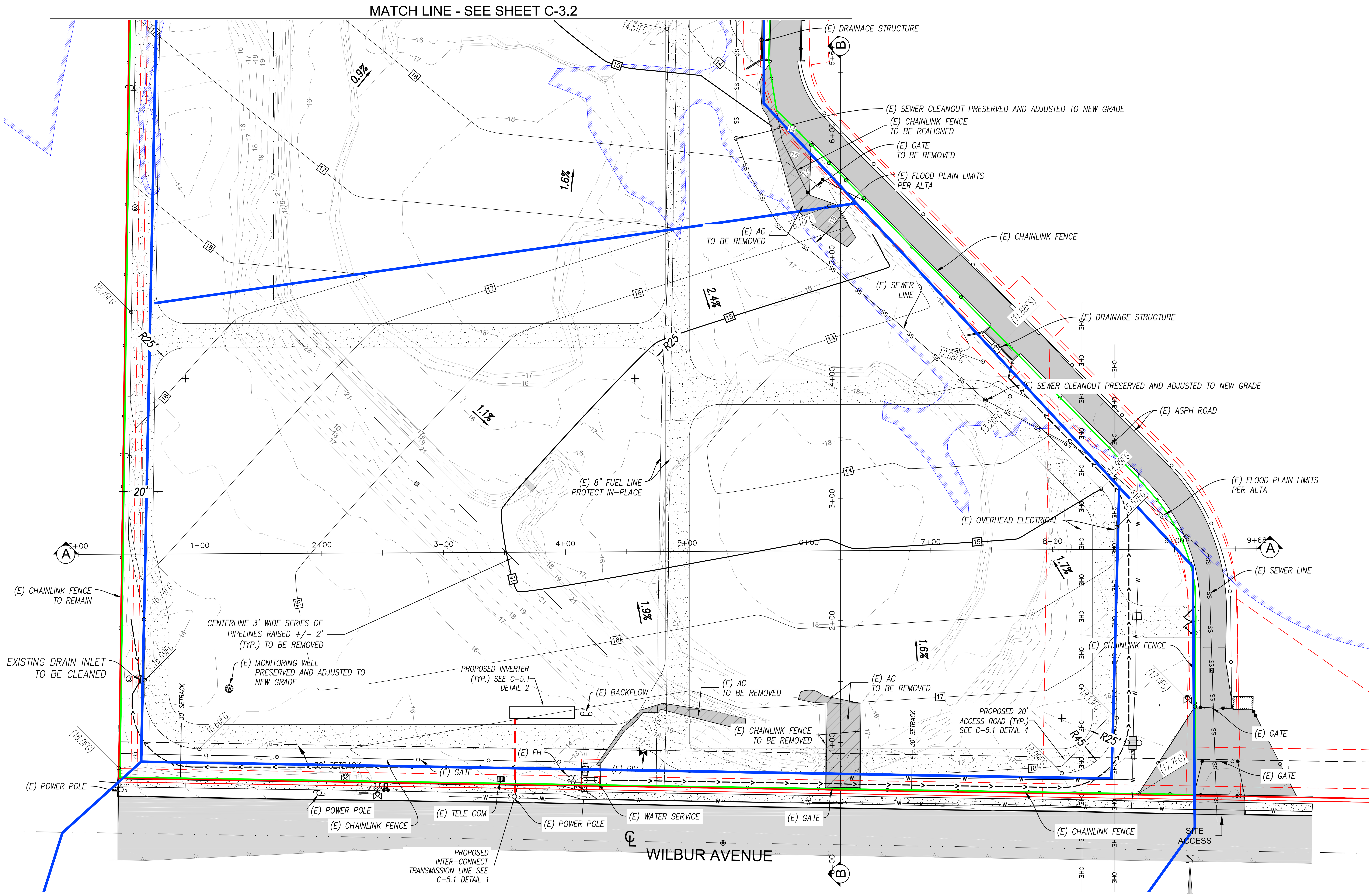
PH: 415-627-1636

SHEET NO. C-2.2



NOTE:
INFORMATION SHOWN ON THIS SHEET IS BASED ON THE SITE PLAN PREPARED BY JOSEPH E. BONADIMAN AND ASSOCIATES, INC. DATED MARCH 14, 2016.

40 ft 0 40 ft 80 ft
SHEET SIZE 22"x34" - SCALE ACCORDINGLY

NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	BY	CHKD	APP
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS
1	03/03/17	REVISED/REISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

TITLE: CONCEPTUAL GRADING AND DRAINAGE PLAN (SOUTH)

DRAFT

PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE., ANTIOCH, CA
APN 051-031-020

ENGINEER: TRC SOLUTIONS, INC
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TRC Results you can rely on

APPLICANT: NRG SOLAR DG LLC
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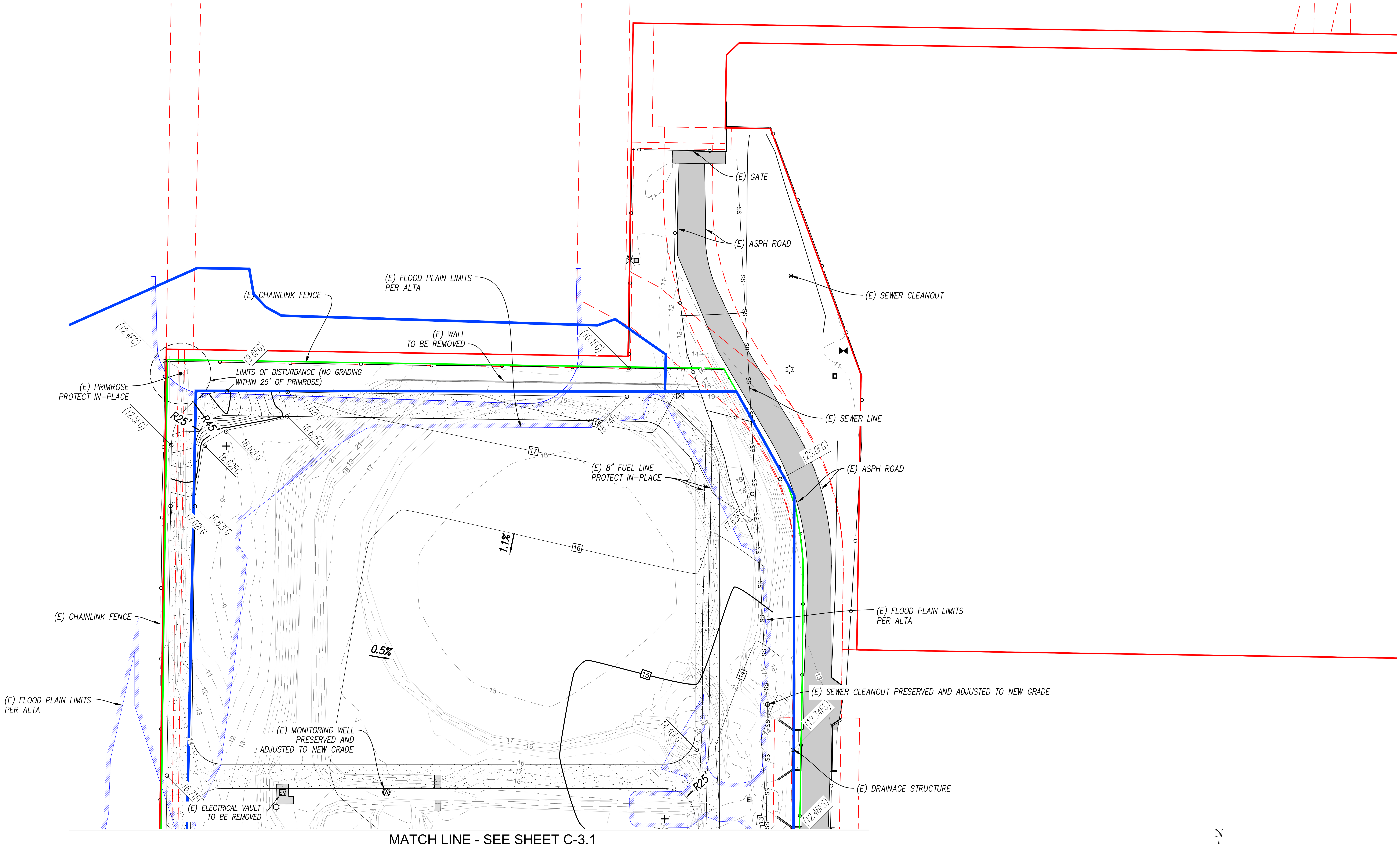
PH: 415-627-1636

SHEET NO. C-3.1



N

40 ft 0 40 ft 80 ft

SHEET SIZE 22"x34" - SCALE ACCORDINGLY

NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	BY	CHKD	APP
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS
1	03/03/17	REVISED/REISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

TITLE: CONCEPTUAL GRADING AND DRAINAGE PLAN (NORTH)

DRAFT

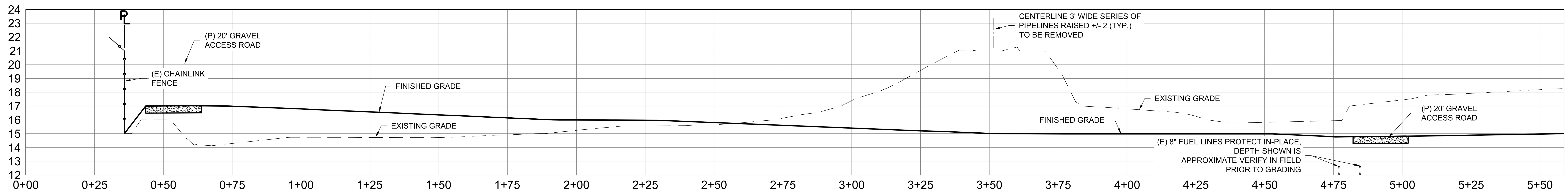
PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

ENGINEER:
TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

TRC Results you can rely on

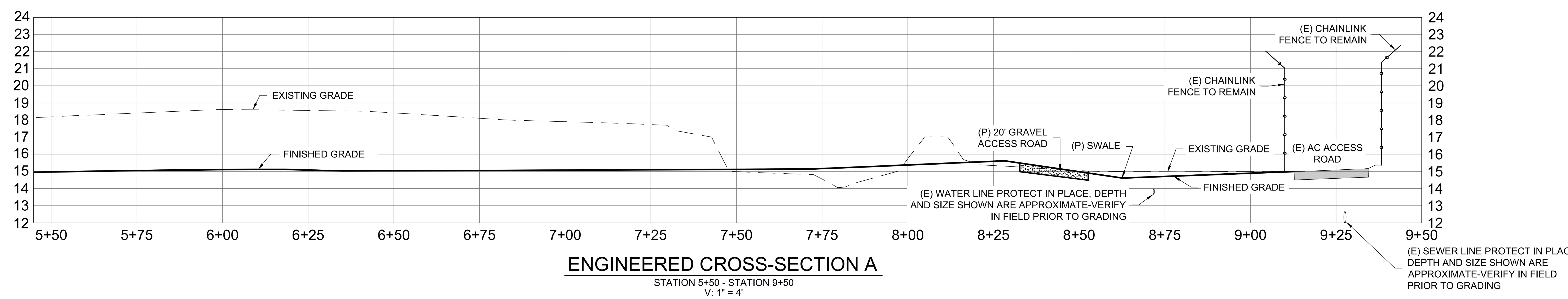
APPLICANT:
NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

SHEET NO. C-3.2



ENGINEERED CROSS-SECTION A

STATION 0+00 - STATION 5+50
V: 1" = 4'
H: 1" = 20'



ENGINEERED CROSS-SECTION A

STATION 5+50 - STATION 9+50
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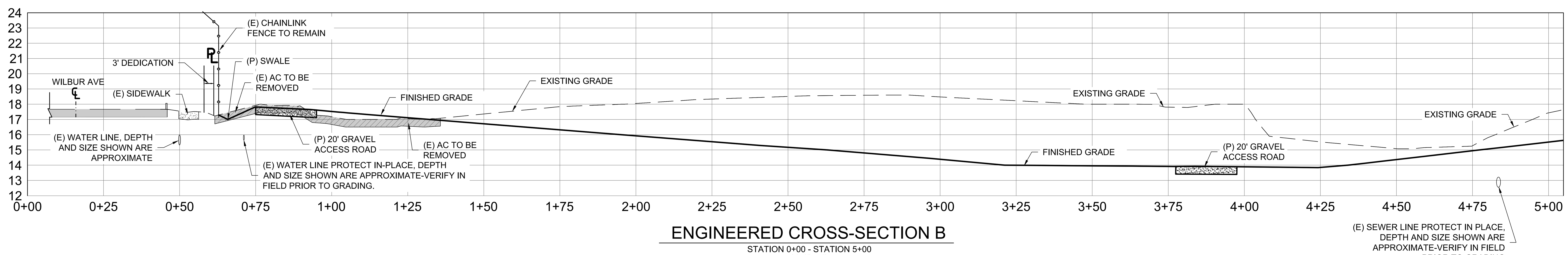
H: 1" = 20'



ENGINEERED CROSS-SECTION B

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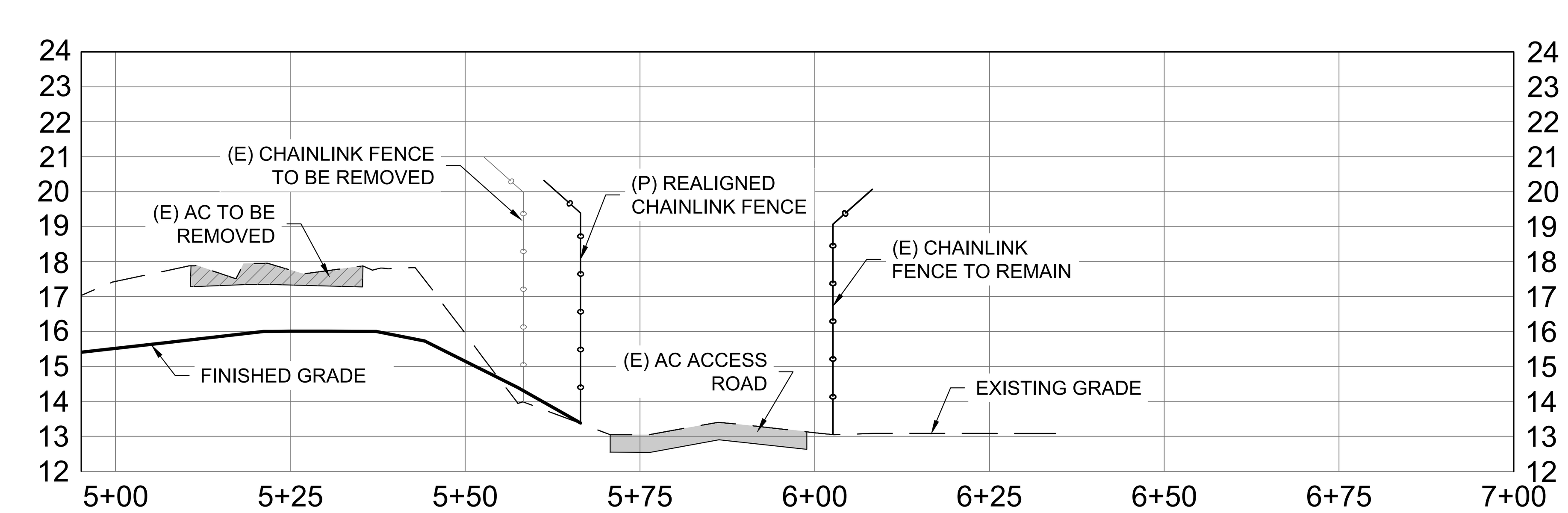
H: 1" = 20'



ENGINEERED CROSS-SECTION B

STATION 5+00 - STATION 7+00
V: 1" = 4'
H: 1" = 20'

NOT FOR CONSTRUCTION

SHEET SIZE 22"x34" - SCALE ACCORDINGLY

REV	DATE	DESCRIPTION	BY	CHKD	APP
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS
1	03/03/17	REVISED/REISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

TITLE: ENGINEERED CROSS-SECTIONS

DRAFT

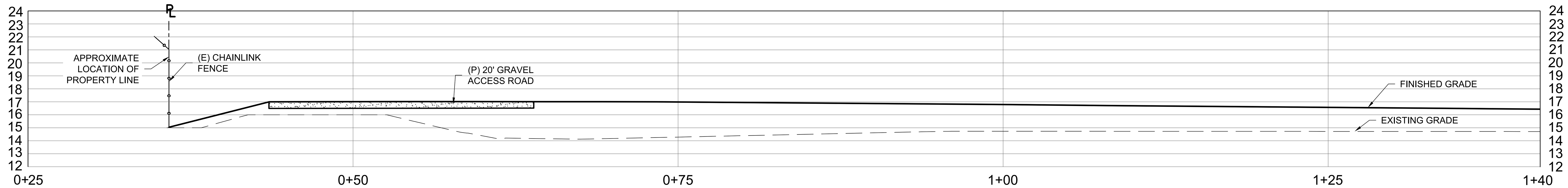
PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

ENGINEER: TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

TRC Results you can rely on

APPLICANT: NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

SHEET NO. C-3.3



TRUE CROSS-SECTION A

STATION 0+00 - STATION 1+40
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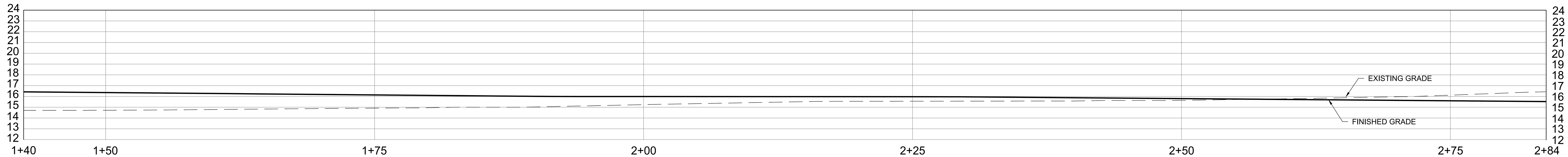

TRUE CROSS-SECTION A

STATION 1+40 - STATION 2+84
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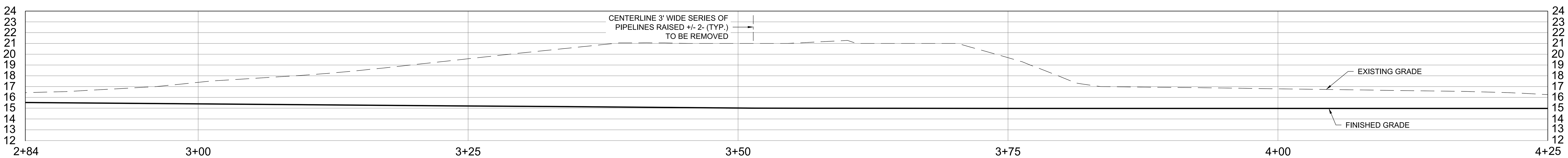
H: 1" = 5'



TRUE CROSS-SECTION A

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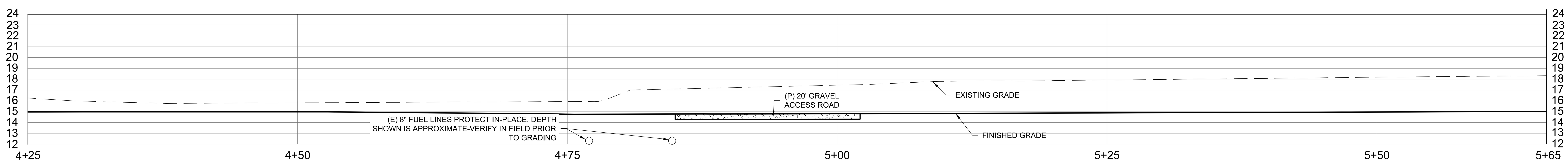
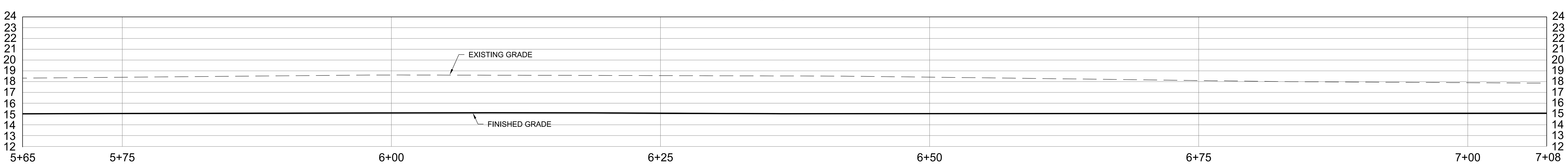


TRUE CROSS-SECTION A

STATION 4+25 - STATION 5+65
V: 1" = 5'
H: 1" = 5'



TRUE CROSS-SECTION A

STATION 5+65 - STATION 7+08
V: 1" = 5'
H: 1" = 5'

NOT FOR CONSTRUCTION

SHEET SIZE 22"x34" - SCALE ACCORDINGLY

REV	DATE	DESCRIPTION	BY	CHKD	APP
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS
1	03/03/17	REVISED/REISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

DRAFT

TITLE: TRUE CROSS-SECTION A

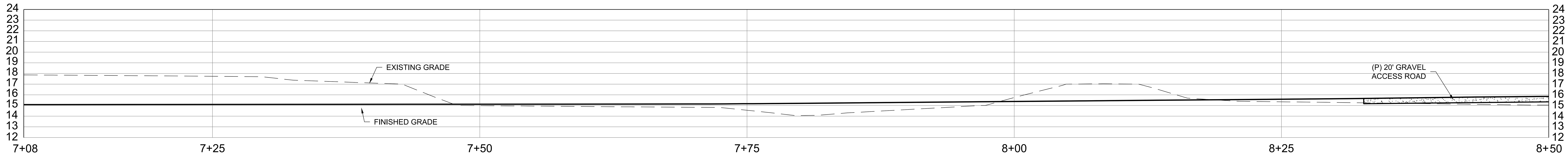
PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

ENGINEER:
TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

TRC Results you can rely on

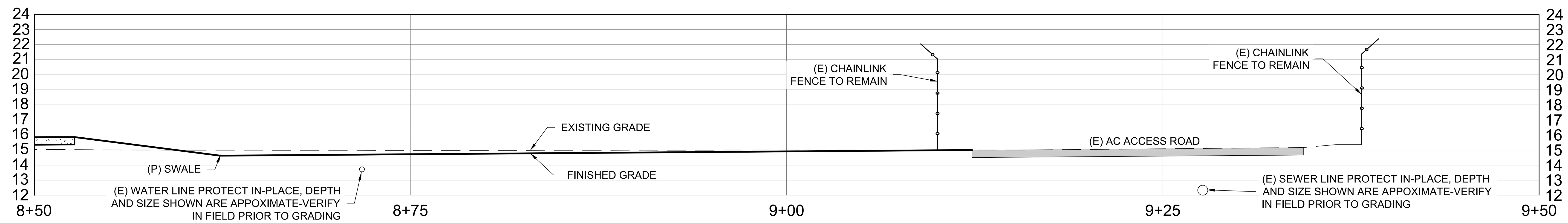
APPLICANT:
NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

SHEET NO. C-3.4



TRUE CROSS-SECTION A

STATION 7+08 - STATION 8+50
V: 1" = 5'
H: 1" = 5'



TRUE CROSS-SECTION A

STATION 8+50 - STATION 9+50
V: 1" = 5'
H: 1" = 5'

REV	DATE	DESCRIPTION	BY	CHKD	APP
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS
1	03/03/17	REVISED/REISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

TITLE: TRUE CROSS-SECTION A

PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

DRAFT

ENGINEER:
TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

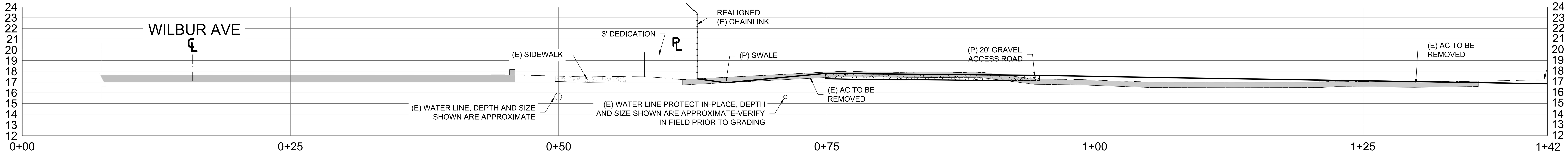
TRC Results you can rely on

APPLICANT:
NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

SHEET NO. C-3.5

SHEET SIZE 22"x34" - SCALE ACCORDINGLY

NOT FOR CONSTRUCTION



TRUE CROSS-SECTION B

STATION 0+00 - STATION 1+42
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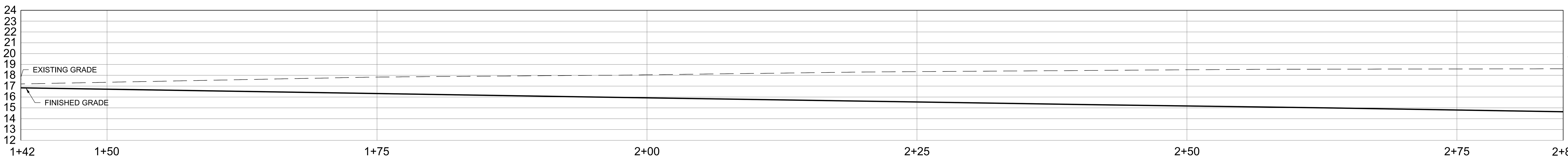
H: 1" = 5'



TRUE CROSS-SECTION B

STATION 1+42 - STATION 2+85
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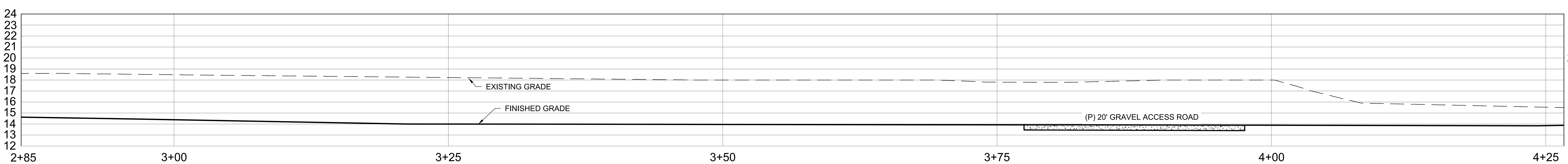
H: 1" = 5'



TRUE CROSS-SECTION B

STATION 2+85 - STATION 4+25
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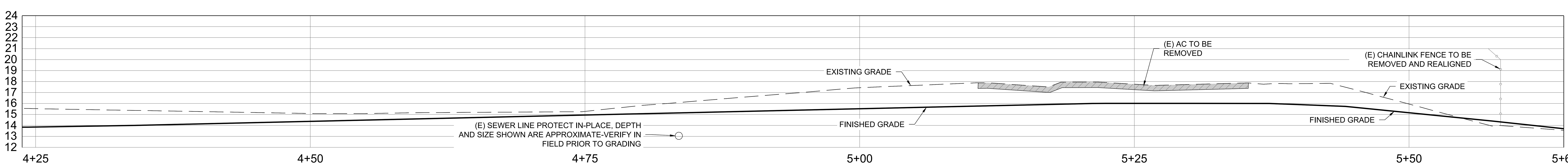
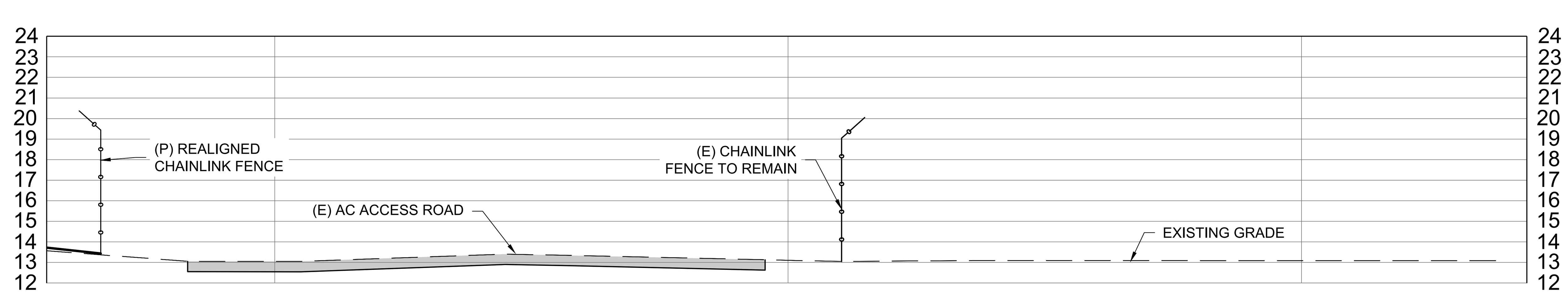
H: 1" = 5'



TRUE CROSS-SECTION B

STATION 4+25 - STATION 5+64
V: 1" = 5'
H: 1" = 5'



TRUE CROSS-SECTION B

STATION 5+64 - STATION 6+36
V: 1" = 5'
H: 1" = 5'

NOT FOR CONSTRUCTION

SHEET SIZE 22"x34" - SCALE ACCORDINGLY

REV	DATE	DESCRIPTION	BY	CHKD	APP
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS
1	03/03/17	REVISED/REISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

DRAFT

TITLE: TRUE CROSS-SECTION B

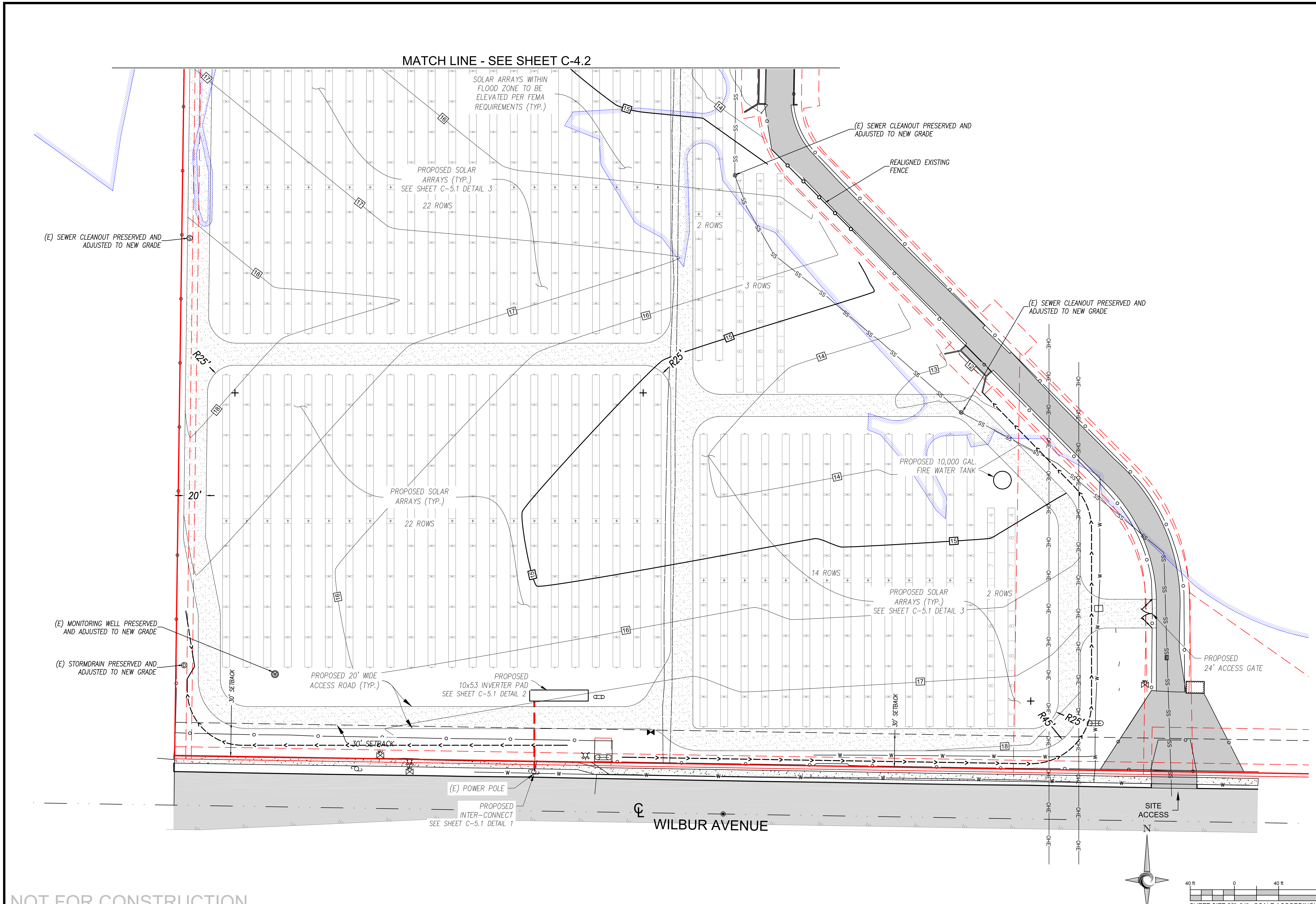
PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

ENGINEER: TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

TRC Results you can rely on

APPLICANT: NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

SHEET NO. C-3.6



REV	DATE	DESCRIPTION	BY	CHKD	APP
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS
1	03/03/17	REVISED/REISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

DRAFT

TITLE: CONCEPTUAL SITE LAYOUT (SOUTH)

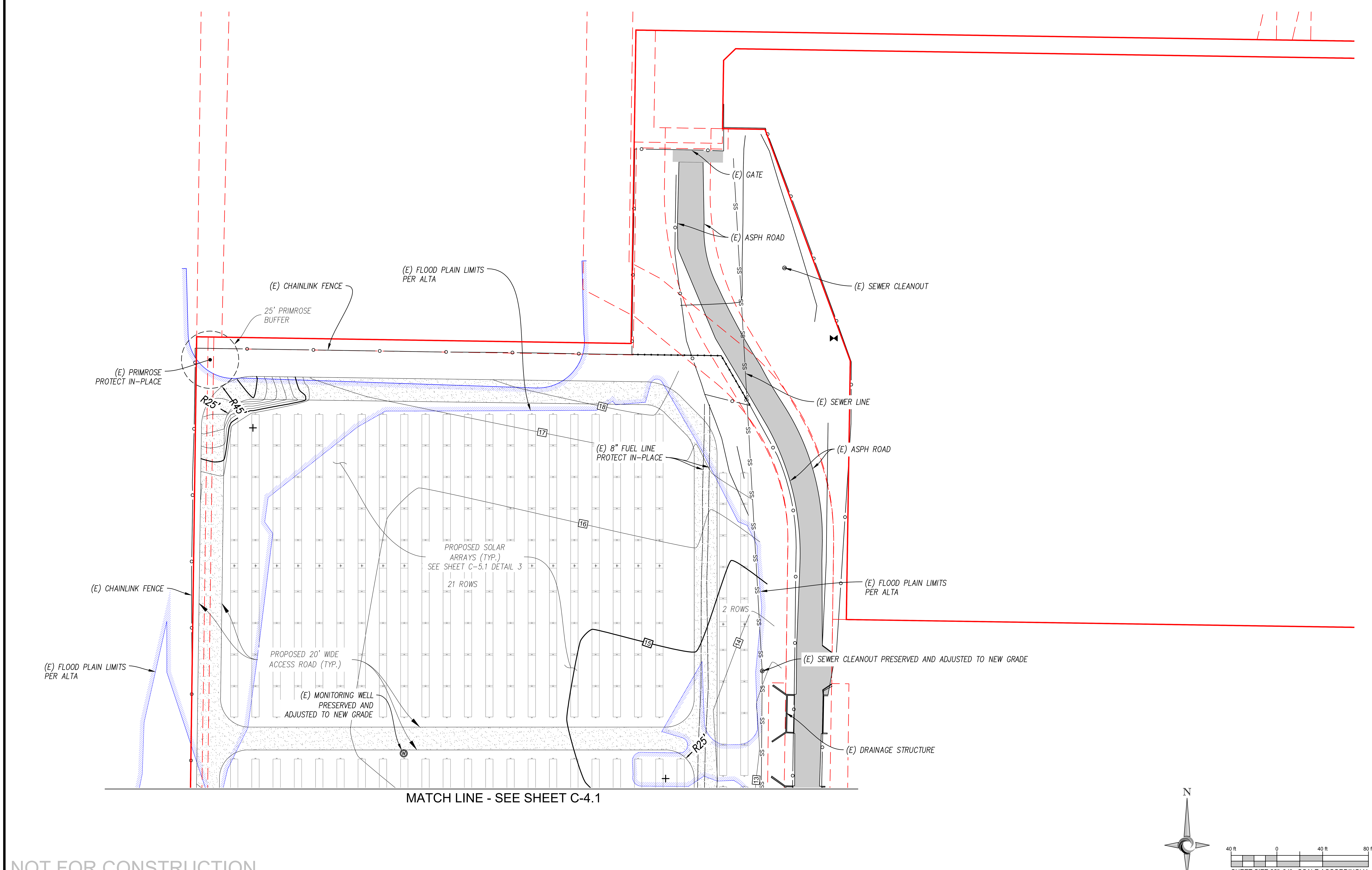
PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

ENGINEER: TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

TRC Results you can rely on

APPLICANT: NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

SHEET NO. C-4.1



NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	BY	CHKD	APP.
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS
1	03/03/17	REVISED/REISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

TITLE: CONCEPTUAL SITE LAYOUT (NORTH)

DRAFT

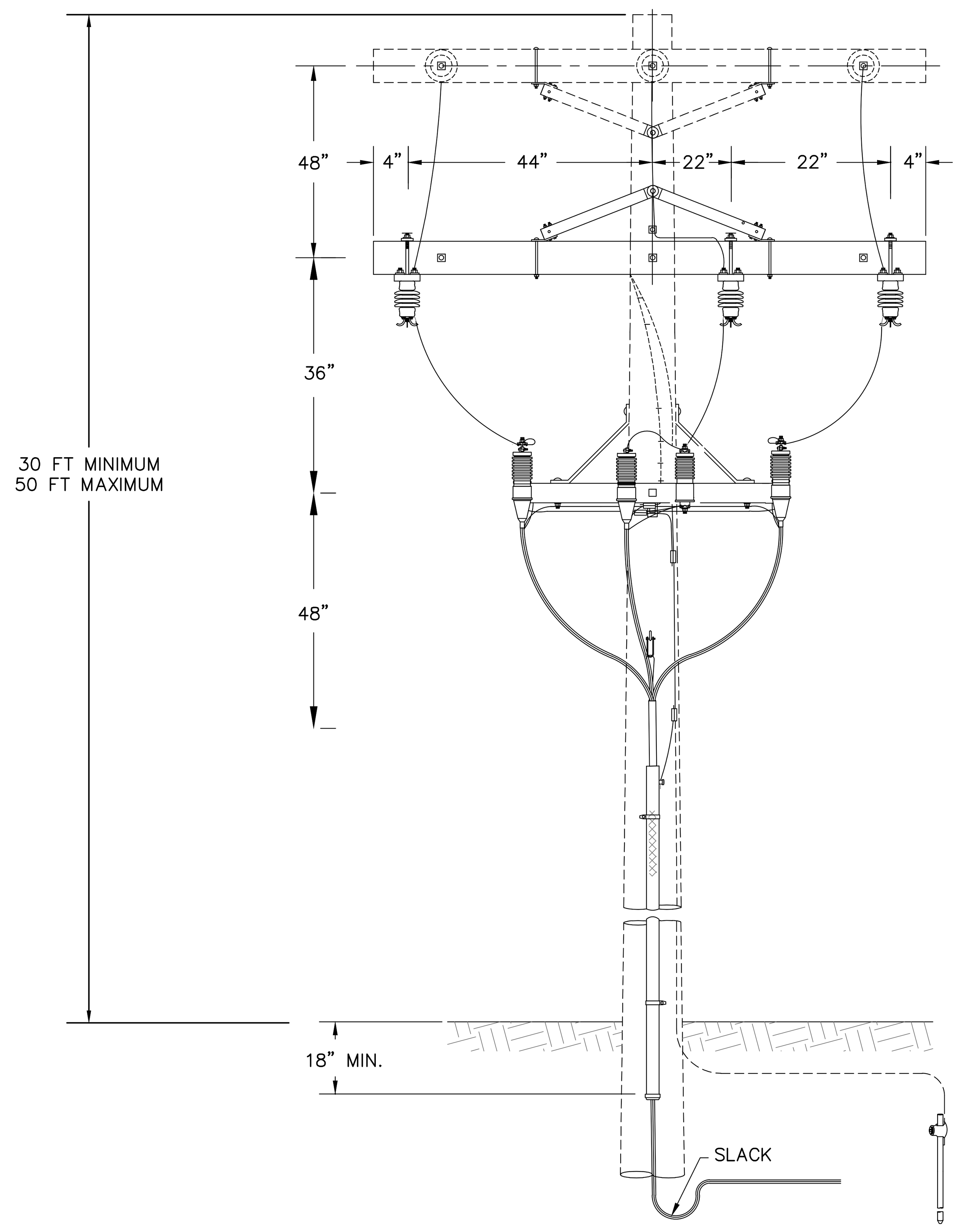
PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

ENGINEER:
TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

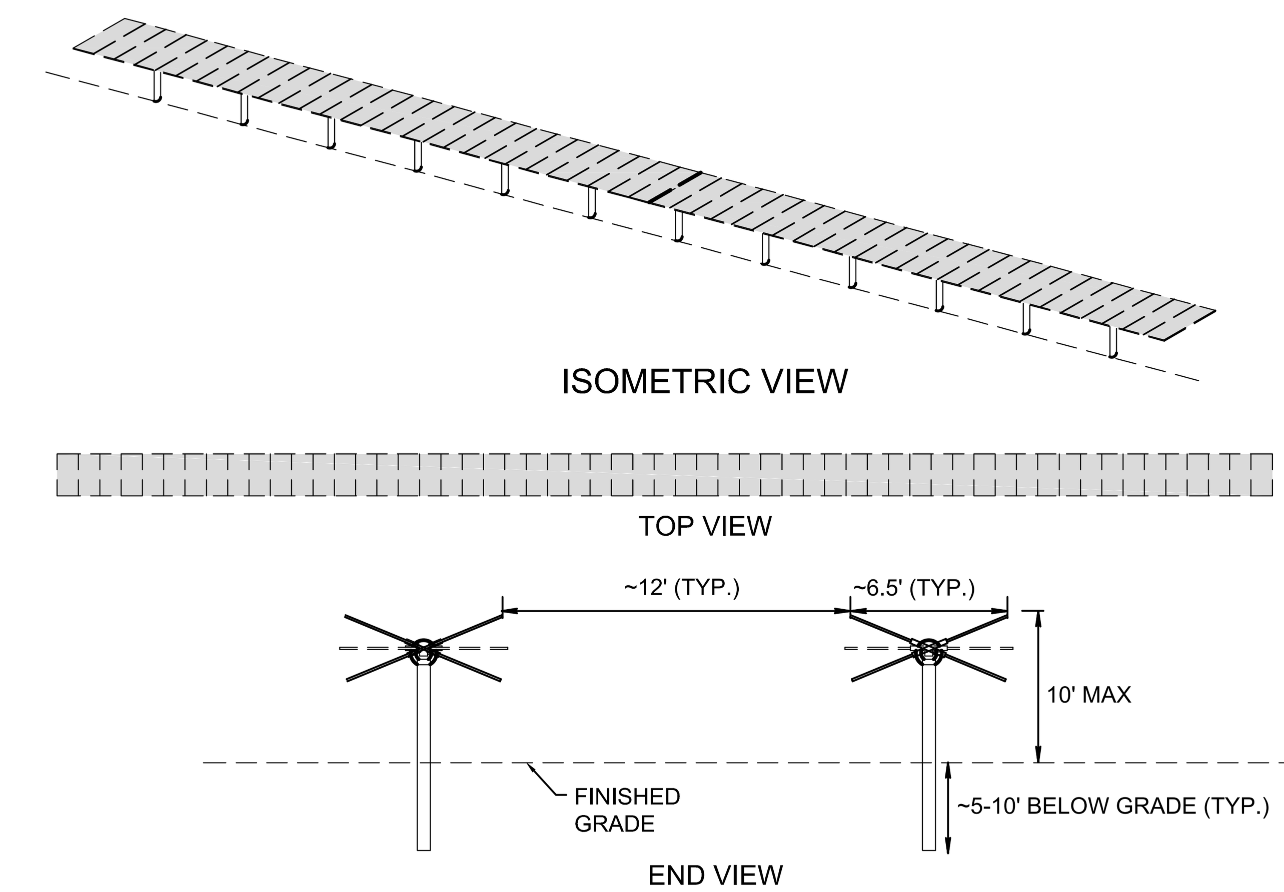
TRC Results you can rely on

APPLICANT:
NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

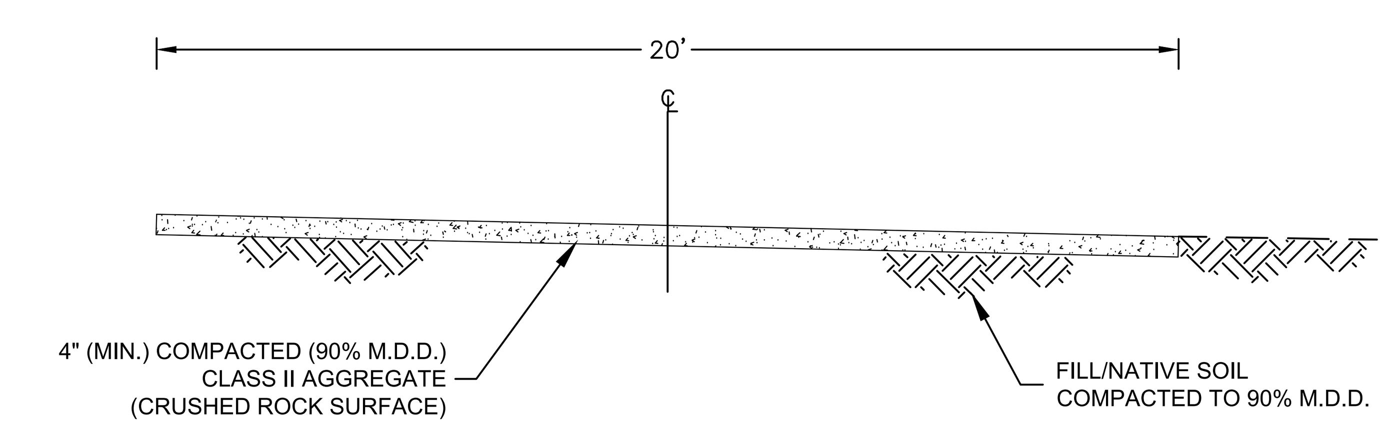
SHEET NO. C-4.2



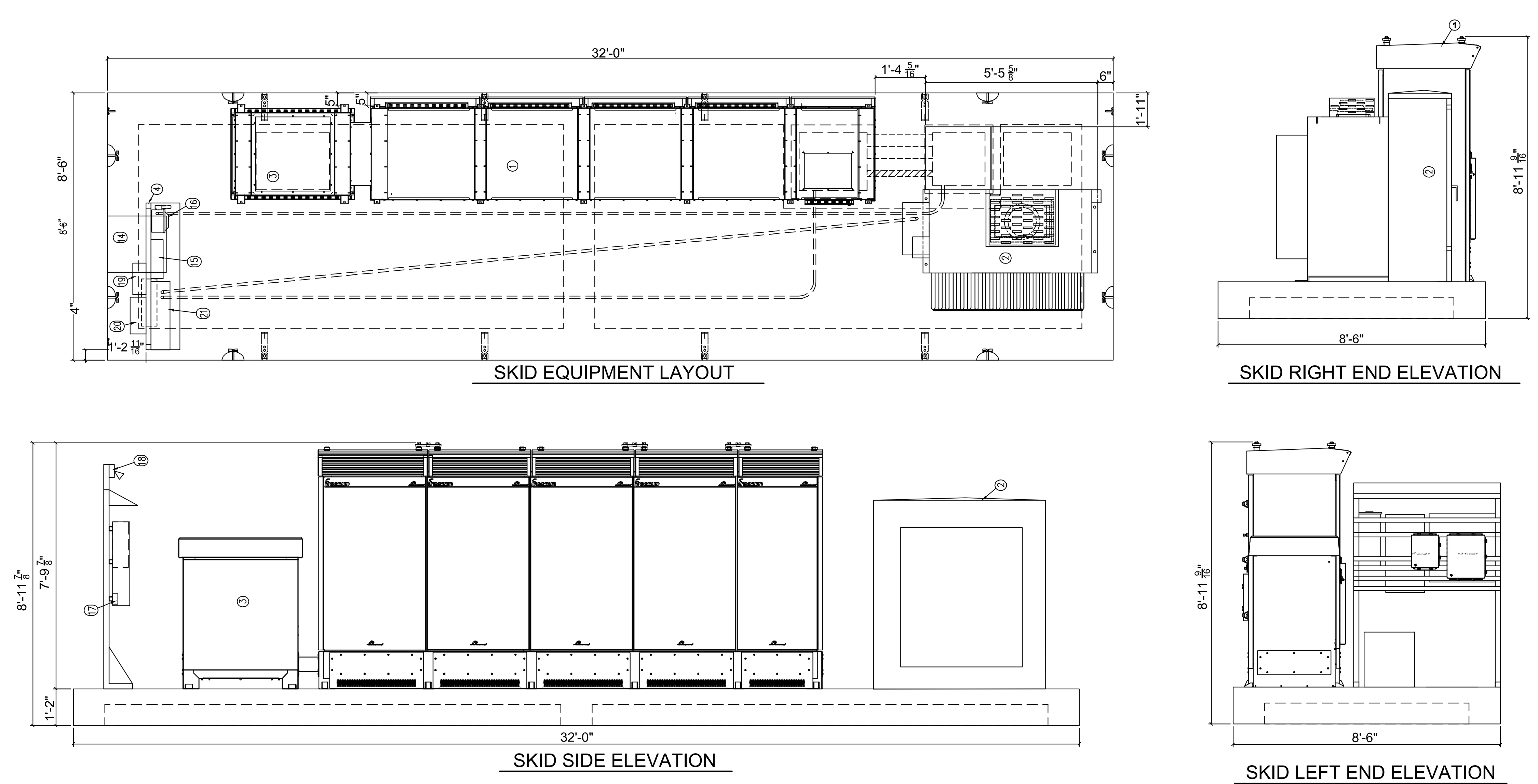
1 EXAMPLE GENERATION TIE LINE RISER POLE
NOT TO SCALE



3 TYPICAL PHOTOVOLTAIC MODULES AND RACK STRUCTURE
NOT TO SCALE



4 20' ACCESS ROAD SECTION
NOT TO SCALE



2 EXAMPLE AC INVERTER EQUIPMENT ENCLOSURE
NOT TO SCALE

NOT FOR CONSTRUCTION

SHEET SIZE 22"x34" - SCALE ACCORDINGLY

REV	DATE	DESCRIPTION	BY	CHKD	APP
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

DRAFT

TITLE: DETAILS

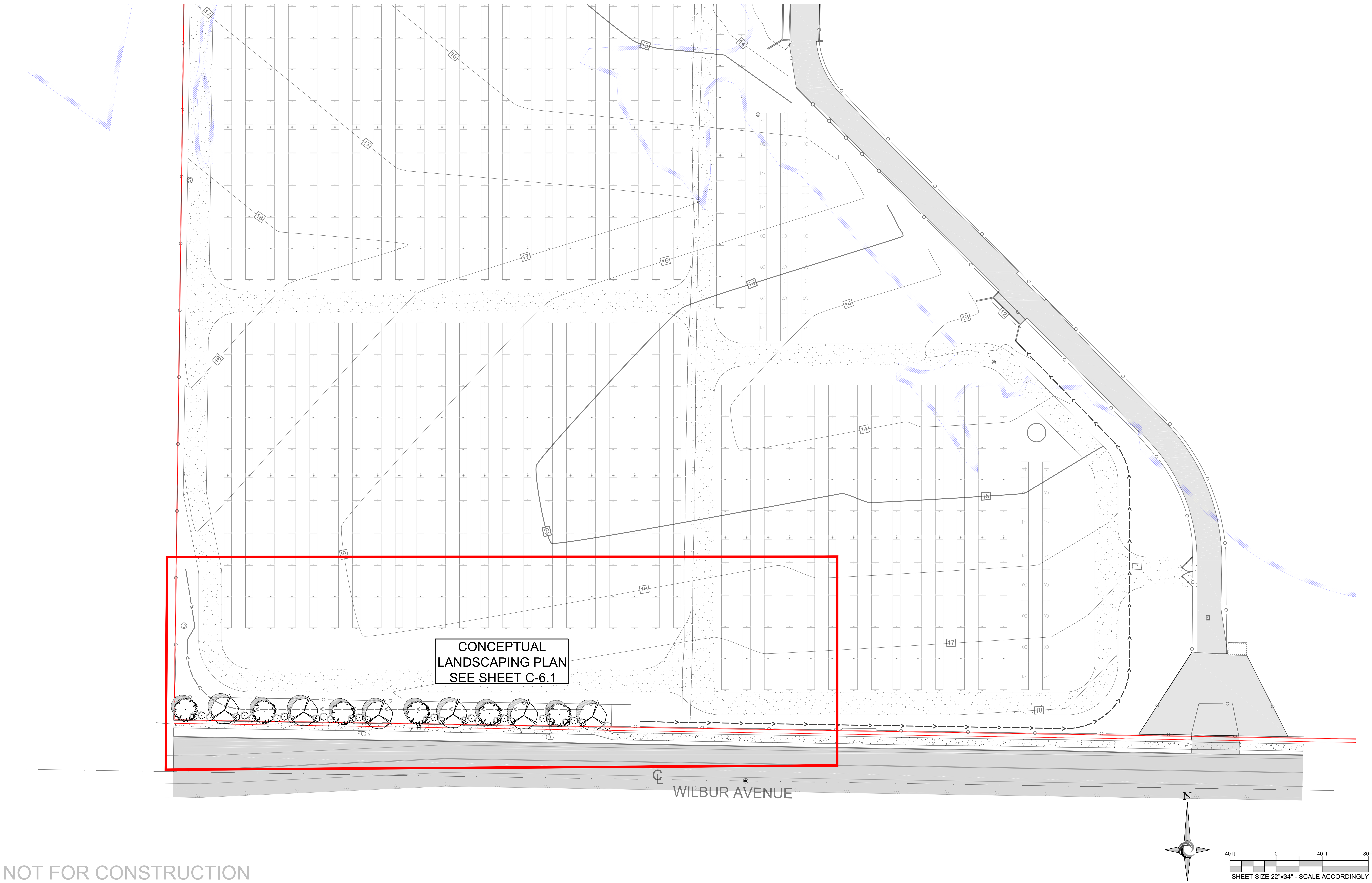
PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE., ANTIOCH, CA
APN 051-031-020

ENGINEER:
TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

TRC Results you can rely on

APPLICANT:
NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

SHEET NO. C-5.1



NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	BY	CHKD	APP.
0	10/05/16	ISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS
1	03/03/17	REVISED/REISSUED FOR DESIGN REVIEW APPLICATION	VL	SH	JS

TITLE: LANDSCAPING PLAN (SHEET INDEX)

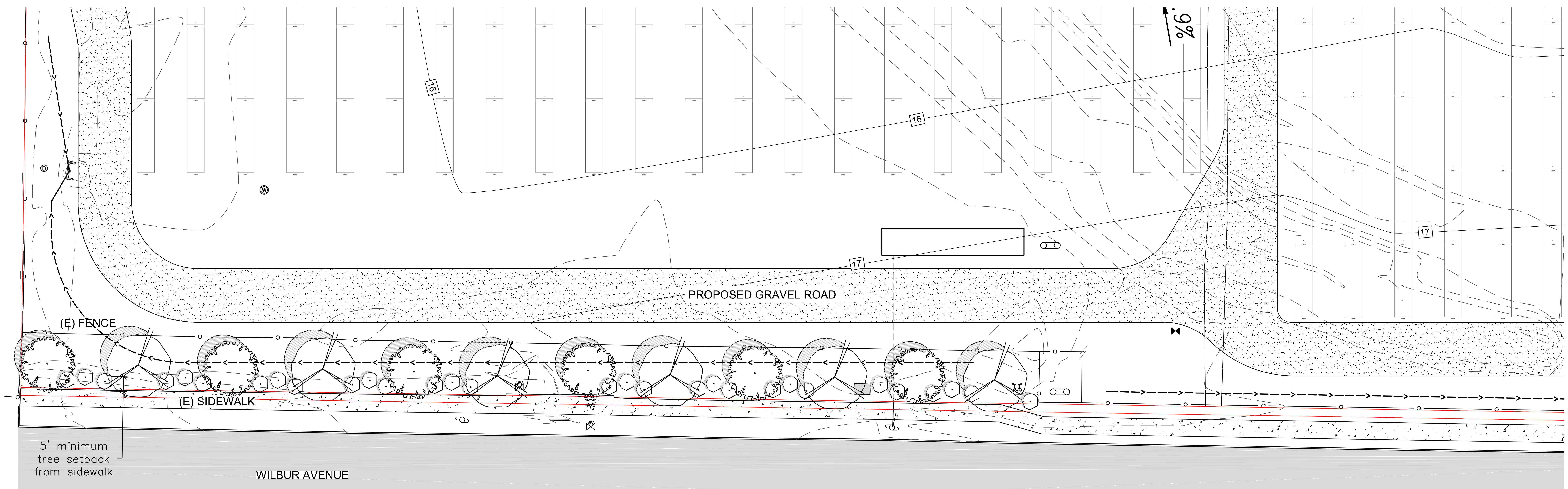
PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

ENGINEER:
TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

Results you can rely on

APPLICANT:
NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

SHEET NO. C-6.0



LANDSCAPE CONCEPT

The landscape concept for the Marsh Landing Solar Project includes a row of small canopy trees in combination with groups of low to medium height flowering shrubs. The suggested plant palette is comprised of drought tolerant species with evergreen foliage. Planting is proposed along the western side of the site's Wilbur Avenue street frontage in an area between the existing fence and sidewalk. The landscaped area is approximately 380 feet long by 20 feet wide or approximately 7,600 square feet. Landscaping will enhance the site appearance and partially screen the existing perimeter fence and new facility.

Two types of tree species are shown - a canopy tree and a flowering accent tree. Suggested trees have evergreen foliage; however an alternative accent tree with deciduous foliage is also included. All suggested trees are listed on the Contra Costa County Landscape Standards as suitable for planting under utility lines (2012). The majority of suggested plants are included in the Appendix A Plant Palette of the City of Antioch Citywide Design Guidelines (2009).

NOTES:

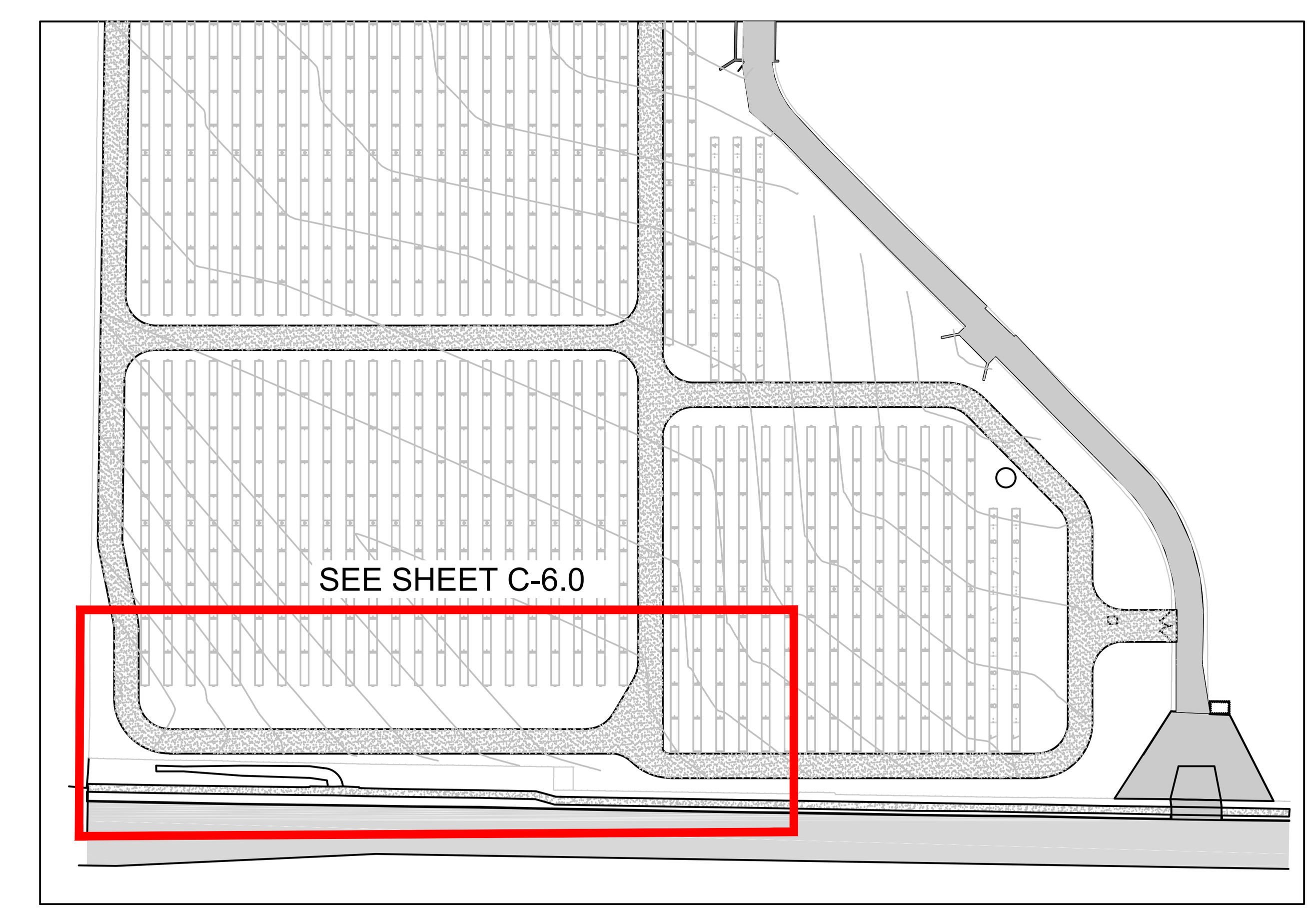
1. A fully automatic drip irrigation system will be installed to provide regular watering of new landscaping.
2. Medium bark mulch to a depth of 3 inches will be applied within the planting area for water conservation and weed suppression.
3. All landscape and irrigation shall conform to the standards of the City-Wide Design Guidelines and the Municipal Code of the City of Antioch and all other applicable landscape related City and Regional Standards.
4. New trees will be a set back minimum of 5 feet from the sidewalk.
5. No trees are proposed within driveway sightlines.
6. Landscape layout is conceptual and subject to change based on final engineering and other factors.

PLANT PALETTE LEGEND

SYMBOL	TYPE AND FORM	APPROXIMATE QUANTITY	SUGGESTED SPECIES	CONTAINER SIZE	APPROXIMATE MAXIMUM HEIGHT/SPREAD
	Small canopy, broad leaf evergreen tree	6	Arbutus unedo (Strawberry Tree), or Rhus lancea (African Sumac), or Eriobotrya deflexa (Bronze Loquat)	15 gallon	25'/25' 25'/25' 20'/20'
	Small, broad leaf evergreen flowering accent tree (alternate species has deciduous foliage)	6	Pyrus kawakamii (Evergreen Pear), or Lagerstroemia indica x fauriei 'Natchez' (Natchez Crape Myrtle)	15 gallon	20'/20' 25'/25'
	Small, broad leaf evergreen shrub	30	Ceanothus griseus horizontalis 'Yankee Point' (Wild Lilac), and Rosmarinus officinalis 'Prostratus' (Dwarf Rosemary), or Rhaphiolepis indica 'Jack Evans' (Indian Hawthorn)	1 gallon	2'-3'/10'-12' 2'/4'-8' 4'-5'/4'

Tree size estimates are based on information contained in: Reimer, Jeffrey L and W. Mark. "SelecTree: A Tree Selection Guide." http://selectree.calpoly.edu/ (site visited June 20, 2016.)

Shrub size estimates based on information contained in: Boething Treeland Farms website. http://www.boethingtreeland.com (site visited June 20, 2016.)



KEY MAP

N

20 ft 0 20 ft 40 ft

SHEET SIZE 22"x34" - SCALE ACCORDINGLY

ENVIRONMENTAL VISION

NOT FOR CONSTRUCTION

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TITLE: CONCEPTUAL LANDSCAPING PLAN

PROJECT: BIG BREAK SOLAR PROJECT
3201 WILBUR AVE, ANTIOCH, CA
APN 051-031-020

DRAFT

ENGINEER: TRC SOLUTIONS, INC
9685 RESEARCH DRIVE
IRVINE, CA 92618
PH: 949-697-7169

TRC Results you can rely on

APPLICANT: NRG SOLAR DG LLC
100 CALIFORNIA STREET, SUITE 400
SAN FRANCISCO, CA 94111
PH: 415-627-1636

SHEET NO. C-6.1

ATTACHMENT 2
RISK ASSESSMENT

Pacific Gas and Electric Company®

Ben LePage, Ph.D., PWS
Manager,
Environmental Remediation

3401 Crow Canyon Rd.
San Ramon, CA 94583

(925) 415-6407
(925) 415-6852
Ben.LePage@pge.com

July 15, 2016

Hongbo Zhu, PhD
Hazardous Substances Engineer
Department of Toxic Substances Control
700 Heinz Avenue
Berkeley, California 94710

Subject: **Risk Evaluation for NRG Big Break Solar Project Area**
Contra Costa Power Plant
Antioch, California

Dear Ms. Zhu,

Pacific Gas and Electric Company (PG&E) is pleased to provide you two copies of the enclosed *Risk Evaluation for NRG Big Break Solar Project Area* for the Contra Costa Power Plant Facility (referred to as "the Facility") located in Antioch, California.

This technical memorandum was prepared to facilitate NRG's planned construction of a ground mount photovoltaic solar system at the Contra Costa Power Plant and in response to the results presented in the *Draft NRG Fuel Oil Pipelines Site Investigation Report, Contra Costa Power Plant Facility, Antioch, California* that was submitted to the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) in April 2016. This Final version includes edits to address comments provided in a DTSC letter to PG&E dated July 8, 2016.

If you have any questions, please contact our project manager Anne Conner at (925) 415-6381.

Sincerely,

Ben LePage, Ph.D., PWS
Manager, Environmental Remediation

Enclosure

cc: Anne Conner, PG&E
David Frandsen, NRG
Joe Corning, NRG
Daniel Murphy, DTSC
Teresa Tamburello, CH2M

Pacific Gas and Electric Company®

Ben LePage, Ph.D., PWS
Manager,
Environmental Remediation

3401 Crow Canyon Rd.
San Ramon, CA 94583

(925) 415-6407
(925) 415-6852
Ben.LePage@pge.com

Risk Evaluation for NRG Big Break Solar Project Area
Contra Costa Power Plant
Antioch, California
July 15, 2016

I certify that the information contained in or accompanying this submittal is true, accurate, and complete. As to those portions of this submittal for which I cannot personally verify the accuracy, I certify that this submittal and all attachments were prepare at my direction in accordance with procedures designed to assure that qualified personnel property gathered and evaluated the information submitted.

Signature: ______________________

Name: Ben LePage, Ph.D., PWS

Title: Manager, Environmental Remediation, PG&E

Date: July 15, 2016

Environment and Nuclear Group
CH2M Oakland
155 Grand Avenue
8th Floor
Oakland, California 94612
O +1 510 251 2888
F +1 510 622 9000
www.ch2m.com

July 12, 2016

Mr. Ben LePage
Pacific Gas and Electric Company
3401 Crow Canyon Road
San Ramon, CA 94583

Subject: Risk Evaluation for NRG Big Break Solar Project Area, Contra Costa Power Plant, Antioch, California

Dear Mr. LePage:

CH2M HILL Engineers, Inc. (CH2M) has prepared this *Risk Evaluation for NRG Big Break Solar Project Area* on behalf of Pacific Gas and Electric Company (PG&E), for the Contra Costa Power Plant Property located in Antioch, California. This technical memorandum was prepared to facilitate NRG's planned construction of a ground mount photovoltaic solar system at the Contra Costa Power Plant and in response to the results presented in the *Draft NRG Fuel Oil Pipelines Site Investigation Report, Contra Costa Power Plant Facility, Antioch, California* that was submitted to the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) in April 2016. This Final version includes edits to address comments provided in a DTSC letter to PG&E dated July 8, 2016.

If you have any questions or comments on this report, please contact Teresa Tamburello at 415.513.5719.

Sincerely,

CH2M Hill Engineers, Inc.

Teresa Tamburello, P.E.
Project Manager

Enclosure

cc:

Anne Conner, PG&E
David Frandsen, NRG
Joe Corning, NRG
Daniel Murphy, DTSC
Hongbo Zhu, DTSC

TECHNICAL MEMORANDUM

Risk Evaluation for NRG Big Break Solar Project Area

PREPARED FOR:	Pacific Gas and Electric Company
COPY TO:	Department of Toxic Substances Control
PREPARED BY:	CH2M
DATE:	July 15, 2016
PROJECT NUMBER:	665189.02.90

Introduction and Executive Summary

CH2M Hill Engineers Inc. (CH2M), on behalf of Pacific Gas and Electric Company (PG&E), has prepared this screening-level human health risk evaluation at the request of the Department of Toxic Substances Control (DTSC) for a portion of the Contra Costa Power Plant located at 3201, 321-C, and 3225 Wilber Avenue in Antioch, California (Facility). The Facility location is shown on Figure 1 and the parcel map is shown on Figure 2. NRG, who is the current property owner, is preparing for the construction of a photovoltaic solar system, herein referred to as the Big Break Solar Project, on the southwest portion of assessor parcel number (APN) 051-031-020 that historically housed three large aboveground fuel oil storage tanks. The Big Break Solar Project area (Project Area) is shown on Figure 3. As part of the preparations for construction, NRG is completing a California Environmental Quality Act initial study with the City of Antioch as the lead agency and the DTSC as a responsible party.

The purpose of this risk evaluation is to determine if soil concentrations remaining in the Project Area present an unacceptable risk to current and future commercial/industrial workers and future construction workers. Previous investigations have been completed in the Project Area by CH2M and others. Previous investigations have identified contaminants, including arsenic and total petroleum hydrocarbons (TPH) as diesel (TPH-d), at concentrations exceeding evaluation criteria established for the Facility (CH2M, 2016).

This technical memorandum presents a screening-level risk evaluation for constituents of potential concern (COPCs) detected in the soil samples collected from the Project Area. Soil risk-based concentrations (RBCs) were used to evaluate potential risks to human health. The risk evaluation was conducted in accordance with DTSC and U.S. Environmental Protection Agency (EPA) guidance (DTSC, 2014; DTSC, 2015a; DTSC, 2015b; DTSC, 2016; EPA, 2014; and EPA, 2015a).

The screening-level risk evaluation did not identify significant risk to future construction workers from concentrations of COPCs in shallow and mixed-zone soils. However, residual elevated TPH-d concentrations beneath the tank pad of the former Tank #8 may be encountered during construction of the Big Break Solar Project.

The screening-level risk evaluation identified potential risk to current and future commercial/industrial workers from TPH-d. However, each of the samples with TPH-d concentrations detected above the commercial/industrial RBC (four of eight samples) were collected from a small area within the gravely soil layer directly below the asphalt pad of former Tank #8 (CH2M, 2016). This gravely soil layer appears to be part of the tank pad construction and the concentrations of TPH-d are likely from the construction material and not from a spill or release. There is an asphalt cap separating the TPH-d concentrations from surface receptors. In addition, the former tank area is not part of the active Facility operations and is separated from the main Facility by a chain link fence and locked gate. Given the inaccessibility of the TPH-d hotspot where long-term exposure would be unlikely, the residual TPH-d within the hotspot would not likely pose significant risk to current or future commercial/industrial workers.

Potential Human Receptors and Exposure Pathways

Potential human receptors in the Project Area are current and future commercial/industrial workers and future construction workers. For the purposes of this risk evaluation, surface soils are defined as samples collected from 0 to 1 foot below ground surface (bgs) and mixed-zone soils are defined as samples collected from 0 to 15 feet bgs. Human exposure to soil at depths greater than 15 feet bgs is considered an incomplete exposure pathway. Human exposure to volatile organic compounds (VOCs) in indoor air through volatilization from soil to soil vapor and vapor intrusion into buildings is an incomplete current exposure pathway, because there are no buildings in the Project Area. Vapor intrusion also is considered an incomplete future exposure pathway because NRG has no plans to construct occupied buildings in the Project Area.

Onsite Commercial/Industrial Worker Scenario

Under current and future site conditions, onsite Facility workers could be exposed to surface soil from the site. Potential routes of exposure to surface soil for the onsite Facility worker includes incidental soil ingestion, dermal contact with soil, and inhalation of ambient vapors or dust generated from wind.

Onsite Construction Worker Scenario

Under future site conditions, onsite construction workers could be exposed to surface and mixed-zone soil during infrequent onsite construction and excavation activities. Potential routes of exposure to surface and mixed-zone soil for the onsite construction worker would include incidental soil ingestion, dermal contact with soil, and inhalation of ambient vapors or dust generated from wind or during onsite excavation activities.

Data Evaluation and Constituents of Potential Concern

Data used in the risk evaluation are for soil samples collected in the Project Area as part of investigations completed in 1997 (Fluor Daniel GTI, Inc., 1998), 2015 (Amec Foster Wheeler, Environment & Infrastructure, Inc., 2015), and 2016 (CH2M, 2016). Samples collected at locations that were subsequently excavated were not included, so this evaluation represents current conditions. Sampling locations are shown on Figure 3.

Soil samples collected in the Project Area were analyzed for one or more of the following parameters: TPH, polynuclear aromatic hydrocarbons (PAHs), and metals. Soil samples collected during the 1997 investigation were submitted for analysis of total extractable petroleum hydrocarbons (TEPH), which includes the C9 to C40 carbon range. Soil samples collected during the 2015 and 2016 investigations were submitted for analysis of TPH-d and TPH as motor oil (TPH-mo). TPH-d represents TPH in the C10 to C24 carbon range and TPH-mo represents the C24 to C40 carbon range.

All detected chemicals in soil are considered COPCs and are included in the risk evaluation. For samples with both a normal and a field duplicate result, the higher of the two results was used in the evaluation. For TPH samples analyzed with and without silica gel treatment (SGT), only the samples without SGT were used in the evaluation.

Exposure Assessment

Exposure point concentrations (EPCs) are estimated chemical concentrations that a receptor might contact, and are specific to each exposure area and medium. EPCs are based on either the maximum concentration detected or the 95 percent upper confidence limit (UCL) on the mean concentration of the samples within the exposure area. The UCLs were calculated using ProUCL 5.0 (EPA, 2013). The summary statistics for the chemicals detected at least once are presented in Table 1.

Use of maximum concentrations is generally appropriate where the data exhibit high variance, the sample size is fewer than five, there are too few detected values, or the 95 percent UCL is greater than the maximum concentration, as indicated in Table 1. EPCs for surface soil samples and mixed-zone soil samples within the Project Area were used in the human health risk evaluation.

Soil Risk-based Concentrations

RBCs protective of human health direct contact exposure (for carcinogenic and noncarcinogenic constituents) by ingestion, dermal contact, and inhalation exposure pathways in an adult receptor were evaluated for the onsite commercial/industrial and onsite construction worker exposure scenarios.

Onsite Commercial/Industrial Worker Scenario

The RBCs for each constituent other than TPH are the EPA Regional Screening Levels (RSLs) for industrial soil (EPA, 2015b) unless the DTSC recommends use of an alternative screening value, as presented in DTSC Human Health Risk Assessment, Note 3 (DTSC, 2016). The industrial soil RSLs were derived based on the toxicity values, exposure equations, and assumptions for industrial/commercial soil presented in the RSL Table User's Guide (EPA, 2015a) and consistent with EPA and DTSC guidance (EPA, 2014; DTSC, 2014).

The RBCs for TPH are the San Francisco Bay Regional Water Quality Control Board (SFRWQCB) Environmental Screening Levels (ESL) (Table S-1 in SFRWQCB, 2016) for direct exposure human health for the commercial/industrial shallow soil exposure scenario, based on a hazard quotient of 1. To be conservative, the RBC for TPH-d was used for the TEPH (C9 to C40) results for samples collected during the 1997 investigation.

The site-specific carcinogenic and non-carcinogenic RBCs for the onsite commercial/industrial worker scenario are shown in Table 2.

Onsite Construction Worker Scenario

The RBCs for each constituent other than TPH are site-specific RSLs for the construction worker exposure scenario (EPA, 2015c). The RSLs were evaluated using sub-chronic toxicity values (due to the short exposure duration), as described in the RSL Table User's Guide and EPA default exposure equations and assumptions for construction workers (EPA, 2015a). RSL inputs and toxicity values are provided in Attachment 1.

The planned construction activities are expected to include the following:

- The entire Project Area will be cleared, grubbed, and graded.
- Cable trenches will be dug to depths not exceeding 5 feet bgs.
- Piles will be installed to support solar racking superstrate and may extend to depths between 7 and 15 feet bgs.

The following site-specific parameters were used to develop construction worker RSLs:

- Total acres: 14
- Area cleared, grubbed, and graded: 14 acres
- Area excavated: 14,000 square meters (estimated area of trenching)
- Dozing and grading blade length: 3.7 meters (based on standard equipment)
- Average depth of excavation: 1.5 meters (based on trenching maximum depth of 5 feet)

The RBCs for TPH are the SFRWQCB ESL (Table S-1 in SFRWQCB, 2016) for direct exposure human health for the construction shallow soil exposure scenario, based on a hazard quotient of 1. To be conservative, the RBC for TPH-d was used for the TEPH (C9 to C40) results of samples collected during the 1997 investigation.

The site-specific carcinogenic and non-carcinogenic RBCs for the onsite construction worker scenario are provided in Attachment 1 and shown in Tables 3 (surface soils) and Table 4 (mixed-zone soil).

Human Health Risk Evaluation Results

This section presents results of the screening-level human health risk evaluation for the COPCs detected in surface soil and mixed-zone soil under commercial/industrial and construction worker exposure scenarios.

Cancer risk and noncancer hazards for constituents detected in soil (with the exception of lead and TPH, which were evaluated separately) were estimated by using following equations:

$$\text{Cancer Risk} = \text{EPC} \times \text{TRL} / \text{RBCc} \quad (1)$$

$$\text{HQ} = \text{EPC} \times \text{THQ} / \text{RBCnc} \quad (2)$$

Where:

Cancer Risk	=	chemical-specific cancer risk estimate (unitless)
TRL	=	target cancer risk level used in the derivation of the RBCc, 1×10^{-6} (or 1E-06) (unitless)
RBCc	=	soil carcinogenic RBC (milligram(s) per kilogram [mg/kg])
HQ	=	chemical-specific noncancer hazard quotient (HQ) estimate (unitless)
THQ	=	target HQ used in the derivation of the RBCnc, 1 (unitless)
RBCnc	=	soil non-carcinogenic RBC (noncancer effects) (mg/kg)
EPC	=	exposure point concentration (mg/kg)

The chemical-specific risk estimates are summed for each sampling location to generate cumulative sample-specific risk estimates by using the following equations:

$$\text{Total Cancer Risk Estimate} = \text{Sum of Cancer Risk Estimates for COPCs} \quad (3)$$

$$\text{Total Noncancer Hazard Index (HI) Estimate} = \text{Sum of Noncancer HQs for COPCs} \quad (4)$$

The results are presented in Tables 2 through 4.

Onsite Commercial/Industrial Worker Scenario

For the commercial/industrial worker exposure scenario for surface soil (Table 2), the cumulative noncancer hazard index is 1, which does not exceed the EPA target value of 1.

The cumulative estimated cancer risk is 2×10^{-5}, which exceeds the EPA point of departure of 1×10^{-6} but is within the EPA risk management range (1×10^{-6} to 1×10^{-4}) (EPA, 2001). The primary risk drivers are arsenic and chromium, which are naturally occurring. A background concentration for arsenic at the Facility has been reported as 4.8 mg/kg (Blasland, Bouck & Lee, Inc., 2004); the EPC for arsenic (2.99 mg/kg) is below the reported background concentration. As a conservative measure, in the absence of chromium speciation data, the toxicity value used for total chromium is the chromium VI toxicity value in accordance with DTSC guidance (DTSC, 2015b). Considering past site activities and how chromium exists in the environment, it is unlikely that all or any of the chromium detected at the Project Area is chromium VI; therefore, the risk from chromium is likely to be significantly overestimated and likely naturally occurring. Excluding naturally occurring arsenic and chromium, the cumulative estimated cancer risk is 3×10^{-7}, which does not exceed the EPA point of departure of 1×10^{-6}.

Therefore, remaining concentrations of COPCs do not likely pose significant risk to current or future commercial/industrial workers.

Onsite Construction Worker Scenario

For the construction worker exposure scenario for surface soil (Table 3), the cumulative hazard index is 0.2, which is does not exceed the EPA target value of 1. The cumulative estimated cancer risk is 1×10^{-6}, which does not exceed the EPA point of departure of 1×10^{-6}.

For the construction worker exposure scenario for mixed-zone soil (Table 4) the cumulative hazard index is 0.2, which is does not exceed the EPA target value of 1. The cumulative estimated cancer risk is 1×10^{6}, which does not exceed the EPA point of departure of 1×10^{-6}.

Therefore, remaining concentrations of COPCs do not likely pose significant risk to future construction workers.

Total Petroleum Hydrocarbon Evaluation

Risk from exposure to TPH was evaluated by comparing the EPCs to the RBCs for TPH-d and TPH-mo. The risks are not included in cumulative hazard index because risks from individual constituents that comprise TPH (i.e., polycyclic aromatic hydrocarbons) were included in the cumulative HI and cancer risk estimate.

The EPC for TPH-d in surface soil is 2,050 mg/kg, which exceeds the RBC for commercial/industrial workers (1,100 mg/kg) but is below the RBC for construction workers (3,800 mg/kg). The EPC in mixed-zone soil is 533 mg/kg, which is below the RBC for construction workers.

The EPC for TPH-mo in surface soil is 9,600 mg/kg (the maximum detected concentration), which is below the RBCs for commercial/industrial workers (140,000 mg/kg) and construction workers (32,000 mg/kg). The EPC in mixed-zone soil is 5,090 mg/kg, which is below the RBC for construction workers.

Because the EPC of TPH-d exceeds the RBC in surface soil for the commercial/industrial worker, residual concentrations in surface soil could pose risk to site workers. However, each of the samples with TPH-d concentrations detected above the commercial/industrial RBC (four of eight samples) were collected from a small area within the gravely soil layer directly below the asphalt pad of former Tank #8 (CH2M, 2016). This gravely soil layer appears to be part of the tank pad construction and the concentrations of TPH-d are likely from the construction material and not from a spill or release. There is an asphalt cap separating the TPH-d concentrations from surface receptors. In addition, the former tank area is not part of the active Facility operations and is separated from the main Facility by a chain link fence and locked gate. Given the inaccessibility of the TPH-d hotspot where long-term exposure would be unlikely, the residual TPH-d within the hotspot would not likely pose significant risk to current or future commercial/industrial workers.

In addition, 23 surface soil samples collected during the 1997 investigation were analyzed for the TEPH (C9 to C40); results ranged from 1.1 to 370 mg/kg, which are below the RBCs for TPH-d for both the commercial/industrial worker exposure scenario (1,100 mg/kg) and the construction worker exposure scenario (3,800 mg/kg).

Lead Evaluation

The potential for health effects from exposure to lead in soil was addressed by comparing lead concentrations with the DTSC Note 3 value for lead for commercial/industrial soil (DTSC, 2016). For the commercial/industrial and construction worker exposure scenarios, the Note 3 value of 320 mg/kg was derived by using the EPA Lead model for adults.

Lead was detected in surface soil at concentrations from 3.2 to 68 mg/kg and in mixed-zone soil at concentrations from 1.6 to 68 mg/kg. Concentrations are below the DTSC Note 3 value for commercial/industrial soil.

Discussion of Uncertainties

The estimation of exposure requires many assumptions to describe potential exposure situations. There are uncertainties regarding the likelihood of exposure, frequency of contact with contaminated media, the concentration of contaminants at exposure points, and the period of exposure. These tend to simplify and approximate actual site conditions. In general, these are upper-bound assumptions that are intended to be conservative and yield an overestimate of the true risk or hazard.

Future soil EPCs were assumed to be equal to existing concentrations. This assumption does not account for fate and transport processes likely to occur in the future. Because some of the COPCs are VOCs, the volatiles will likely be released from soil over time; therefore, risk estimates are likely to be overestimated for future exposure scenarios.

As previously discussed, data collected in 1997 were used in the risk evaluation. The use of older data to calculate risks likely overestimates the risks and hazards from these constituents, because concentrations have probably decreased since the data were collected.

Because the majority of TPH-d contamination detected above the RBC were collected from a small area within the gravely soil layer directly below the asphalt pad of former Tank #8 (CH2M, 2016), the EPC likely overestimates the long-term exposure for the entire Project Area.

In the risk characterization, the assumption was made that the total risk of developing cancer from exposure to site contaminants is the sum of the risk attributed to each individual contaminant. Likewise, the potential for the development of noncancer adverse effects is the sum of the noncarcinogenic risks estimated for exposure to each individual contaminant. This approach is consistent with EPA guidance; however, the approach does not account for the possibility that constituents act synergistically or antagonistically. Therefore, there is uncertainty associated with the estimated cumulative risks for carcinogens and with the HIs for noncarcinogens.

For this risk evaluation, to be conservative, the toxicity value used for total chromium is the chromium VI toxicity value. It is unlikely that all or any of the chromium detected at the Project Area is chromium VI; therefore, the risk from chromium is likely to be significantly overestimated.

For this evaluation, the noncarcinogenic risks from all COPCs were summed to obtain the HI. The HQs for individual chemicals were not segregated based on target organs; therefore, the HI could overestimate the potential for one type of noncancer effect because all COPCs do not affect the same target organ.

Summary

A screening-level human health risk evaluation was completed to evaluate potential risks to receptors on the basis of concentrations of COPCs remaining in soil in the Project Area. The risk evaluation for the COPCs detected in soil were evaluated for the current and future commercial/industrial and future construction worker exposure scenarios. The following is a summary of the screening-level risk evaluation results:

- For the current and future commercial/industrial worker exposed to COPCs remaining in surface soil (excluding naturally occurring arsenic and chromium), the estimated cumulative cancer risk is 3×10^{-7}, which does not exceed the EPA point of departure. While the estimated cumulative cancer risk for all COPCs is 2×10^{-5}, which is within the risk management range, the risk drivers are naturally-occurring arsenic and chromium. The data indicates that both arsenic and total chromium concentrations are ubiquitous and relatively consistent throughout the Project Area, indicating concentrations are not site-related. A background concentration for arsenic at the Facility has been reported as 4.8 mg/kg (Blasland, Bouck & Lee, Inc., 2004); the EPC for arsenic (2.99 mg/kg) used in the risk evaluation is below the reported background concentration. As a conservative measure, in the absence of chromium speciation data, the toxicity value used in the risk evaluation for total chromium is the chromium VI toxicity value in accordance with DTSC guidance (DTSC, 2015b). Considering past site activities and how chromium exists in the environment, it is unlikely that all or any of the chromium detected at the Project Area is chromium VI, and therefore the carcinogenic risk from chromium is likely to be significantly overestimated. If the detected chromium is evaluated as chromium III, which is not carcinogenic, the estimated cumulative cancer risk for all COPCs is 1 x 10^{-5}, primarily from naturally occurring arsenic.

- For the current and future commercial/industrial worker exposed to COPCs remaining in surface soil, the human health risk evaluation results estimate a cumulative hazard index of 1, which does not exceed the EPA target value.
- For the future construction worker exposed to COPCs remaining in surface soil, the human health risk evaluation results estimate a cumulative hazard index of 0.2, which does not exceed the EPA target value, and a cumulative cancer risk of 1 x 10^{-6}, which does not exceed the EPA point of departure.
- For the future construction worker exposed to COPCs remaining in mixed-zone soil, the human health risk evaluation results estimate a cumulative hazard index of 0.2, which does not exceed the EPA target value, and a cumulative cancer risk of 1 x 10^{-6}, which does not exceed the EPA point of departure.
- TPH-d remaining in surface soil exceeds the RBC for commercial/industrial workers. However, given the inaccessibility of the elevated TPH-d concentrations in soil and the unlikelihood of long-term exposure, the residual TPH-d would not likely pose significant risk to current or future commercial/industrial workers.
- The human health risk evaluation results for exposure to lead in soil identify that the remaining concentrations of lead do not pose significant risk to current or future commercial/industrial workers or future construction workers because the EPCs for lead (35.4 mg/kg in surface soil and 11.9 mg/kg in mixed-zone soil) are below the DTSC Note 3 value for industrial soil (320 mg/kg).

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Tables

Table 1. Summary Statistics for Soil

Risk Evaluation for NRG Big Break Solar Project Area, Contra Costa Power Plant, Antioch, California

Matrix	Depth (ft bgs)	CAS	Parameter	Number of Detects	Number of Analyses	Frequency of Detects	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Minimum DL for Non-detects	Maximum DL for Non-detects	Location of Maximum Detected Concentration	Lower Depth of Maximum Detected Concentration	Qualifier of Maximum Detected Concentration	Mean Value *	Standard Deviation *	Recommended 95% UCL of mean	Recommended UCL Basis	EPC: Smaller of UCL or Maximum Detect	Smaller of UCL or Maximum Detect Basis
Soil	0-1	321-60-8	2-Fluorobiphenyl	4	4	4/4	100	mg/kg	0.25	0.28	NA	NA	AOC21-SB-01	1		NA	NA	NA	Fewer Than Five Samples	0.28	Maximum Result
Soil	0-1	120-12-7	Anthracene	1	27	1/27	4	mg/kg	0.014	0.014	0.0057	0.5	AOC21-SB-03	1		NA	NA	0.111	Too Few Unique Detected Values	0.014	Maximum Result
Soil	0-1	7440-38-2	Arsenic	6	8	6/8	75	mg/kg	2	4.3	1.1	1.1	AOC29-SB-05	1		2.29	0.958	2.99	95% KM (t) UCL	2.99	95% KM (t) UCL
Soil	0-1	7440-39-3	Barium	8	8	8/8	100	mg/kg	28	120	NA	NA	AOC29-SB-05	1		67.9	29.3	87.5	95% Student's-t UCL	87.5	95% Student's-t UCL
Soil	0-1	56-55-3	Benzo(a)anthracene	3	27	3/27	11	mg/kg	0.014	0.053	0.006	0.5	AOC21-SB-03	1		0.03	0.0203	0.0512	95% KM (t) UCL	0.0512	95% KM (t) UCL
Soil	0-1	50-32-8	Benzo(a)pyrene	3	27	3/27	11	mg/kg	0.016	0.054	0.006	0.25	AOC21-SB-03	1		0.0224	0.0159	0.0397	95% KM (t) UCL	0.0397	95% KM (t) UCL
Soil	0-1	205-99-2	Benzo(b)fluoranthene	3	27	3/27	11	mg/kg	0.04	0.16	0.006	0.5	AOC21-SB-03	1		0.0532	0.0439	0.0986	95% KM (t) UCL	0.0986	95% KM (t) UCL
Soil	0-1	191-24-2	Benzo(g,h,i)perylene	2	27	2/27	7	mg/kg	0.0068	0.024	0.006	0.5	AOC21-SB-03	1		0.0108	0.00763	0.02	95% KM (t) UCL	0.02	95% KM (t) UCL
Soil	0-1	207-08-9	Benzo(k)fluoranthene	3	27	3/27	11	mg/kg	0.012	0.05	0.006	0.5	AOC21-SB-03	1		0.025	0.0173	0.0431	95% KM (t) UCL	0.0431	95% KM (t) UCL
Soil	0-1	7440-41-7	Beryllium	1	8	1/8	13	mg/kg	0.41	0.41	0.34	1.1	AOC29-SB-05	1		NA	NA	0.678	Too Few Unique Detected Values	0.41	Maximum Result
Soil	0-1	7440-43-9	Cadmium	2	8	2/8	25	mg/kg	1.4	1.4	0.57	1.1	A2905R-N			NA	NA	1.38	Too Few Unique Detected Values	1.4	Maximum Result
Soil	0-1	7440-47-3	Chromium	8	8	8/8	100	mg/kg	20	54	NA	NA	AOC29-SB-05	1		30.4	11.1	37.8	95% Student's-t UCL	37.8	95% Student's-t UCL
Soil	0-1	218-01-9	Chrysene	4	27	4/27	15	mg/kg	0.031	0.12	0.006	0.5	CB4-001	0.5		0.0473	0.0378	0.0834	95% KM (t) UCL	0.0834	95% KM (t) UCL
Soil	0-1	7440-48-4	Cobalt	8	8	8/8	100	mg/kg	4.3	24	NA	NA	A2905R-N			11.9	8.02	17.3	95% Student's-t UCL	17.3	95% Student's-t UCL
Soil	0-1	7440-50-8	Copper	8	8	8/8	100	mg/kg	8	38	NA	NA	A2905R-N			19.5	9.55	25.9	95% Student's-t UCL	25.9	95% Student's-t UCL
Soil	0-1	334-48-5	Decanoic Acid	4	4	4/4	100	mg/kg	0.0009	0.05	NA	NA	AOC21-SB-03	1		NA	NA	NA	Fewer Than Five Samples	0.05	Maximum Result
Soil	0-1	53-70-3	Dibenzo(a,h)anthracene	2	27	2/27	7	mg/kg	0.034	0.046	0.0057	0.25	CB4-006	0.5	J	0.0171	0.0165	0.0334	95% KM (t) UCL	0.0334	95% KM (t) UCL
Soil	0-1	DRO	TPH as Diesel	8	8	8/8	100	mg/kg	1.8	3100	NA	NA	A2905R-E			1170	1320	2050	95% Student's-t UCL	2050	95% Student's-t UCL
Soil	0-1	206-44-0	Fluoranthene	5	27	5/27	19	mg/kg	0.018	0.11	0.006	0.5	AOC21-SB-01	1		0.0452	0.0341	0.0715	95% KM (t) UCL	0.0715	95% KM (t) UCL
Soil	0-1	86-73-7	Fluorene	1	27	1/27	4	mg/kg	0.013	0.013	0.0057	0.5	AOC21-SB-03	1		NA	NA	0.111	Too Few Unique Detected Values	0.013	Maximum Result
Soil	0-1	193-39-5	Indeno(1,2,3-Cd)Pyrene	3	27	3/27	11	mg/kg	0.0085	0.075	0.006	0.3	CB4-010	0.5		0.0147	0.0152	0.0246	95% KM (t) UCL	0.0246	95% KM (t) UCL
Soil	0-1	7439-92-1	Lead	6	8	6/8	75	mg/kg	3.2	68	1.1	1.1	AOC21-SB-03	1	J	17.7	24.1	35.4	95% KM (t) UCL	35.4	95% KM (t) UCL
Soil	0-1	7439-96-5	Manganese	4	4	4/4	100	mg/kg	240	350	NA	NA	A2905R-W			NA	NA	NA	Fewer Than Five Samples	350	Maximum Result
Soil	0-1	7439-97-6	Mercury	6	8	6/8	75	mg/kg	0.021	0.36	0.11	0.11	A2905R-N			0.125	0.115	0.21	95% KM (t) UCL	0.21	95% KM (t) UCL
Soil	0-1	91-20-3	Naphthalene	2	27	2/27	7	mg/kg	0.023	0.024	0.0057	0.5	AOC21-SB-01	1		0.0146	0.00891	0.0253	95% KM (t) UCL	0.024	Maximum Result
Soil	0-1	7440-02-0	Nickel	8	8	8/8	100	mg/kg	20	69	NA	NA	AOC29-SB-05	1		34.9	18.2	47.1	95% Student's-t UCL	47.1	95% Student's-t UCL
Soil	0-1	85-01-8	Phenanthrene	3	27	3/27	11	mg/kg	0.012	0.074	0.006	0.5	AOC21-SB-03	1		0.0405	0.0316	0.0735	95% KM (t) UCL	0.0735	95% KM (t) UCL
Soil	0-1	92-94-4	p-Terphenyl	4	4	4/4	100	mg/kg	1.3	1.6	NA	NA	AOC29-SB-05	1		NA	NA	NA	Fewer Than Five Samples	1.6	Maximum Result
Soil	0-1	1718-51-0	p-Terphenyl-d14	4	4	4/4	100	mg/kg	0.29	0.34	NA	NA	AOC29-SB-05	1		NA	NA	NA	Fewer Than Five Samples	0.34	Maximum Result
Soil	0-1	129-00-0	Pyrene	3	27	3/27	11	mg/kg	0.018	0.11	0.006	0.5	AOC21-SB-01	1		0.0201	0.0269	0.0341	95% KM (t) UCL	0.0341	95% KM (t) UCL

Table 1. Summary Statistics for Soil

Risk Evaluation for NRG Big Break Solar Project Area, Contra Costa Power Plant, Antioch, California

Matrix	Depth (ft bgs)	CAS	Parameter	Number of Detects	Number of Analyses	Frequency of Detects	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Minimum DL for Non-detects	Maximum DL for Non-detects	Location of Maximum Detected Concentration	Lower Depth of Maximum Detected Concentration	Qualifier of Maximum Detected Concentration	Mean Value *	Standard Deviation *	Recommended 95% UCL of mean	Recommended UCL Basis	EPC: Smaller of UCL or Maximum Detect	Smaller of UCL or Maximum Detect Basis
Soil	0-1	TPH	TPH (C9-C40)	21	23	21/23	91	mg/kg	1.1	370	1.1	1.2	CB4-047	0.5		42.3	74.7	142	97.5% KM (Chebyshev) UCL	142	97.5% KM (Chebyshev) UCL
Soil	0-1	TPHMO	TPH as Motor Oil	4	4	4/4	100	mg/kg	3900	9600	NA	NA	A2905R-E			NA	NA	NA	Fewer Than Five Samples	9600	Maximum Result
Soil	0-1	TPHMO_SGT	TPH as Motor Oil, SGT	2	4	2/4	50	mg/kg	130	190	57	60	AOC21-SB-01	1		NA	NA	NA	Fewer Than Five Samples	190	Maximum Result
Soil	0-1	7440-62-2	Vanadium	8	8	8/8	100	mg/kg	38	110	NA	NA	A2905R-N			59	31.8	80.3	95% Student's-t UCL	80.3	95% Student's-t UCL
Soil	0-1	7440-66-6	Zinc	8	8	8/8	100	mg/kg	26	83	NA	NA	AOC21-SB-03	1		41.4	18.9	54	95% Student's-t UCL	54	95% Student's-t UCL
Soil	0-15	321-60-8	2-Fluorobiphenyl	45	45	45/45	100	mg/kg	0.2	0.29	NA	NA	AOC29-SB-09	3		0.252	0.021	0.257	95% Student's-t UCL	0.257	95% Student's-t UCL
Soil	0-15	120-12-7	Anthracene	1	114	1/114	1	mg/kg	0.014	0.014	0.0052	0.5	AOC21-SB-03	1		NA	NA	0.0551	Too Few Unique Detected Values	0.014	Maximum Result
Soil	0-15	7440-36-0	Antimony	1	68	1/68	1	mg/kg	6.1	6.1	1	2.4	AOC21-SB-01	3		NA	NA	1.19	Too Few Unique Detected Values	6.1	Maximum Result
Soil	0-15	7440-38-2	Arsenic	66	68	66/68	97	mg/kg	1.5	5.6	1.1	1.1	AOC29-SB-09	2		2.77	0.907	2.96	95% KM (BCA) UCL	2.96	95% KM (BCA) UCL
Soil	0-15	7440-39-3	Barium	68	68	68/68	100	mg/kg	28	280	NA	NA	AOC29-SB-09	3	J	82.6	45.3	91.2	95% Approximate Gamma UCL	91.2	95% Approximate Gamma UCL
Soil	0-15	56-55-3	Benzo(a)anthracene	3	114	3/114	3	mg/kg	0.014	0.053	0.0052	0.5	AOC21-SB-03	1		0.00739	0.0093	0.0102	95% KM (t) UCL	0.0102	95% KM (t) UCL
Soil	0-15	50-32-8	Benzo(a)pyrene	3	114	3/114	3	mg/kg	0.016	0.054	0.0052	0.25	AOC21-SB-03	1		0.0067	0.00715	0.0086	95% KM (t) UCL	0.0086	95% KM (t) UCL
Soil	0-15	205-99-2	Benzo(b)fluoranthene	4	114	4/114	4	mg/kg	0.0053	0.16	0.0052	0.5	AOC21-SB-03	1		0.00954	0.0207	0.0145	95% KM (t) UCL	0.0145	95% KM (t) UCL
Soil	0-15	191-24-2	Benzo(g,h,i)perylene	3	114	3/114	3	mg/kg	0.0068	0.07	0.0052	0.5	CB4-023	2.25	J	0.00705	0.00978	0.00998	95% KM (t) UCL	0.00998	95% KM (t) UCL
Soil	0-15	207-08-9	Benzo(k)fluoranthene	3	114	3/114	3	mg/kg	0.012	0.05	0.0052	0.5	AOC21-SB-03	1		0.00694	0.00765	0.00926	95% KM (t) UCL	0.00926	95% KM (t) UCL
Soil	0-15	7440-41-7	Beryllium	11	68	11/68	16	mg/kg	0.32	0.5	0.31	1.2	AOC29-SB-09	2		0.333	0.0477	0.345	95% KM (t) UCL	0.345	95% KM (t) UCL
Soil	0-15	7440-43-9	Cadmium	2	68	2/68	3	mg/kg	1.4	1.4	0.52	1.2	A2905R-N			NA	NA	0.509	Too Few Unique Detected Values	1.4	Maximum Result
Soil	0-15	7440-47-3	Chromium	68	68	68/68	100	mg/kg	16	78	NA	NA	AOC29-SB-09	3		34.1	15.8	37.3	95% Student's-t UCL	37.3	95% Student's-t UCL
Soil	0-15	218-01-9	Chrysene	4	114	4/114	4	mg/kg	0.031	0.12	0.0052	0.5	CB4-001	0.5		0.00952	0.0187	0.0139	95% KM (t) UCL	0.0139	95% KM (t) UCL
Soil	0-15	7440-48-4	Cobalt	68	68	68/68	100	mg/kg	4.1	24	NA	NA	A2905R-N			8.9	5	9.91	95% Student's-t UCL	9.91	95% Student's-t UCL
Soil	0-15	7440-50-8	Copper	68	68	68/68	100	mg/kg	5.7	41	NA	NA	AOC29-SB-09	3		15.7	9.24	17.6	95% Approximate Gamma UCL	17.6	95% Approximate Gamma UCL
Soil	0-15	334-48-5	Decanoic Acid	51	51	51/51	100	mg/kg	0	0.05	NA	NA	AOC21-SB-03	1		0.00393	0.00944	0.00969	95% Chebyshev (Mean, Sd) UCL	0.00969	95% Chebyshev (Mean, Sd) UCL
Soil	0-15	53-70-3	Dibenzo(a,h)anthracene	3	114	3/114	3	mg/kg	0.034	0.046	0.0052	0.25	CB4-006	0.5	J	0.00729	0.00821	0.0097	95% KM (t) UCL	0.0097	95% KM (t) UCL
Soil	0-15	DRO	TPH as Diesel	36	74	36/74	49	mg/kg	1.1	3100	1	12	A2905R-E			133	543	533	97.5% KM (Chebyshev) UCL	533	97.5% KM (Chebyshev) UCL
Soil	0-15	206-44-0	Fluoranthene	6	114	6/114	5	mg/kg	0.018	0.11	0.0052	0.5	AOC21-SB-01	1		0.0112	0.02	0.0157	95% KM (t) UCL	0.0157	95% KM (t) UCL
Soil	0-15	86-73-7	Fluorene	1	114	1/114	1	mg/kg	0.013	0.013	0.0052	0.5	AOC21-SB-03	1		NA	NA	0.0551	Too Few Unique Detected Values	0.013	Maximum Result

Table 1. Summary Statistics for Soil

Risk Evaluation for NRG Big Break Solar Project Area, Contra Costa Power Plant, Antioch, California

Matrix	Depth (ft bgs)	CAS	Parameter	Number of Detects	Number of Analyses	Frequency of Detects	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Minimum DL for Non-detects	Maximum DL for Non-detects	Location of Maximum Detected Concentration	Lower Depth of Maximum Detected Concentration	Qualifier of Maximum Detected Concentration	Mean Value *	Standard Deviation *	Recommended 95% UCL of mean	Recommended UCL Basis	EPC: Smaller of UCL or Maximum Detect	Smaller of UCL or Maximum Detect Basis
Soil	0-15	193-39-5	Indeno(1,2,3-Cd)Pyrene	3	114	3/114	3	mg/kg	0.0085	0.075	0.0052	0.3	CB4-010	0.5		0.00637	0.00729	0.00796	95% KM (t) UCL	0.00796	95% KM (t) UCL
Soil	0-15	7439-92-1	Lead	66	68	66/68	97	mg/kg	1.6	68	1.1	1.1	AOC21-SB-03	1	J	6.53	10.1	11.9	95% KM (Chebyshev) UCL	11.9	95% KM (Chebyshev) UCL
Soil	0-15	7439-96-5	Manganese	23	23	23/23	100	mg/kg	170	480	NA	NA	FOP-SB-03	9		247	79.3	276	95% Student's-t UCL	276	95% Student's-t UCL
Soil	0-15	7439-97-6	Mercury	44	68	44/68	65	mg/kg	0.0095	0.36	0.009	0.12	A2905R-N			0.0386	0.0543	0.0501	95% KM (BCA) UCL	0.0501	95% KM (BCA) UCL
Soil	0-15	91-20-3	Naphthalene	2	114	2/114	2	mg/kg	0.023	0.024	0.0052	0.5	AOC21-SB-01	1		0.00601	0.00377	0.00733	95% KM (t) UCL	0.00733	95% KM (t) UCL
Soil	0-15	7440-02-0	Nickel	68	68	68/68	100	mg/kg	15	140	NA	NA	AOC29-SB-07	4		42.9	26.9	57.1	95% Chebyshev (Mean, Sd) UCL	57.1	95% Chebyshev (Mean, Sd) UCL
Soil	0-15	85-01-8	Phenanthrene	3	114	3/114	3	mg/kg	0.012	0.074	0.0052	0.5	AOC21-SB-03	1		0.00832	0.0138	0.0125	95% KM (t) UCL	0.0125	95% KM (t) UCL
Soil	0-15	92-94-4	p-Terphenyl	51	51	51/51	100	mg/kg	1	2.6	NA	NA	AOC29-SB-07	4		1.75	0.289	1.82	95% Student's-t UCL	1.82	95% Student's-t UCL
Soil	0-15	1718-51-0	p-Terphenyl-d14	45	45	45/45	100	mg/kg	0.25	0.35	NA	NA	AOC29-SB-06	3		0.295	0.0221	0.3	95% Student's-t UCL	0.3	95% Student's-t UCL
Soil	0-15	129-00-0	Pyrene	5	114	5/114	4	mg/kg	0.018	0.11	0.0052	0.5	AOC21-SB-01	1		0.00966	0.0172	0.0135	95% KM (t) UCL	0.0135	95% KM (t) UCL
Soil	0-15	TPH	TPH (C9-C40)	55	69	55/69	80	mg/kg	0.61	370	1	1.9	CB4-047	0.5		23.2	52	62.7	97.5% KM (Chebyshev) UCL	62.7	97.5% KM (Chebyshev) UCL
Soil	0-15	TPHMO	TPH as Motor Oil	10	23	10/23	43	mg/kg	66	9600	10	12	A2905R-E			1290	2770	5090	97.5% KM (Chebyshev) UCL	5090	97.5% KM (Chebyshev) UCL
Soil	0-15	TPHMO_SGT	TPH as Motor Oil, SGT	4	51	4/51	8	mg/kg	59	190	52	62	AOC21-SB-01	1		56.6	21.8	62.5	95% KM (t) UCL	62.5	95% KM (t) UCL
Soil	0-15	7440-62-2	Vanadium	68	68	68/68	100	mg/kg	25	110	NA	NA	A2905R-N			42.2	14.8	45.2	95% Student's-t UCL	45.2	95% Student's-t UCL
Soil	0-15	7440-66-6	Zinc	68	68	68/68	100	mg/kg	16	83	NA	NA	AOC21-SB-03	1		35.8	15.8	39	95% Student's-t UCL	39	95% Student's-t UCL

* Kaplan Meier statistics are provided in these columns when nondetects are present.

Notes:

% KM = UCL based upon Kaplan-Meier estimates using the percentile bootstrap method

BCA = Bias-corrected accelerated bootstrap method

Chebyshev (Mean, Sd) UCL = UCL for moderately skewed to highly skewed nonparametric data sets

DL = Detection Limit

EPC = Exposure Point Concentration

ft bgs = Feet below ground surface

Kaplan-Meier

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

KM (Chebyshev) UCL = UCL based upon Kaplan-Meier estimates using the Chebyshev inequality

KM (t) = UCL based upon Kaplan-Meier estimates using the Student's t-distribution critical value

mg/kg = Milligrams per kilogram

NA = Not applicable. Not enough data for calculation.

SGT = Silica gel treatment

TPH = Total petroleum hydrocarbons

UCL = Upper confidence limit

Table 2. Cancer Risks and Hazard Quotients for Surface Soil (0 to 1 foot bgs), Commercial/Industrial Worker Exposure Scenario

Risk Evaluation for NRG Big Break Solar Project Area, Contra Costa Power Plant, Antioch, California

COPC	CAS	Maximum Detected Result (mg/kg)	Exposure Point Concentration (mg/kg)	EPC Basis	Carcinogenic RBC[c] (mg/kg)	Non-Cancer RBC[c] (mg/kg)	Cancer Risk Estimate	Non-Cancer Hazard Quotient
2-Fluorobiphenyl	321-60-8	0.28	0.28	Maximum Result	NA	NA	--	--
Anthracene	120-12-7	0.014	0.014	Maximum Result	NA	2.3E+05	--	6.1E-08
Arsenic	7440-38-2	4.3	2.99	95% KM (t) UCL	2.50E-01	3.00E+00	**1.2E-05**	1.0E+00
Barium	7440-39-3	120	87.5	95% Student's-t UCL	NA	2.2E+05	--	4.0E-04
Benzo(a)anthracene	56-55-3	0.053	0.0512	95% KM (t) UCL	2.9E+00	NA	1.8E-08	--
Benzo(a)pyrene	50-32-8	0.054	0.0397	95% KM (t) UCL	2.9E-01	NA	1.4E-07	--
Benzo(b)fluoranthene	205-99-2	0.16	0.0986	95% KM (t) UCL	2.9E+00	NA	3.4E-08	--
Benzo(g,h,i)perylene	191-24-2	0.024	0.02	95% KM (t) UCL	NA	NA	--	--
Benzo(k)fluoranthene	207-08-9	0.05	0.0431	95% KM (t) UCL	2.9E+01	NA	1.5E-09	--
Beryllium	7440-41-7	0.41	0.41	Maximum Result	6.9E+03	2.10E+02	5.9E-11	2.0E-03
Cadmium	7440-43-9	1.4	1.4	Maximum Result	9.30E+03	7.30E+00	1.5E-10	1.9E-01
Chromium[a]	7440-47-3	54	37.8	95% Student's-t UCL	6.30E+00	3.50E+03	**6.0E-06**	1.1E-02
Chrysene	218-01-9	0.12	0.0834	95% KM (t) UCL	2.9E+02	NA	2.9E-10	--
Cobalt	7440-48-4	24	17.3	95% Student's-t UCL	1.9E+03	3.5E+02	9.1E-09	4.9E-02
Copper	7440-50-8	38	25.9	95% Student's-t UCL	NA	4.7E+04	--	5.5E-04
Decanoic Acid	334-48-5	0.05	0.05	Maximum Result	NA	NA	--	--
Dibenzo(a,h)anthracene	53-70-3	0.046	0.0334	95% KM (t) UCL	2.9E-01	NA	1.2E-07	--
TPH as Diesel[d]	DRO	3100	2050	95% Student's-t UCL	NA	1.10E+03	--	--
Fluoranthene	206-44-0	0.11	0.0715	95% KM (t) UCL	NA	3.0E+04	--	2.4E-06
Fluorene	86-73-7	0.013	0.013	Maximum Result	NA	3.0E+04	--	4.3E-07
Indeno(1,2,3-Cd)Pyrene	193-39-5	0.075	0.0246	95% KM (t) UCL	2.9E+00	NA	8.4828E-09	--
Lead[b]	7439-92-1	68	35.4	95% KM (t) UCL	NA	3.20E+02	--	--
Manganese	7439-96-5	350	350	Maximum Result	NA	6.90E+03	--	5.1E-02
Mercury	7439-97-6	0.36	0.21	95% KM (t) UCL	NA	4.50E+00	--	4.7E-02
Naphthalene	91-20-3	0.024	0.024	Maximum Result	1.7E+01	5.9E+02	1.4E-09	4.1E-05
Nickel	7440-02-0	69	47.1	95% Student's-t UCL	6.4E+04	3.10E+03	7.4E-10	1.5E-02
Phenanthrene	85-01-8	0.074	0.0735	95% KM (t) UCL	NA	NA	--	--

Table 2. Cancer Risks and Hazard Quotients for Surface Soil (0 to 1 foot bgs), Commercial/Industrial Worker Exposure Scenario

Risk Evaluation for NRG Big Break Solar Project Area, Contra Costa Power Plant, Antioch, California

COPC	CAS	Maximum Detected Result (mg/kg)	Exposure Point Concentration (mg/kg)	EPC Basis	Carcinogenic RBC[c] (mg/kg)	Non-Cancer RBC[c] (mg/kg)	Cancer Risk Estimate	Non-Cancer Hazard Quotient
p-Terphenyl	92-94-4	1.6	1.6	Maximum Result	NA	NA	--	--
p-Terphenyl-d14	1718-51-0	0.34	0.34	Maximum Result	NA	NA	--	--
Pyrene	129-00-0	0.11	0.0341	95% KM (t) UCL	NA	2.3E+04	--	1.5E-06
TPH (C9-C40)[d]	TPH	370	142	97.5% KM (Chebyshev) UCL	NA	1.10E+03	--	--
TPH as Motor Oil[e]	TPHMO	9600	9600	Maximum Result	NA	1.40E+05	--	--
Vanadium	7440-62-2	110	80.3	95% Student's-t UCL	NA	1.00E+03	--	8.0E-02
Zinc	7440-66-6	83	54	95% Student's-t UCL	NA	3.5E+05	--	1.5E-04
						Cumulative:	**2E-05**	1
						Cumulative, excluding arsenic and chromium:	3E-07	0.4

[a]Based on conservative chromium VI toxicity.

[b]Risk evaluated by comparing maximum detected concentration to DTSC Note 3 value for industrial workers. Not included in cumulative hazard index.

[c]RBC is the DTSC Note 3 value (DTSC, 2016), if available, or the EPA RSL for industrial workers (EPA, 2015).

[d]Risk evaluated separately by comparing EPC to RBC for TPH as diesel. Not included in cumulative hazard index because risks from individual constituents that comprise TPH (polycyclic aromatic hydrocarbons) were included.

[e]Risk evaluated separately by comparing EPC to RBC for TPH as motor oil. Not included in cumulative hazard index because risks from individual constituents that comprise TPH (polycyclic aromatic hydrocarbons) were included.

Notes:

COPC = Constituent of potential concern.

EPC = Exposure point concentration (see Table 1)

ESL = Environmental screening level

mg/kg = Milligrams per kilogram

NA = No applicable toxicity values

RBC = Risk-based concentration.

UCL = Upper confidence limit

Bolded results indicate that cancer risk exceeds criteria of 1E-06 (1×10^{-6}) or HQ exceeds 1.

References:

DTSC. 2016. Human Health Risk Assessment Note 3 - DTSC Recommended Methodology for Use of U.S. EPA Regional Screening Levels (RSLs) in Human Health Risk Assessment Process at Hazardous Waste Sites and Permitted Facilities. California Department of Environmental Protection. January.

SFRWQCB. 2016. Environmental Screening Levels - Interim Final. February. http://www.waterboards.ca.gov/rwqcb2/water_issues/programs/esl.shtml

EPA. 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm.

Table 3. Cancer Risks and Hazard Quotients for Surface Soil (0 to 1 foot bgs), Construction Worker Exposure Scenario

Risk Evaluation for NRG Big Break Solar Project Area, Contra Costa Power Plant, Antioch, California

COPC	CAS	Maximum Detected Result (mg/kg)	Exposure Point Concentration (mg/kg)	EPC Basis	Carcinogenic RBC[c] (mg/kg)	Non-Cancer RBC[c] (mg/kg)	Cancer Risk Estimate	Non-Cancer Hazard Quotient
2-Fluorobiphenyl	321-60-8	0.28	0.28	Maximum Result	NA	NA	--	--
Anthracene	120-12-7	0.014	0.014	Maximum Result	NA	2.40E+05	--	5.8E-08
Arsenic	7440-38-2	4.3	2.99	95% KM (t) UCL	2.36E+01	1.41E+02	1.3E-07	2.1E-02
Barium	7440-39-3	120	87.5	95% Student's-t UCL	NA	6.46E+04	--	1.4E-03
Benzo(a)anthracene	56-55-3	0.053	0.0512	95% KM (t) UCL	NA	NA	--	--
Benzo(a)pyrene	50-32-8	0.054	0.0397	95% KM (t) UCL	2.40E+00	NA	1.7E-08	--
Benzo(b)fluoranthene	205-99-2	0.16	0.0986	95% KM (t) UCL	2.40E+01	NA	4.1E-09	--
Benzo(g,h,i)perylene	191-24-2	0.024	0.02	95% KM (t) UCL	NA	NA	--	--
Benzo(k)fluoranthene	207-08-9	0.05	0.0431	95% KM (t) UCL	2.39E+02	NA	1.8E-10	--
Beryllium	7440-41-7	0.41	0.41	Maximum Result	8.13E+03	1.29E+03	5.0E-11	3.2E-04
Cadmium	7440-43-9	1.4	1.4	Maximum Result	1.08E+04	2.70E+02	1.3E-10	5.2E-03
Chromium[a]	7440-47-3	54	37.8	95% Student's-t UCL	4.08E+01	1.66E+03	9.3E-07	2.3E-02
Chrysene	218-01-9	0.12	0.0834	95% KM (t) UCL	2.39E+03	NA	3.5E-11	--
Cobalt	7440-48-4	24	17.3	95% Student's-t UCL	2.17E+03	8.55E+02	8.0E-09	2.0E-02
Copper	7440-50-8	38	25.9	95% Student's-t UCL	NA	3.39E+03	--	7.6E-03
Decanoic Acid	334-48-5	0.05	0.05	Maximum Result	NA	NA	--	--
Dibenzo(a,h)anthracene	53-70-3	0.046	0.0334	95% KM (t) UCL	2.40E+00	NA	1.4E-08	--
TPH as Diesel[d]	DRO	3100	2050	95% Student's-t UCL	NA	3.80E+03	--	--
Fluoranthene	206-44-0	0.11	0.0715	95% KM (t) UCL	NA	2.40E+04	--	3.0E-06
Fluorene	86-73-7	0.013	0.013	Maximum Result	NA	9.58E+04	--	1.4E-07
Indeno(1,2,3-Cd)Pyrene	193-39-5	0.075	0.0246	95% KM (t) UCL	2.40E+01	NA	1.025E-09	--
Lead[b]	7439-92-1	68	35.4	95% KM (t) UCL	NA	3.20E+02	--	--
Manganese	7439-96-5	350	350	Maximum Result	NA	5.06E+03	--	6.9E-02
Mercury	7439-97-6	0.36	0.21	95% KM (t) UCL	NA	3.63E+00	--	5.8E-02
Naphthalene	91-20-3	0.024	0.024	Maximum Result	2.60E+01	3.63E+01	9.2E-10	6.6E-04
Nickel	7440-02-0	69	47.1	95% Student's-t UCL	7.50E+04	6.02E+03	6.3E-10	7.8E-03
Phenanthrene	85-01-8	0.074	0.0735	95% KM (t) UCL	NA	NA	--	--

Table 3. Cancer Risks and Hazard Quotients for Surface Soil (0 to 1 foot bgs), Construction Worker Exposure Scenario

Risk Evaluation for NRG Big Break Solar Project Area, Contra Costa Power Plant, Antioch, California

COPC	CAS	Maximum Detected Result (mg/kg)	Exposure Point Concentration (mg/kg)	EPC Basis	Carcinogenic RBC[c] (mg/kg)	Non-Cancer RBC[c] (mg/kg)	Cancer Risk Estimate	Non-Cancer Hazard Quotient
p-Terphenyl	92-94-4	1.6	1.6	Maximum Result	NA	NA	--	--
p-Terphenyl-d14	1718-51-0	0.34	0.34	Maximum Result	NA	NA	--	--
Pyrene	129-00-0	0.11	0.0341	95% KM (t) UCL	NA	7.19E+04	--	4.7E-07
TPH (C9-C40)[d]	TPH	370	142	97.5% KM (Chebyshev) UCL	NA	3.80E+03	--	--
TPH as Motor Oil[e]	TPHMO	9600	9600	Maximum Result	NA	3.20E+04	--	--
Vanadium	7440-62-2	110	80.3	95% Student's-t UCL	NA	3.01E+03	--	2.7E-02
Zinc	7440-66-6	83	54	95% Student's-t UCL	NA	1.02E+05	--	5.3E-04
					Cumulative:		1E-06	0.2

[a]Based on conservative chromium VI toxicity.

[b]Risk evaluated by comparing maximum detected concentration to DTSC Note 3 value for industrial workers. Not included in cumulative hazard index.

[c]RBCs are site-specific EPA RSLs (EPA, 2015).

[d]Risk evaluated separately by comparing EPC to RBC for TPH as diesel. Not included in cumulative hazard index because risks from individual constituents that comprise TPH (polycyclic aromatic hydrocarbons) were included.

[e]Risk evaluated separately by comparing EPC to RBC for TPH as motor oil. Not included in cumulative hazard index because risks from individual constituents that comprise TPH (polycyclic aromatic hydrocarbons) were included.

Notes:

COPC = Constituent of potential concern.

EPC = Exposure point concentration (see Table 1)

ESL = Environmental screening level

mg/kg = Milligrams per kilogram

NA = No applicable toxicity values

RBC = Risk-based concentration.

UCL = Upper confidence limit

Bolded results indicate that cancer risk exceeds criteria of 1E-06 (1×10^{-6}) or HQ exceeds 1.

References:

DTSC, 2016. Human Health Risk Assessment Note 3 - DTSC Recommended Methodology for Use of U.S. EPA Regional Screening Levels (RSLs) in Human Health Risk Assessment Process at Hazardous Waste Sites and Permitted Facilities. California Department of Environmental Protection. January.

SFRWQCB, 2016. Environmental Screening Levels - Interim Final. February. http://www.waterboards.ca.gov/rwqcb2/water_issues/programs/esl.shtml

EPA, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm.

Table 4. Cancer Risks and Hazard Quotients for Mixed-zone Soil (0 to 15 foot bgs), Construction Worker Exposure Scenario

Risk Evaluation for NRG Big Break Solar Project Area, Contra Costa Power Plant, Antioch, California

COPC	CAS	Maximum Detected Result (mg/kg)	Exposure Point Concentration (mg/kg)	EPC Basis	Carcinogenic RBC[c] (mg/kg)	Non-Cancer RBC[c] (mg/kg)	Cancer Risk Estimate	Non-Cancer Hazard Quotient
2-Fluorobiphenyl	321-60-8	0.29	0.257	95% Student's-t UCL	NA	NA	--	--
Anthracene	120-12-7	0.014	0.014	Maximum Result	NA	2.40E+05	--	5.8E-08
Antimony	7440-36-0	6.1	6.1	Maximum Result	NA	1.36E+02	--	4.5E-02
Arsenic	7440-38-2	5.6	2.96	95% KM (BCA) UCL	2.36E+01	1.41E+02	1.3E-07	2.1E-02
Barium	7440-39-3	280	91.2	95% Approximate Gamma UCL	NA	6.46E+04	--	1.4E-03
Benzo(a)anthracene	56-55-3	0.053	0.0102	95% KM (t) UCL	NA	NA	--	--
Benzo(a)pyrene	50-32-8	0.054	0.0086	95% KM (t) UCL	2.40E+00	NA	3.6E-09	--
Benzo(b)fluoranthene	205-99-2	0.16	0.0145	95% KM (t) UCL	2.40E+01	NA	6.0E-10	--
Benzo(g,h,i)perylene	191-24-2	0.07	0.00998	95% KM (t) UCL	NA	NA	--	--
Benzo(k)fluoranthene	207-08-9	0.05	0.00926	95% KM (t) UCL	2.39E+02	NA	3.9E-11	--
Beryllium	7440-41-7	0.5	0.345	95% KM (t) UCL	8.13E+03	1.29E+03	4.2E-11	2.7E-04
Cadmium	7440-43-9	1.4	1.4	Maximum Result	1.08E+04	2.70E+02	1.3E-10	5.2E-03
Chromium[a]	7440-47-3	78	37.3	95% Student's-t UCL	4.08E+01	1.66E+03	9.1E-07	2.2E-02
Chrysene	218-01-9	0.12	0.0139	95% KM (t) UCL	2.39E+03	NA	5.8E-12	--
Cobalt	7440-48-4	24	9.91	95% Student's-t UCL	2.17E+03	8.55E+02	4.6E-09	1.2E-02
Copper	7440-50-8	41	17.6	95% Approximate Gamma UCL	NA	3.39E+03	--	5.2E-03
Decanoic Acid	334-48-5	0.05	0.00969	95% Chebyshev (Mean, Sd) UCL	NA	NA	--	--
Dibenzo(a,h)anthracene	53-70-3	0.046	0.0097	95% KM (t) UCL	2.40E+00	NA	4.0E-09	--
TPH as Diesel[d]	DRO	3100	533	97.5% KM (Chebyshev) UCL	NA	3.80E+03	--	--
Fluoranthene	206-44-0	0.11	0.0157	95% KM (t) UCL	NA	2.40E+04	--	6.5E-07
Fluorene	86-73-7	0.013	0.013	Maximum Result	NA	9.58E+04	--	1.4E-07
Indeno(1,2,3-Cd)Pyrene	193-39-5	0.075	0.00796	95% KM (t) UCL	2.40E+01	NA	3.3167E-10	--
Lead[b]	7439-92-1	68	11.9	95% KM (Chebyshev) UCL	NA	3.20E+02	--	--
Manganese	7439-96-5	480	276	95% Student's-t UCL	NA	5.06E+03	--	5.5E-02
Mercury	7439-97-6	0.36	0.0501	95% KM (BCA) UCL	NA	3.63E+00	--	1.4E-02
Naphthalene	91-20-3	0.024	0.00733	95% KM (t) UCL	2.60E+01	3.63E+01	2.8E-10	2.0E-04
Nickel	7440-02-0	140	57.1	95% Chebyshev (Mean, Sd) UCL	7.50E+04	6.02E+03	7.6E-10	9.5E-03

Table 4. Cancer Risks and Hazard Quotients for Mixed-zone Soil (0 to 15 foot bgs), Construction Worker Exposure Scenario

Risk Evaluation for NRG Big Break Solar Project Area, Contra Costa Power Plant, Antioch, California

COPC	CAS	Maximum Detected Result (mg/kg)	Exposure Point Concentration (mg/kg)	EPC Basis	Carcinogenic RBC[c] (mg/kg)	Non-Cancer RBC[c] (mg/kg)	Cancer Risk Estimate	Non-Cancer Hazard Quotient
Phenanthrene	85-01-8	0.074	0.0125	95% KM (t) UCL	NA	NA	--	--
p-Terphenyl	92-94-4	2.6	1.82	95% Student's-t UCL	NA	NA	--	--
p-Terphenyl-d14	1718-51-0	0.35	0.3	95% Student's-t UCL	NA	NA	--	--
Pyrene	129-00-0	0.11	0.0135	95% KM (t) UCL	NA	7.19E+04	--	1.9E-07
TPH (C9-C40)[d]	TPH	370	62.7	97.5% KM (Chebyshev) UCL	NA	3.80E+03	--	--
TPH as Motor Oil[e]	TPHMO	9600	5090	97.5% KM (Chebyshev) UCL	NA	3.20E+04	--	--
Vanadium	7440-62-2	110	45.2	95% Student's-t UCL	NA	3.01E+03	--	1.5E-02
Zinc	7440-66-6	83	39	95% Student's-t UCL	NA	1.02E+05	--	3.8E-04
					Cumulative:		1E-06	0.2

[a]Based on conservative chromium VI toxicity.

[b]Risk evaluated by comparing maximum detected concentration to DTSC Note 3 value for industrial workers. Not included in cumulative hazard index.

[c]RBCs are site-specific EPA RSLs (EPA, 2015). For TPH the Water Board Human Health ESL (Table S-1) is used (SFRWQCB, 2016).

[d]Risk evaluated separately by comparing EPC to RBC for TPH as diesel. Not included in cumulative hazard index because risks from individual constituents that comprise TPH (polycyclic aromatic hydrocarbons) were included.

[e]Risk evaluated separately by comparing EPC to RBC for TPH as motor oil. Not included in cumulative hazard index because risks from individual constituents that comprise TPH (polycyclic aromatic hydrocarbons) were included.

Notes:

COPC = Constituent of potential concern.

EPC = Exposure point concentration (see Table 1)

ESL = Environmental screening level

mg/kg = Milligrams per kilogram

NA = No applicable toxicity values

RBC = Risk-based concentration.

UCL = Upper confidence limit

Bolded results indicate that cancer risk exceeds criteria of 1E-06 (1×10^{-6}) or HQ exceeds 1.

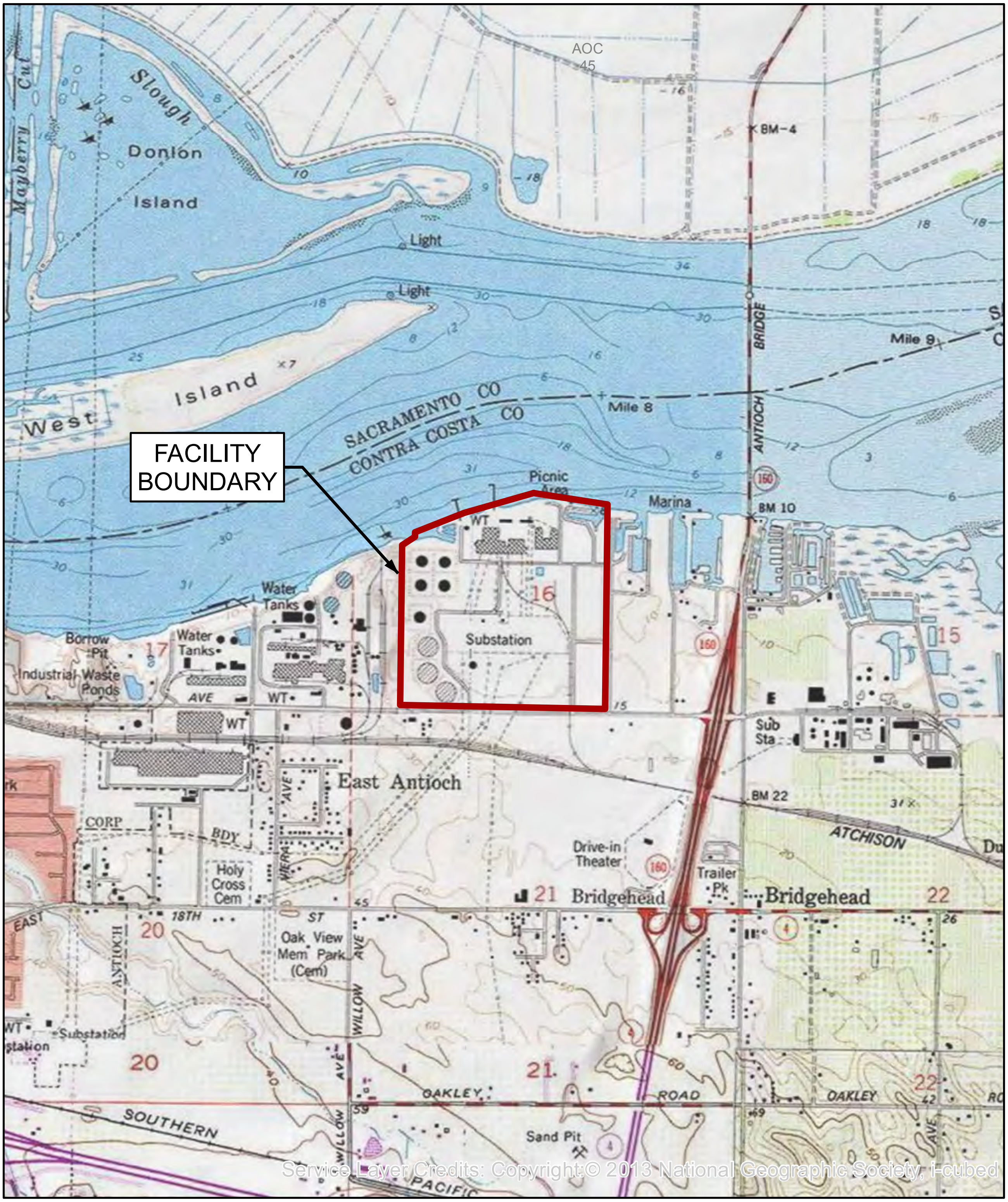
References:

DTSC. 2016. Human Health Risk Assessment Note 3 - DTSC Recommended Methodology for Use of U.S. EPA Regional Screening Levels (RSLs) in Human Health Risk Assessment Process at Hazardous Waste Sites and Permitted Facilities. California Department of Environmental Protection. January.

SFRWQCB. 2016. Environmental Screening Levels - Interim Final. February. http://www.waterboards.ca.gov/rwqcb2/water_issues/programs/esl.shtml

USEPA. 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm.

Figures



LEGEND

APPROXIMATE FACILTY BOUNDARY

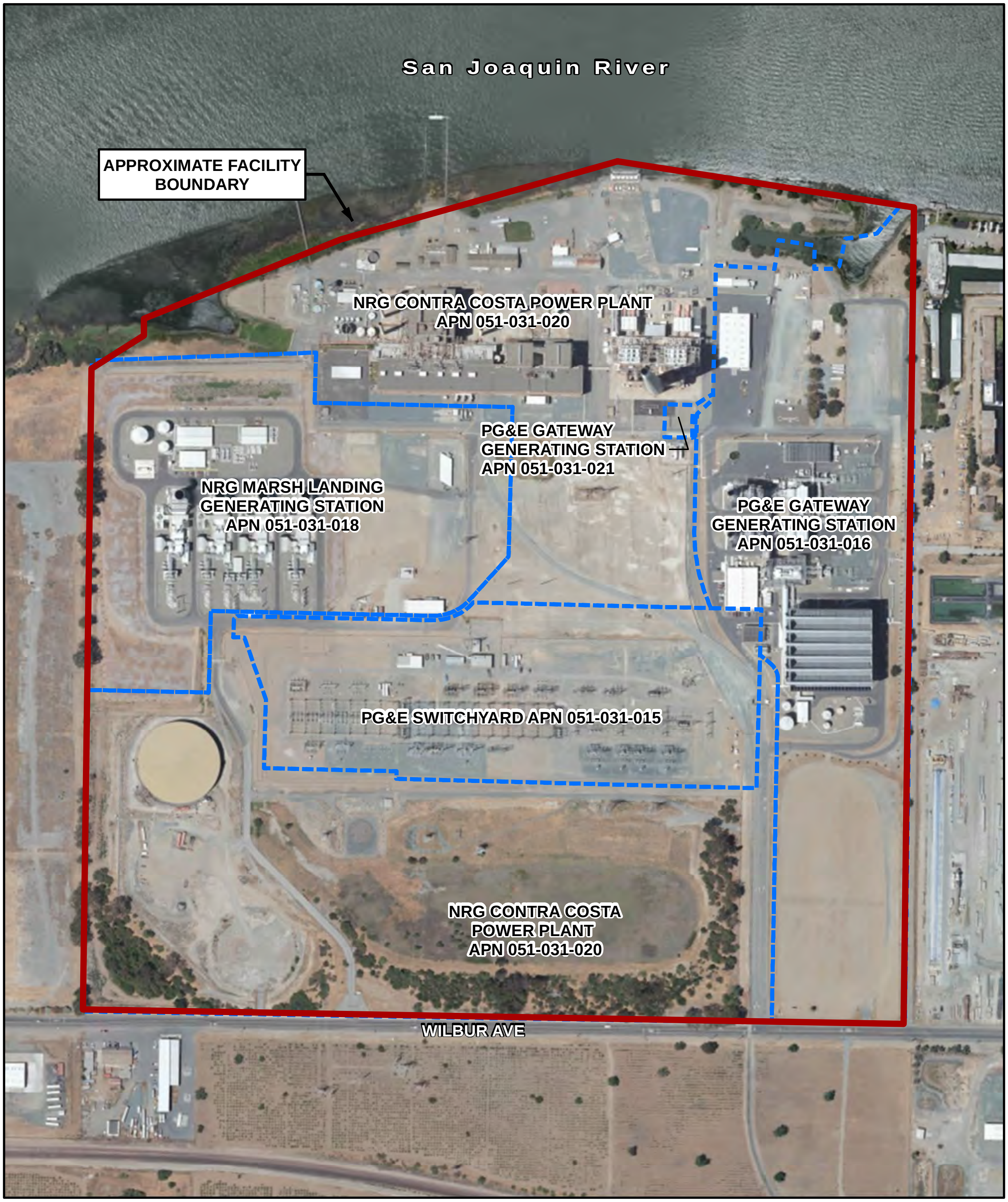
BASE MAP FROM USGS 7.5'
ANTIOCH NORTH, ANTIOCH SOUTH,
BRENTWOOD AND JERSEY ISLAND,
CALIFORNIA TOPOGRAPHIC QUADRANGLES.

N

0 1,000 2,000
Approximate scale in feet

FIGURE 1
Facility Location
Risk Evaluation,
Big Break Solar Project
Contra Costa Power Plant, Antioch, California

ch2m



LEGEND

APPROXIMATE FACILITY BOUNDARY

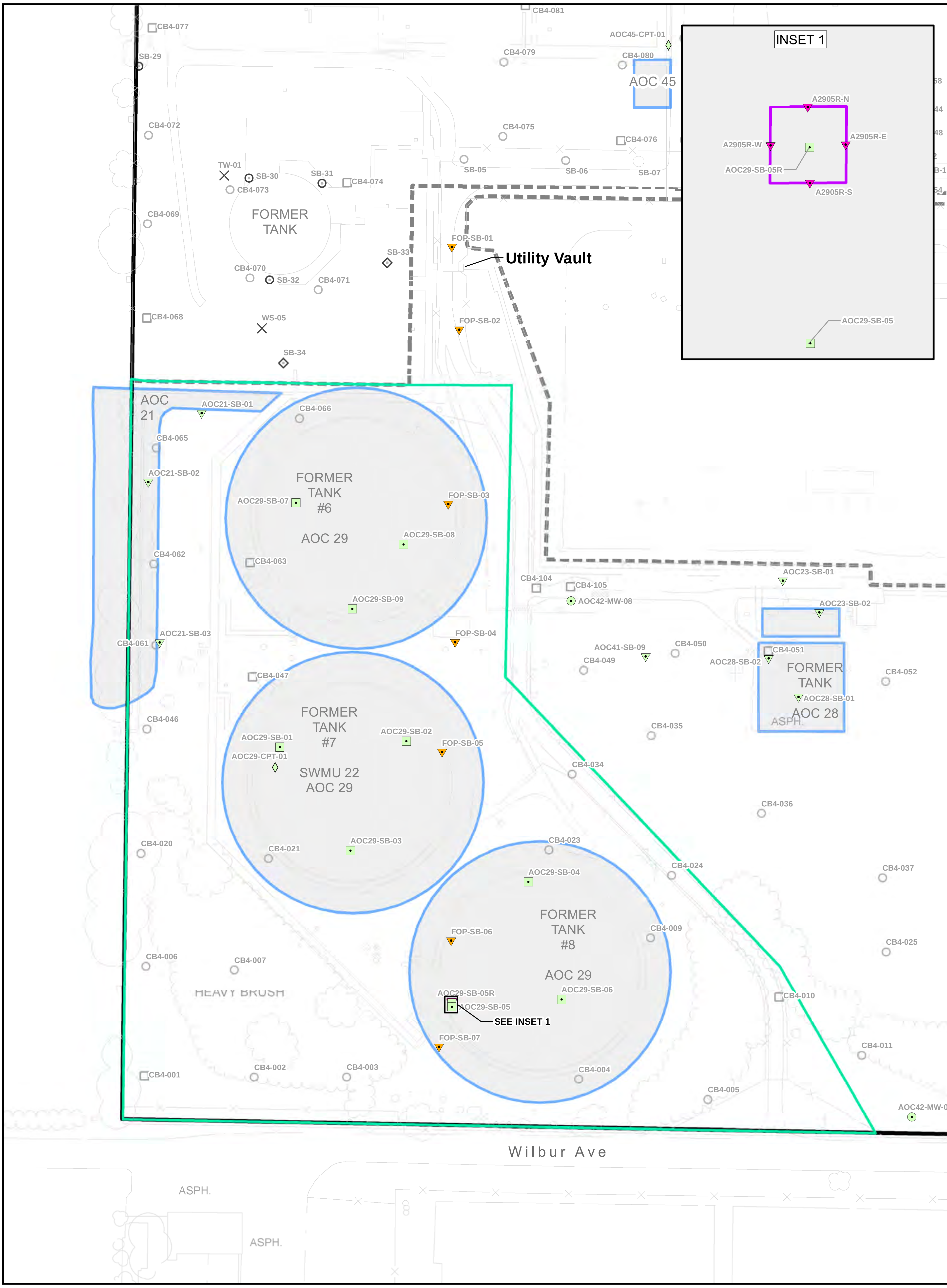
PARCEL BOUNDARIES

NOTES:
1) PARCEL BOUNDARIES PROVIDED BY CONTRA COSTA COUNTY OFFICE OF THE ASSESSOR <HTTP://WWW.CCMAP.US/CATALOG.ASP> REVISED: JUNE 2014. ACCESS DATE: 4/13/2016.
2) DATE OF AERIAL PHOTO: 6/12/2014.
3) AERIAL SERVICE LAYER SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY.

N

0 250 500
Approximate scale in feet

FIGURE 2
Parcel Map
Risk Evaluation,
Big Break Solar Project
Contra Costa Power Plant, Antioch, California



LEGEND

- 2016 FOP SITE INVESTIGATION SOIL BORING LOCATION
- 2016 TPH DELINEATION SAMPLES
- 2015 CPT AND GRAB GROUNDWATER SAMPLING LOCATION
- 2015 MONITORING WELL LOCATION
- 2015 SOIL AND GRAB GROUNDWATER SAMPLING LOCATION
- 2015 SOIL AND GRAB GROUNDWATER SAMPLING LOCATION
- 2010 SOIL SAMPLING LOCATION
- 2010 GRAB GROUNDWATER SAMPLING LOCATION
- 2010 SOIL AND GRAB GROUNDWATER SAMPLING LOCATION
- 2009 SOIL AND GROUNDWATER SAMPLE LOCATION
- 1997 SOIL SAMPLING LOCATION
- 1997 SOIL AND GRAB GROUNDWATER SAMPLING LOCATION
- DESTROYED WELL (AMEC, 2014)
- APPROXIMATE FACILITY BOUNDARY
- INTERNAL PARCEL LINES
- PROJECT AREA
- AOC/SWMU LOCATION
- SURFACE SOIL TPH DELINEATION AREA

N

0 125

Approximate scale in feet

FIGURE 3
Project Area
Risk Evaluation,
Big Break Solar Project
Contra Costa Power Plant, Antioch, California

R:\PGEALLIANCE\CONTRACOSTAPOWER\MAPFILES\RISK EVALUATION\CCP_FIGUREX_11X17_PORTRAIT.MXD ETOWERS_CH2MHILLENVG 5/24/2016 3:04:44 PM

ch2m.

Attachment 1

Site-specific

Construction Worker Equation Inputs for Soil - Other Construction Activities

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
EF_{cw} (exposure frequency - construction worker) day/yr	250
ED_{cw} (exposure duration - construction worker) yr	1
ET_{cw} (exposure time - construction worker) hr/day	8
LT (lifetime) yr	70
BW_{cw} (body weight - construction worker) kg	80
IR_{cw} (soil ingestion rate - construction worker) mg/day	330
SA_{cw} (surface area - construction worker) cm^2/day	3527
AF_{cw} (skin adherence factor - construction worker) mg/cm^2	0.3
AT_{cw} (averaging time - construction worker)	365
EW_{cw} (overall duration of construction) weeks/year	50
DW_{cw} (days worked - construction worker) days/week	5
A_c (acres)	14
A_{till} (areal extent of tilling) acres	0
A_{excav} (area of excavation site) m^2	14000
$A_{c-grade}$ (areal extent of grading) acres	14
A_{c-doz} (areal extent of dozing) acres	14
M_{m-doz} (Gravimetric soil moisture content) %	7.9
$M_{m-excav}$ (Gravimetric soil moisture content) %	12
ρ$_{soil}$ (density) g/cm^3 - chemical-specific	1.68
N_{A-dump} (number of times soil is dumped)	5
N_{A-till} (number of times soil is tilled)	0
s_{till} (soil silt content) %	18
s_{doz} (soil silt content) %	6.9
B_l (dozing blade length) m	3.7
B_l (grading blade length) m	3.7
N_{A-doz} (number of times site was dozed)	1
$N_{A-grade}$ (number of times site was graded)	1
S_{doz} (dozing speed) kph	11.4
S_{grade} (dozing speed) kph	11.4
d_{excav} (average depth of excavation site) m	1.5
V (fraction of vegetative cover)	0

Output generated 20MAY2016:13:37:47

Site-specific

Construction Worker Equation Inputs for Soil - Other Construction Activities

Variable	Value
U_m (mean annual wind speed) m/s	4.69
U_t (equivalent threshold value) m/s	11.32
t_c (overall duration of construction) hours	8400
F_D Unitless Dispersion Correction Factor	0.185837208
T (time over which traffic occurs) s	7200000
$J`_T$ (g/m²s)	0.0000006745424
F(x) (function dependant on U_m/U_t derived using Cowherd et al. (1985))	0.194
M_{wind} (dust emitted by wind erosion) g	246509.57928381
M_{doz} (dust emitted from dozing operations) g	455.01336170919
M_{till} (dust emitted from tilling operations) g	0
M_{grade} (dust emitted from grading operations) g	6686.6485310270
M_{excav} (dust emitted from excavation soil dumping) g	21510.478319809
ΣVKT_{doz} (sum of fleet vehicle km traveled) km	15.312972972972
ΣVKT_{grade} (sum of fleet vehicle km traveled) km	15.312972972972
Q/C_{sa} (inverse of the ratio of the geometric mean air concentration to the emission flu	7.9747492817218
$PEF`_{sc}$ (particulate emission factor) m^3/kg	63617275.202701
A (PEF Dispersion Constant)	2.4538
B (PEF Dispersion Constant)	17.5660
C (PEF Dispersion Constant)	189.0426
A_{surf} (areal extent of site) m^2	56656.04
A_s ($VF_{ulim-sc}$ acres)	14
T (temperature) °C	25
foc (fraction organic carbon in soil) g/g	0.006
ρ$_b$ (dry soil bulk density) g/cm^3	1.5
ρ$_s$ (soil particle density) g/cm^3	2.65
θ$_w$ (water-filled soil porosity) L_{water}/L_{soil}	0.15
A (VF Dispersion Constant)	2.4538
B (VF Dispersion Constant)	17.5660
C (VF Dispersion Constant)	189.0426
Q/C_{sa} (inverse of the ratio of the geometric mean air concentration to the emission flu	7.9747492817218
n (total soil porosity) L_{pore}/L_{soil}	0.43396
θ$_a$ (air-filled soil porosity) L_{air}/L_{soil}	0.28396
A_s ($VF_{mlim-sc}$ acres)	14

Output generated 20MAY2016:13:37:47

Site-specific

Construction Worker Equation Inputs for Soil - Other Construction Activities

Variable	Value
ρ$_b$ (dry soil bulk density) g/cm ^{3}	1.5
d_s (average source depth) m	.3
Q/C_{vol} (inverse of the ratio of the geometric mean air concentration to the emission fl	7.9747492817218
$VF_{mlim-sc}$ (volitization factor) m $^3_{air}$/kg_{soil}	5176.0651935752

Output generated 20MAY2016:13:37:47

Site-specific

Construction Worker Screening Levels (RSL) for Soil - Other Construction Activities

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Inhalation Unit Risk (ug/m ^{3})$^{-1}$	IUR Ref	Subchronic RfD (mg/kg-day)	Subchronic RfD Ref
Arsenic, Inorganic	7440-38-2	No	No	1.50E+00	I	4.30E-03	I	3.00E-04	I
Barium	7440-39-3	No	No	-		-		2.00E-01	A
Beryllium and compounds	7440-41-7	No	No	-		2.40E-03	I	5.00E-03	H
Cadmium (Diet)	7440-43-9	No	No	-		1.80E-03	I	1.00E-03	I
Chromium(III), Insoluble Salts	16065-83-1	No	No	-		-		1.50E+00	H
Chromium(VI)	18540-29-9	Yes	No	5.00E-01	J	8.40E-02	S	5.00E-03	A
Chromium, Total	7440-47-3	No	No	-		-		-	
Cobalt	7440-48-4	No	No	-		9.00E-03	P	3.00E-03	P
Copper	7440-50-8	No	No	-		-		1.00E-02	A
Lead and Compounds	7439-92-1	No	No	-		-		-	
Mercury (elemental)	7439-97-6	No	Yes	-		-		-	
Nickel Soluble Salts	7440-02-0	No	No	-		2.60E-04	C	2.00E-02	H
Anthracene	120-12-7	No	Yes	-		-		1.00E+00	P
Benzo[a]pyrene	50-32-8	Yes	No	7.30E+00	I	1.10E-03	C	-	
Benzo[b]fluoranthene	205-99-2	Yes	No	7.30E-01	W	1.10E-04	C	-	
Benzo[g,h,i]perylene	191-24-2	No	No	-		-		-	
Benzo[k]fluoranthene	207-08-9	Yes	No	7.30E-02	W	1.10E-04	C	-	
Chrysene	218-01-9	Yes	No	7.30E-03	W	1.10E-05	C	-	
Dibenzo(a,e)pyrene	192-65-4	No	No	1.20E+01	C	1.10E-03	C	-	
Fluoranthene	206-44-0	No	No	-		-		1.00E-01	P
Fluorene	86-73-7	No	Yes	-		-		4.00E-01	A
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	7.30E-01	W	1.10E-04	C	-	
Naphthalene	91-20-3	No	Yes	-		3.40E-05	C	6.00E-01	A
Pyrene	129-00-0	No	Yes	-		-		3.00E-01	P
Vanadium and Compounds	7440-62-2	No	No	-		-		1.00E-02	A
Zinc and Compounds	7440-66-6	No	No	-		-		3.00E-01	A

Site-specific

Construction Worker Screening Levels (RSL) for Soil - Other Construction Activities

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	Subchronic RfC (mg/m³)	Subchronic RfC Ref	GIABS	ABS	RBA	Volatilization Factor (m³/kg)	Soil Saturation Concentration (mg/kg)	Particulate Emission Factor (m³/kg)	Ingestion SL TR=1.0E-6 (mg/kg)
Arsenic, Inorganic	1.50E-05	C	1	0.03	0.6	-	-	6.36E+07	2.75E+01
Barium	5.00E-03	H	0.07	-	1	-	-	6.36E+07	-
Beryllium and compounds	2.00E-05	I	0.007	-	1	-	-	6.36E+07	-
Cadmium (Diet)	1.00E-05	A	0.025	0.001	1	-	-	6.36E+07	-
Chromium(III), Insoluble Salts	5.00E-03	A	0.013	-	1	-	-	6.36E+07	-
Chromium(VI)	3.00E-04	A	0.025	-	1	-	-	6.36E+07	4.96E+01
Chromium, Total	-		0.013	-	1	-	-	6.36E+07	-
Cobalt	2.00E-05	P	1	-	1	-	-	6.36E+07	-
Copper	-		1	-	1	-	-	6.36E+07	-
Lead and Compounds	-		1	-	1	-	-	6.36E+07	-
Mercury (elemental)	3.00E-04	H	1	-	1	5.18E+03	3.13E+00	6.36E+07	-
Nickel Soluble Salts	2.00E-04	A	0.04	-	1	-	-	6.36E+07	-
Anthracene	-		1	0.13	1	5.18E+03	-	6.36E+07	-
Benzo[a]pyrene	-		1	0.13	1	-	-	6.36E+07	3.39E+00
Benzo[b]fluoranthene	-		1	0.13	1	-	-	6.36E+07	3.39E+01
Benzo[g,h,i]perylene	-		1	0.13	1	-	-	6.36E+07	-
Benzo[k]fluoranthene	-		1	0.13	1	-	-	6.36E+07	3.39E+02
Chrysene	-		1	0.13	1	-	-	6.36E+07	3.39E+03
Dibenzo(a,e)pyrene	-		1	0.13	1	-	-	6.36E+07	2.06E+00
Fluoranthene	-		1	0.13	1	-	-	6.36E+07	-
Fluorene	-		1	0.13	1	5.18E+03	-	6.36E+07	-
Indeno[1,2,3-cd]pyrene	-		1	0.13	1	-	-	6.36E+07	3.39E+01
Naphthalene	3.00E-03	I	1	0.13	1	5.18E+03	-	6.36E+07	-
Pyrene	-		1	0.13	1	5.18E+03	-	6.36E+07	-
Vanadium and Compounds	1.00E-04	A	0.026	-	1	-	-	6.36E+07	-
Zinc and Compounds	-		1	-	1	-	-	6.36E+07	-

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Site-specific

Construction Worker Screening Levels (RSL) for Soil - Other Construction Activities

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	Dermal SL TR=1.0E-6 (mg/kg)	Inhalation SL TR=1.0E-6 (mg/kg)	Carcinogenic SL TR=1.0E-6 (mg/kg)	Ingestion SL THQ=1 (mg/kg)	Dermal SL THQ=1 (mg/kg)	Inhalation SL THQ=1 (mg/kg)	Noncarcinogenic SL THI=1 (mg/kg)	Screening Level (mg/kg)
Arsenic, Inorganic	1.72E+02	4.54E+03	2.36E+01	1.70E+02	1.06E+03	4.01E+03	1.41E+02	2.36E+01 ca**
Barium	-	-	-	6.79E+04	-	1.34E+06	6.46E+04	6.46E+04 nc
Beryllium and compounds	-	8.13E+03	8.13E+03	1.70E+03	-	5.34E+03	1.29E+03	1.29E+03 nc
Cadmium (Diet)	-	1.08E+04	1.08E+04	3.39E+02	2.65E+03	2.67E+03	2.70E+02	2.70E+02 nc
Chromium(III), Insoluble Salts	-	-	-	5.09E+05	-	1.34E+06	3.69E+05	3.69E+05 max
Chromium(VI)	-	2.32E+02	4.08E+01	1.70E+03	-	8.02E+04	1.66E+03	4.08E+01 ca*
Chromium, Total	-	-	-	-	-	-	-	
Cobalt	-	2.17E+03	2.17E+03	1.02E+03	-	5.34E+03	8.55E+02	8.55E+02 nc
Copper	-	-	-	3.39E+03	-	-	3.39E+03	3.39E+03 nc
Lead and Compounds	-	-	-	-	-	-	8.00E+02	8.00E+02 nc
Mercury (elemental)	-	-	-	-	-	6.52E+00	6.52E+00	6.52E+00 sat
Nickel Soluble Salts	-	7.50E+04	7.50E+04	6.79E+03	-	5.34E+04	6.02E+03	6.02E+03 nc
Anthracene	-	-	-	3.39E+05	8.14E+05	-	2.40E+05	2.40E+05 max
Benzo[a]pyrene	8.14E+00	1.77E+04	2.40E+00	-	-	-	-	2.40E+00 ca
Benzo[b]fluoranthene	8.14E+01	1.77E+05	2.40E+01	-	-	-	-	2.40E+01 ca
Benzo[g,h,i]perylene	-	-	-	-	-	-	-	
Benzo[k]fluoranthene	8.14E+02	1.77E+05	2.39E+02	-	-	-	-	2.39E+02 ca
Chrysene	8.14E+03	1.77E+06	2.39E+03	-	-	-	-	2.39E+03 ca
Dibenzo(a,e)pyrene	4.95E+00	1.77E+04	1.46E+00	-	-	-	-	1.46E+00 ca
Fluoranthene	-	-	-	3.39E+04	8.14E+04	-	2.40E+04	2.40E+04 nc
Fluorene	-	-	-	1.36E+05	3.26E+05	-	9.58E+04	9.58E+04 nc
Indeno[1,2,3-cd]pyrene	8.14E+01	1.77E+05	2.40E+01	-	-	-	-	2.40E+01 ca
Naphthalene	-	4.67E+01	4.67E+01	2.04E+05	4.89E+05	6.52E+01	6.52E+01	4.67E+01 ca**
Pyrene	-	-	-	1.02E+05	2.44E+05	-	7.19E+04	7.19E+04 nc
Vanadium and Compounds	-	-	-	3.39E+03	-	2.67E+04	3.01E+03	3.01E+03 nc
Zinc and Compounds	-	-	-	1.02E+05	-	-	1.02E+05	1.02E+05 max

Chemical	CASNUM	Inhalation Unit Risk (µg/m ³)-1	Toxicity Source	EPA Cancer Classification	Inhalation Unit Risk Tumor Type	Inhalation Unit Risk Target Organ	Inhalation Unit Risk Species	Inhalation Unit Risk Method	Inhalation Unit Risk Route	Inhalation Unit Risk Treatment Duration
Anthracene	120-12-7									
Arsenic, Inorganic	7440-38-2	4.30E-03	IRIS	A	Cancer	Lung	Human	Absolute-risk linear model	NA	NA
Barium	7440-39-3									
Benzo[a]pyrene	50-32-8	1.10E-03	Cal EPA	NA	NA	NA	NA	NA	NA	NA
Benzo[b]fluoranthene	205-99-2	1.10E-04	Cal EPA	NA	NA	NA	NA	NA	NA	NA
Benzo[g,h,i]perylene	191-24-2									
Benzo[k]fluoranthene	207-08-9	1.10E-04	Cal EPA	NA	NA	NA	NA	NA	NA	NA
Beryllium and compounds	7440-41-7	2.40E-03	IRIS	Known/likely human carcinogen	Lung cancer	Lung	Human	Relative risk	NA	NA
Cadmium (Diet)	7440-43-9	1.80E-03	IRIS	B1	Lung, trachea, bronchus cancer deaths	Lung	Human	Two stage; only first affected by exposure; extra risk	NA	NA
Chromium(III), Insoluble Salts	16065-83-1									
Chromium(VI)	18540-29-9	8.40E-02	IRIS	Carcinogenic potential cannot be determined	Lung cancer	Lung	Human	Multistage, extra risk	NA	NA
Chromium, Total	7440-47-3									
Chrysene	218-01-9	1.10E-05	Cal EPA	NA	NA	NA	NA	NA	NA	NA
Cobalt	7440-48-4	9.00E-03	PPRTV	LI	Adenoma and carcinoma	Alveolar/bronchiolar	Rat/Mouse	NA	Inhalation	2 years
Copper	7440-50-8									
Dibenzo(a,e)pyrene	192-65-4	1.10E-03	Cal EPA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	206-44-0									
Fluorene	86-73-7									
Indeno[1,2,3-cd]pyrene	193-39-5	1.10E-04	Cal EPA	NA	NA	NA	NA	NA	NA	NA
Lead and Compounds	7439-92-1	1.20E-05	Cal EPA	NA	NA	NA	NA	NA	NA	NA
Manganese (Diet)	7439-96-5									
Mercury (elemental)	7439-97-6									

Inhalation Unit Risk Study Reference	Inhalation Unit Risk Study Date
Brown and Chu 1983a,b,c, Lee-Feldstein 1983, Higgins 1982, Enterline and Marsh 1982	NA
NA	NA
NA	NA
NA	NA
Wagoner et al.	1980
Thun et al.	1985
Mancuso	1975
NA	NA
NTP 1998, Bucher et al. 1999	2008
NA	NA
NA	NA
NA	NA

Chemical	CASNUM	Inhalation Unit Risk (µg/m ^{3})$^{-1}$	Toxicity Source	EPA Cancer Classification	Inhalation Unit Risk Tumor Type	Inhalation Unit Risk Target Organ	Inhalation Unit Risk Species	Inhalation Unit Risk Method	Inhalation Unit Risk Route	Inhalation Unit Risk Treatment Duration
Naphthalene	91-20-3	3.40E-05	Cal EPA	NA	NA	NA	NA	NA	NA	NA
Nickel Soluble Salts	7440-02-0	2.60E-04	Cal EPA	NA	NA	NA	NA	NA	NA	NA
Pyrene	129-00-0									
Vanadium and Compounds	7440-62-2									
Zinc and Compounds	7440-66-6									

Inhalation Unit Risk Study Reference	Inhalation Unit Risk Study Date
NA	NA
NA	NA

Chemical	CASNUM	Oral Slope Factor (mg/kg-day) $^{-1}$	Toxicity Source	EPA Cancer Classification	Oral Slope Factor Tumor Type	Oral Slope Factor Target Organ	Oral Slope Factor Species	Oral Slope Factor Method	Oral Slope Factor Route	Oral Slope Factor Treatment Duration
Anthracene	120-12-7									
Arsenic, Inorganic	7440-38-2	1.50E+00	IRIS	A	Skin cancer	Skin	Human	Time- and dose-related formulation of the multistage model	NA	NA
Barium	7440-39-3									
Benzo[a]pyrene	50-32-8	7.30E+00	IRIS	B2	squamous cell papillomas and carcinomas	Forestomach	Mouse	Risk estimate based on a geometric mean of four slope factors obtained by different modeling procedures	NA	NA
Benzo[b]fluoranthene	205-99-2	7.30E-01	IRIS	B2	NA	NA	NA	NA	NA	NA
Benzo[g,h,i]perylene	191-24-2									
Benzo[k]fluoranthene	207-08-9	7.30E-02	IRIS	B2	NA	NA	NA	NA	NA	NA
Beryllium and compounds	7440-41-7									
Cadmium (Diet)	7440-43-9									
Chromium(III), Insoluble Salts	16065-83-1									
Chromium(VI)	18540-29-9	5.00E-01	IRIS	Carcinogenic potential cannot be determined	NA	NA	NA	NA	NA	NA
Chromium, Total	7440-47-3									
Chrysene	218-01-9	7.30E-03	IRIS	B2	NA	NA	NA	NA	NA	NA
Cobalt	7440-48-4									
Copper	7440-50-8									
Dibenzo(a,e)pyrene	192-65-4	1.20E+01	Cal EPA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	206-44-0									
Fluorene	86-73-7									
Indeno[1,2,3-cd]pyrene	193-39-5	7.30E-01	IRIS	B2	NA	NA	NA	NA	NA	NA
Lead and Compounds	7439-92-1	8.50E-03	Cal EPA	NA	NA	NA	NA	NA	NA	NA
Manganese (Diet)	7439-96-5									
Mercury (elemental)	7439-97-6									
Naphthalene	91-20-3									

Oral Slope Factor Study Reference	Oral Slope Factor Study Date
Fong et al. 1968, Tseng 1977, US EPA 1988	NA
Neal and Rigdon	1967
NA	NA
NA	NA
NA	NA
NA	NA
NA	NA
NA	NA
NA	NA

Chemical	CASNUM	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$	Toxicity Source	EPA Cancer Classification	Oral Slope Factor Tumor Type	Oral Slope Factor Target Organ	Oral Slope Factor Species	Oral Slope Factor Method	Oral Slope Factor Route	Oral Slope Factor Treatment Duration
Nickel Soluble Salts	7440-02-0									
Pyrene	129-00-0									
Vanadium and Compounds	7440-62-2									
Zinc and Compounds	7440-66-6									

Oral Slope Factor Study Reference	Oral Slope Factor Study Date

Chemical	CASNUM	Subchronic Oral Reference Dose (mg/kg-day)	Toxicity Source	Oral Subchronic Reference Dose Basis	Oral Subchronic Reference Dose Confidence Level	Oral Subchronic Reference Dose Critical Effect	Oral Subchronic Reference Dose Target Organ	Oral Subchronic Reference Dose Modifying Factor	Oral Subchronic Reference Dose Uncertainty Factor
Anthracene	120-12-7	1	PPRTV	NOEL: 1000 mg/kg-day	Low	No effects	Whole body	NA	1000
Arsenic, Inorganic	7440-38-2	0.0003	HEAST	NOAEL: 0.009 mg/L	NA	Keratosis; Hyperpigmentation	Skin; Skin	NA	3
Barium	7440-39-3	0.2	ATSDR	NOAEL: 65 mg/kg-day	NA	Increased absolute and relative kidney weight	Renal	NA	100
Benzo[a]pyrene	50-32-8	-							
Benzo[b]fluoranthene	205-99-2	-							
Benzo[g,h,i]perylene	191-24-2	-							
Benzo[k]fluoranthene	207-08-9	-							
Beryllium and compounds	7440-41-7	0.005	HEAST	NOAEL: 0.54 mg/kg/day	NA	None observed		NA	100
Cadmium (Diet)	7440-43-9	-							
Chromium(III), Insoluble Salts	16065-83-1	1.5	HEAST	NOEL: 5 % (Cr2O3)	NA	None observed		NA	1000
Chromium(VI)	18540-29-9	0.005	ATSDR	LOAEL: 0.77 mg/kg-day	NA	Microcytic, hypochromic anemia	Hemato.	NA	100
Chromium, Total	7440-47-3	-							
Chrysene	218-01-9	-							
Cobalt	7440-48-4	0.003	PPRTV	LOAEL: 1 mg/kg-day	Low	Decreased iodine uptake	Thyroid	NA	300
Copper	7440-50-8	0.01	ATSDR	NOAEL: 0.042 mg/kg-day	NA	Gastrointestinal symptoms	Gastro.	NA	3
Dibenzo(a,e)pyrene	192-65-4	-							
Fluoranthene	206-44-0	0.1	PPRTV	BMDL: 124 mg/kg-day	Low	Nephropathy	Kidney	NA	1000
Fluorene	86-73-7	0.4	ATSDR	LOAEL: 125 mg/kg-day	NA	Increased relative liver wgt	Hepatic	NA	300
Indeno[1,2,3-cd]pyrene	193-39-5	-							
Lead and Compounds	7439-92-1	-							
Manganese (Diet)	7439-96-5	0.14	HEAST	NOAEL: 0.14 mg/kg/day	NA	Effects	Central nervous system	NA	1
Mercury (elemental)	7439-97-6	-							

Oral Subchronic Reference Dose Species	Oral Subchronic Reference Dose Route	Oral Subchronic Reference Dose Study Duration	Oral Subchronic Reference Dose Study Date	Oral Subchronic Reference Dose Study Reference
Mouse	Oral - gavage	90 days	2009	Wolfe 1989
Human	Oral			
Rat	Renal	90 days	2007	NTP 1994
Rat	Oral: drinking water	Lifetime		
Rat	Oral: diet	840 days		
Rat	Hemato.	22 days	2012	NTP 2008a
Human	Oral	2 weeks	2008	Roche and Layrisse 1956
Human	Gastro.	2 months	2004	Araya et al. 2003
Mouse	Oral: gavage	13 weeks	2012	U.S. EPA 1988
Mouse	Hepatic	13 weeks	1995	
Human	Oral: diet	Chronic		

Chemical	CASNUM	Subchronic Oral Reference Dose (mg/kg-day)	Toxicity Source	Oral Subchronic Reference Dose Basis	Oral Subchronic Reference Dose Confidence Level	Oral Subchronic Reference Dose Critical Effect	Oral Subchronic Reference Dose Target Organ	Oral Subchronic Reference Dose Modifying Factor	Oral Subchronic Reference Dose Uncertainty Factor
Naphthalene	91-20-3	0.6	ATSDR	LOAEL: 50 mg/kg-day	NA	Transient clinical signs in pregnant rats	Neurol.	NA	90
Nickel Soluble Salts	7440-02-0	0.02	HEAST	NOAEL: 100 ppm	NA	Decreased weight; Decreased weight	Whole body; Organs, major	NA	300
Pyrene	129-00-0	0.3	PPRTV	NOAEL: 75 mg/kg-day	Low	Nephropathy and decreased kidney weights	Kidney	NA	300
Vanadium and Compounds	7440-62-2	0.01	ATSDR	NOAEL: 0.12 mg/kg-day	NA	No effects	Hemato.	NA	10
Zinc and Compounds	7440-66-6	0.3	ATSDR	NOAEL: 0.83 mg/kg-day	NA	Reduced erythrocyte superoxide dismutase activity, hematocrit, and serum ferritin	Hemato.	NA	3

Oral Subchronic Reference Dose Species	Oral Subchronic Reference Dose Route	Oral Subchronic Reference Dose Study Duration	Oral Subchronic Reference Dose Study Date	Oral Subchronic Reference Dose Study Reference
Rat	Neurol.	9 days	2005	NTP 1991a
Rat	Oral: diet	2 years		
Mouse	Oral: gavage	13 weeks	2007	EPA 1989
Human	Hemato.	12 weeks	2012	Fawcett et al. 1997
Human	Hemato.	10 weeks	2005	Yadrick et al. 1989

Chemical	CASNUM	Subchronic Inhalation Reference Concentration (mg/m³)	Toxicity Source	Inhalation Subchronic Reference Concentration Basis	Inhalation Subchronic Reference Concentration Confidence Level	Inhalation Subchronic Reference Concentration Critical Effect	Inhalation Subchronic Reference Concentration Target Organ
Anthracene	120-12-7	-					
Arsenic, Inorganic	7440-38-2	-					
Barium	7440-39-3	0.005	HEAST	NOEL: 0.8 mg/cu m	NA	Fetotoxicity	Fetus
Benzo[a]pyrene	50-32-8	-					
Benzo[b]fluoranthene	205-99-2	-					
Benzo[g,h,i]perylene	191-24-2	-					
Benzo[k]fluoranthene	207-08-9	-					
Beryllium and compounds	7440-41-7	-					
Cadmium (Diet)	7440-43-9	-					
Chromium(III), Insoluble Salts	16065-83-1	0.005	ATSDR	:	NA		
Chromium(VI)	18540-29-9	0.0003	ATSDR	LOAEL: 0.77 mg/kg-day	NA	Microcytic, hypochromic anemia	Hemato.
Chromium, Total	7440-47-3	-					
Chrysene	218-01-9	-					
Cobalt	7440-48-4	0.00002	PPRTV	NOAEL: 1.9 ug/m3	Low to medium	Irritation; Decreased function	Respiratory tract; Lung
Copper	7440-50-8	-					
Dibenzo(a,e)pyrene	192-65-4	-					
Fluoranthene	206-44-0	-					
Fluorene	86-73-7	-					
Indeno[1,2,3-cd]pyrene	193-39-5	-					
Lead and Compounds	7439-92-1	-					
Manganese (Diet)	7439-96-5	-					
Mercury (elemental)	7439-97-6	0.0003	HEAST	NOAEL: 0.009 mg/cu m	NA	Neurotoxicity	Nervous system
Naphthalene	91-20-3	-					
Nickel Soluble Salts	7440-02-0	0.0002	ATSDR	:	NA		
Pyrene	129-00-0	-					
Vanadium and Compounds	7440-62-2	-					
Zinc and Compounds	7440-66-6	-					

Inhalation Subchronic Reference Concentration Modifying Factor	Inhalation Subchronic Reference Concentration Uncertainty Factor	Inhalation Subchronic Reference Concentration Species	Inhalation Subchronic Reference Concentration Route	Inhalation Subchronic Reference Concentration Study Duration	Inhalation Subchronic Reference Concentration Study Date	Inhalation Subchronic Reference Concentration Study Reference
NA	100	Rat	Inhalation: intermittent	4 months		
NA						
NA	100	Rat	Hemato.	22 days	2012	NTP 2008a
NA	100	Human	Inhalation		2008	Nemery et al. 1992
NA	30	Human	Inhalation			
NA						

APPENDIX A
CONSTRUCTION AIR EMISSIONS ESTIMATE

Big Break Solar Project: Worst-Case Peak Daily Air Emissions Calculation

The Big Break Solar Project (Project) power generation facility is proposed for construction on an approximately 15-acre portion of an 86-acre parcel located in Antioch, California. The site is located within the jurisdiction of the Bay Area Air Quality Management District (BAAQMD).

The Project is expected to take 6 months for construction following 2 months of final design. During construction, the Rough Grading Phase is expected to be the worst case phase in regards to air emissions. Therefore, peak daily emissions have been estimated based upon construction activities during the Rough Grading Phase.

As a worst-case assumption the Rough Grading Phase is estimated to be completed in 15 total work days taking place over three weeks, during which time up to 20 truckloads of debris (e.g. concrete, rubble) per work day may be hauled offsite. Construction equipment is assumed to be model year 2010 or later. It is also assumed that exposed surfaces will be watered twice per day and ground cover will be replaced as soon as reasonably possible. The following equipment was included in the emission calculation.

- 1x Grader (174 Horsepower [HP]) @ 8 hours per day
- 1x Water Truck (400 HP) @ 8 hours per day
- 2x Dump trucks (400 HP each) @ 8 hours per day
- 1x Self- Propelled Compactor (80 HP) @ 8 hours per day
- 2x Bulldozers (255 HP each) @ 8 hours per day
- 1x Scraper (361 HP) @ 8 hours per day
- 2x Bobcats (64 HP) @ 8 hours per day
- 2x Quad Carts @ 8 hours per day

Emissions were calculated using the California Emissions Estimator Model (CalEEMod), version 2013.2.2 in accordance with BAAQMD guidance. The calculated peak daily emissions are provided below.

Peak Daily Emissions (pounds per day)

	ROG	CO	NOx	SO2	Fugitive PM10	Exhaust PM10	Fugitive PM2.5	Exhaust PM2.5
Emissions	3.0	64.7	51.6	0.1	6.7	1.8	3.1	1.8
Thresholds[1]	54	None	54	None	None	82	None	54
Significant?	No	-	No	-	-	No	-	No

[1] Source: BAAQMD, *CEQA Guidelines*, May 2010

APPENDIX B
BIOLOGICAL RESOURCES ASSESSMENT

Biological Resources Assessment
Marsh Landing Solar Generation Facility

Antioch, Contra Costa County, California

Prepared for:

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Date:

February 2016

ENVIRONMENTAL CONSULTANTS

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LIST OF ACRONYMS AND ABBREVIATIONS

CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Corps	U.S. Army Corps of Engineers
ESA	Federal Endangered Species Act
ECCC HCP/NCCP	East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan
Inventory	CNPS Inventory of Rare and Endangered Plants
MBTA	Migratory Bird Treaty Act
Rank	California Rare Plant Rank
RWQCB	Regional Water Quality Control Board
USFWS	U.S. Fish and Wildlife Service
WBWG	Western Bat Working Group
WRA	WRA, Inc.

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EXECUTIVE SUMMARY

This report provides an analysis of natural community and special-status species constraints at the 15.92-acre proposed Marsh Landing Solar Facility (Study Area) in Antioch, Contra Costa County, California.

On August 7 and 11, 2015, WRA, Inc. (WRA) conducted a biological resources assessment and focused tree survey within the Study Area. One sensitive biological community type, common tarweed covering 1.49 acres of the Study Area was identified. WRA observed three biological communities, 57 plant species and 11 wildlife species. One federal and state listed plant species, Antioch Dune evening-primrose (*Oenothera deltoides* ssp. *howellii*), was observed within the Study Area. No other special status plants have potential to occur and six special-status wildlife species have a moderate potential to occur within the Study Area. Recommendations to avoid and/or minimize impacts to sensitive communities and plant and wildlife species are provided.

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1.0 INTRODUCTION

On August 7 and 11, 2015, WRA, Inc. (WRA) performed an assessment of biological resources at the 15.92-acre proposed Marsh Landing Solar Facility (Study Area) in Antioch, Contra Costa County, California (Figure 1)Figure. The Study Area includes former industrial land adjacent to the existing Contra Costa Generating Station, and Wilbur Avenue. The purpose of the assessment was to examine potential biological constraints for a proposal to install solar panels and associated infrastructure within the Study Area (Project).

This report describes the results of the site visit, which assessed the Study Area for the (1) potential to support special-status species; and (2) presence of other sensitive biological resources protected by local, state, and federal laws and regulations. If special-status species were observed during the site visit, they were recorded. Specific findings on the habitat suitability or presence of special-status species or sensitive habitats may require that protocol-level surveys be conducted.

A biological resources assessment provides general information on the potential presence of sensitive species and habitats. The biological assessment is not an official protocol-level survey for listed species that may be required for project approval by local, state, or federal agencies. This assessment is based on information available at the time of the study and on site conditions that were observed on the date of the site visit.

1.1 Study Area Description

The Study Area is located between the Contra Costa Generating Station and Wilbur Avenue. The proposed solar array area consists of level, vacant, grassy fields separated by low slopes and a seasonal stream corridor, along with an existing unimproved access road. Areas to the north include the existing energy facility; partially developed and wetland areas to the east; formerly developed industrial lots to the west; and Wilbur Avenue to the south. Industrial lots and agricultural fields lay on the opposite side of Wilbur Avenue. The San Joaquin River is located approximately 0.3 miles north of the Study Area.

Figure 1. Project Location Map

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Marsh Landing Solar Facility
Contra Costa County, California

WRA
ENVIRONMENTAL CONSULTANTS

Map Date: December 2015
Map By: Chris Zumwalt
Base Source: ESRI World Topo

Path: L:\Acad 2000 Files\25000\25212\GIS\ArcMap\Fig 1 Location.mxd

2.0 REGULATORY BACKGROUND

The following sections explain the regulatory context of the biological assessment, including applicable laws and regulations that were applied to the field investigations and analysis of potential Project impacts.

2.1 Sensitive Biological Communities

Sensitive biological communities include habitats that fulfill special functions or have special values, such as wetlands, streams, or riparian habitat. These habitats are protected under federal regulations such as the Clean Water Act; state regulations such as the Porter-Cologne Act, the CDFW Streambed Alteration Program, and California Environmental Quality Act (CEQA); or local ordinances or policies such as city or county tree ordinances, Special Habitat Management Areas, and General Plan Elements.

2.1.1 Waters of the United States

The U.S. Army Corps of Engineers (Corps) regulates “Waters of the United States” under Section 404 of the Clean Water Act. Waters of the U.S. are defined in the Code of Federal Regulations (CFR) as waters susceptible to use in commerce, including interstate waters and wetlands, all other waters (intrastate waterbodies, including wetlands), and their tributaries (33 CFR 328.3). Potential wetland areas, according to the three criteria used to delineate wetlands as defined in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987), are identified by the presence of (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. Areas that are inundated at a sufficient depth and for a sufficient duration to exclude growth of hydrophytic vegetation are subject to Section 404 jurisdiction as “other waters” and are often characterized by an ordinary high water mark. Other waters, for example, generally include lakes, rivers, and streams. The placement of fill material into Waters of the U.S generally requires an individual or nationwide permit from the Corps under Section 404 of the Clean Water Act.

2.1.2 Waters of the State

The term “Waters of the State” is defined by the Porter-Cologne Act as “any surface water or groundwater, including saline waters, within the boundaries of the state.” The Regional Water Quality Control Board (RWQCB) protects all waters in its regulatory scope and has special responsibility for wetlands, riparian areas, and headwaters. These waterbodies have high resource value, are vulnerable to filling, and are not systematically protected by other programs. RWQCB jurisdiction includes “isolated” wetlands and waters that may not be regulated by the Corps under Section 404. Waters of the State are regulated by the RWQCB under the State Water Quality Certification Program which regulates discharges of fill and dredged material under Section 401 of the Clean Water Act and the Porter-Cologne Water Quality Control Act. Projects that require a Corps permit, or fall under other federal jurisdiction, and have the potential to impact Waters of the State, are required to comply with the terms of the Water Quality Certification determination. If a proposed project does not require a federal permit, but does involve dredge or fill activities that may result in a discharge to Waters of the State, the RWQCB has the option to regulate the dredge and fill activities under its state authority in the form of Waste Discharge Requirements.

2.1.3 Streams, Lakes, and Riparian Habitat

Streams and lakes, as habitat for fish and wildlife species, are subject to jurisdiction by CDFW under Sections 1600-1616 of California Fish and Game Code. Alterations to or work within or adjacent to streambeds or lakes generally require a 1602 Lake and Streambed Alteration Agreement. The term “stream”, which includes creeks and rivers, is defined in the California Code of Regulations (CCR) as “a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life [including] watercourses having a surface or subsurface flow that supports or has supported riparian vegetation” (14 CCR 1.72). In addition, the term “stream” can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife (CDFG 1994). “Riparian” is defined as “on, or pertaining to, the banks of a stream.” Riparian vegetation is defined as “vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself” (CDFG 1994). Removal of riparian vegetation also requires a Section 1602 Lake and Streambed Alteration Agreement from CDFW.

2.1.4 San Francisco Bay and Shoreline

The San Francisco Bay Conservation and Development Commission (BCDC) has regulatory jurisdiction, as defined by the McAteer-Petris Act, over the Bay and its shoreline, which generally consists of the area between the shoreline and a line 100 feet landward of and parallel to the shoreline. BCDC jurisdiction in the northeastern portion of the Bay extends to “a line between Stake Point and Simmons Point, extending northeasterly to the mouth of Marshall Cut.” The NRG Pittsburg Power Plant, including the Study Area, is located to the east of this line; therefore, it is not within BCDC jurisdiction, and special BCDC regulations do not apply to the Study Area.

2.1.5 Other Sensitive Biological Communities

Other sensitive biological communities not discussed above include habitats that fulfill special functions or have special values. Natural communities considered sensitive are those identified in local or regional plans, policies, regulations, or by the CDFW. CDFW ranks sensitive communities as "threatened" or "very threatened" and keeps records of their occurrences in its California Natural Diversity Database (CNDDB; CDFW 2013). CNDDB vegetation alliances are ranked 1 through 5 based on NatureServe's (2010) methodology, with those alliances ranked globally (G) or statewide (S) as 1 through 3 considered sensitive. Impacts to sensitive natural communities identified in local or regional plans, policies, or regulations or those identified by the CDFW or USFWS must be considered and evaluated under CEQA (CCR Title 14, Div. 6, Chap. 3, Appendix G). Specific habitats may also be identified as sensitive in city or county general plans or ordinances.

2.1.6 East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan

The East Contra Costa County Habitat Conservation Plan / Natural Community Conservation Plan (Plan) is a regional conservation plan intended to protect natural resources and promote connectivity of habitats while streamlining regulatory requirements for continued economic development and growth in the area. Approved in August 2007, the Plan provides specific conditions and conservation measures for covered activities to mitigate for incidental take of sensitive species associated with those activities.

2.1.7 Contra Costa County General Plan and Zoning Ordinances

Conservation Element of the Contra Costa County General Plan (2005) has policies regarding new development along natural watercourses. The General Plan recommends setbacks of 50 feet on each side of the centerline of the creek for new development (General Plan Policy 8-89). The County Zoning Ordinances also require minimum setbacks to meet water quality and erosion control goals through a stream ordinance for unimproved earthen channels. This ordinance requires a "structure setback line" that varies between 30 feet and 50 feet from the top-of-bank (TOB), depending on the height of the TOB above the channel invert (County Code Title 9, Division 914-14.012).

2.1.8 City of Antioch Municipal Code Section 9-5 – Tree Removal and Protection

The City of Antioch tree ordinance requires approval for the removal of:

- All established indigenous trees (blue oak, valley oak, coast live oak, canyon live oak, interior live oak, California buckeye, or California bay) 10 inches in diameter measured at 4 ½ feet above ground.
- All trees larger than 26 inches in diameter at 4 ½ feet above ground level and/or 40 feet in height above the grade.
- Any street tree or tree required to be preserved as a condition of approval from a "regular development application" and/or any tree that is shown to be preserved on an approved development plan as submitted by the applicant and subsequently approved by the city.

Trees to be removed or protected will be shown on a site map and includes a description including species, size, general health, and reason for removal. A bond is required to ensure compliance with replacement and protection conditions specified in the approval document.

2.2 Sensitive Special-Status Species

Special-status species include those plants and wildlife species that have been formally listed, are proposed as endangered or threatened, or are candidates for such listing under the Federal Endangered Species Act (ESA) or California Endangered Species Act. These acts afford protection to both listed species and those that are formal candidates for listing. In addition, California Department of Fish and Wildlife (CDFW) Species of Special Concern, which are species that face extirpation in California if current population and habitat trends continue; U.S. Fish and Wildlife Service (USFWS) Birds of Conservation Concern; and CDFW special-status invertebrates. Although CDFW Species of Special Concern generally have no special legal status, they are given special consideration under the CEQA. Bat species are also evaluated for conservation status by the Western Bat Working Group (WBWG), a non-governmental entity; bats named as a "High Priority" species for conservation by the WBWG are typically considered special-status. In addition to regulations for special-status species, most birds in the United States, including non-special-status native species, are protected by the Migratory Bird Treaty Act of 1918 (MBTA) and the California Fish and Game Code sections 3503, 3503.5 and 3513. Under these laws, deliberately destroying active bird nests, eggs, and/or young is illegal.

Plant species on the California Native Plant Society (CNPS) Rare and Endangered Plant status plant species and must be considered under CEQA. Rank 3 and Rank 4 species are afforded little or no protection under CEQA, but are included in this analysis for completeness. A description of the CNPS Ranks is provided below in Table 1.

Table 1. Description of CNPS Ranks and Threat Codes

California Rare Plant Ranks (formerly known as CNPS Lists)	
Rank 1A	Presumed extirpated in California and either rare or extinct elsewhere
Rank 1B	Rare, threatened, or endangered in California and elsewhere
Rank 2A	Presumed extirpated in California, but more common elsewhere
Rank 2B	Rare, threatened, or endangered in California, but more common elsewhere
Rank 3	Plants about which more information is needed - A review list
Rank 4	Plants of limited distribution - A watch list
Threat Ranks	
0.1	Seriously threatened in California
0.2	Moderately threatened in California
0.3	Not very threatened in California

2.3 Critical Habitat

Critical Habitat is a term defined in the ESA as a specific, designated geographic area that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. The ESA requires federal agencies to consult with the USFWS to conserve listed species on their lands and to ensure that any activities or projects they fund, authorize, or carry out will not jeopardize the survival of a threatened or endangered species. In consultation for those species with Critical Habitat, federal agencies must also ensure that their activities or projects do not adversely modify Critical Habitat to the point that it will no longer aid in the species' recovery. In many cases, this level of protection is similar to that already provided to species by the ESA jeopardy standard. However, Critical Habitat areas that are currently unoccupied by the species but which are needed for the species' recovery are protected by the prohibition against adverse modification.

3.0 METHODS

On August 7 and 11, 2015 the Study Area was traversed on foot to determine (1) plant communities present within the Study Area, (2) if existing conditions provided suitable habitat for any special-status plant or wildlife species, and (3) if sensitive habitats are present. In addition, a tree survey was conducted to inventory and describe any potential trees that may be protected by City of Antioch Municipal Code. All plant and wildlife species encountered were recorded and are listed in Appendix A. Plant nomenclature follows Baldwin et al. (2012) and subsequent revisions by the Jepson Flora Project (2015), except where noted. For cases in which regulatory agencies, CNPS, or other entities base rarity on older taxonomic treatments, precedence was given to the treatment used by those entities.

3.1 Biological Communities

Prior to the site visit, aerial photographs, web soil survey (Natural Resources Conservation Service, United States Department of Agriculture 2015), the List of Vegetation Alliances (CDFG 2010), and A Manual of California Vegetation (Sawyer et al. 2009) were reviewed to assess the potential for sensitive biological communities to occur in the Study Area. Natural communities considered sensitive are those identified in local or regional plans, policies, regulations, or by the CDFW. CDFW ranks sensitive communities as "threatened" or "very threatened" and keeps records of their occurrences in its California Natural Diversity Database (CNDDB; CDFW 2015). CNDDB vegetation alliances are ranked 1 through 5 based on NatureServe's (2015) methodology, with those alliances ranked globally (G) or statewide (S) with 1 through 3 considered sensitive.

Natural communities were mapped in the Study Area by using aerial imagery of the Study Area in the field while gathering ground level information such as percent cover of dominant species and associated species. The information gathered was used to visually delineate the different communities on the aerial imagery in the field and in GIS. Community types mapped within the Study Area and described in this report do not strictly follow vegetation alliances, but were chosen to best represent biological constraints within the Study Area.

3.1.1 Non-sensitive Biological Communities

Non-sensitive biological communities are those communities that are not afforded special protection under CEQA, and other state, federal, and local laws, regulations and ordinances. These communities may, however, provide suitable habitat for some special-status plant or wildlife species and are identified or described in Section 4.1.1 below.

3.1.2 Sensitive Biological Communities

Sensitive biological communities are defined as those communities that are given special protection under CEQA and other applicable federal, state, and local laws, regulations and ordinances. Applicable laws and ordinances are discussed above in Section 2.0. Special methods used to identify sensitive biological communities are discussed below.

3.1.3 Other Sensitive Biological Communities

The Study Area was evaluated for the presence of other sensitive biological communities, including sensitive plant communities recognized by CDFW and areas protected under Contra Costa County General Plan and Zoning Ordinances (Section 2.1). Prior to the site visit, aerial photographs, local soil maps, the List of Vegetation Alliances (CDFG 2009), and A Manual of

California Vegetation (Sawyer et al. 2009) were reviewed to assess the potential for sensitive biological communities to occur in the Study Area.

3.2 Special-Status Species

3.2.1 Literature Review

Potential occurrence of special-status species in the Study Area was evaluated by first determining which special-status species occur in the vicinity of the Study Area through a literature and database search. Database searches for known occurrences of special-status species focused on the Honker Bay 7.5 minute USGS quadrangle and the eight surrounding USGS quadrangles. The following sources were reviewed to determine which special-status plant and wildlife species have been documented to occur in the vicinity of the Study Area:

- California Natural Diversity Database (CNDDB) records (CDFW 2015)
- CNPS Inventory records (CNPS 2015)
- CDFG publication “California’s Wildlife, Volumes I-III” (Zeiner et al. 1990)
- CDFG publication: *California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California* (Shuford and Gardali 2008)
- CDFG publication “Amphibians and Reptile Species of Special Concern in California” (Jennings and Hayes 1995)
- *A Field Guide to Western Reptiles and Amphibians* (Stebbins 2003)
- *Breeding Bird Atlas of Contra Costa County* (Glover 2009)
- USGS 7.5-Minute Quadrangle Map (USGS 1980)

3.2.2 Site Assessment

Two site visits were made to the Study Area to search for suitable habitats for special-status species and perform planning-level surveys for one special status plant species: Antioch Dunes evening primrose. Habitat conditions observed in the Study Area were used to evaluate the potential for presence of special-status species based on these searches and the professional expertise of the investigating biologists. The potential for each special-status species to occur in the Study Area was then evaluated according to the following criteria:

- No Potential. Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).
- Unlikely. Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.
- Moderate Potential. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
- High Potential. All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.
- Present. Species is observed on the site or has been recorded (i.e. CNDDB, other reports) on the site recently.

The site assessment is intended to identify the presence or absence of suitable habitat for each special-status species known to occur in the vicinity in order to determine its potential to occur in the Study Area. In cases where little information is known about species occurrences and habitat requirements, the species evaluation was based on best professional judgment of WRA biologists with experience working with the species and habitats. If necessary, recognized experts in individual species biology were contacted to obtain the most up to date information regarding species biology and ecology.

If a special-status species was observed during the site visit, its presence is recorded and discussed below in Section 4.2. For some species, a site assessment visit at the level conducted for this report may not be sufficient to determine presence or absence of a species to the specifications of regulatory agencies. In these cases, a species may be assumed to be present or further protocol-level special-status species surveys may be necessary. Special-status species for which further protocol-level surveys may be necessary are described below in Section 5.0.

4.0 RESULTS

The Study Area is located on vacant, formerly developed industrial land located between Wilbur Avenue and the San Joaquin River. It is bounded by the Contra Costa Generating Station, formerly developed industrial land, and Wilbur Avenue. Elevations within the Study Area range from about 10 to 20 feet (USGS 1980).

Representive photographs of the Study Area are shown in Appendix C. The majority of the Study Area is characterized by developed/disturbed former industrial site. Three large storage tanks and associated infrastructure previously occupied the property. The southern portion of the property is dominated by a grove of ornamental trees. A seasonal wetland borders the property to the east but lies outside the Study Area boundaries.

The Study Area is on a mostly-flat terrace which appears to have been highly modified by human activities. In the former storage tank locations, the substrate appears to be imported fill material. The fill material was distributed and shaped to form a broad, mostly-flat area at slightly higher elevation than the adjacent industrial and agricultural areas. The eastern boundary of the Study Area includes a portion of an existing access road.

In addition to the historic disturbance that shaped the Study Area, regular land management activities appear to have reduced the habitat suitability for most special-status plants and wildlife.

Although all soils within the Study Area appear to have been modified as described above, the soils in this area are officially mapped as Delhi sand, 2 to 9 percent slopes (USDA 2015). The following sections present the results and discussion of the biological assessment within the Study Area.

4.1 Biological Communities

Biological communities observed within the Study Area are summarized in Table 2 and depicted in Figure 2. Descriptions of each biological community are contained in the following sections.

Table 2. Summary of Biological Communities within the Study Area

Biological Community Type	Acres
Non-sensitive Biological Communities	
Ornamental Grove	3.50
Disturbed/Developed	10.93
Sensitive Biological Communities	
Common Tarweed Field	1.49
Total	**15.92**

4.1.1 Non-Sensitive Biological Communities

4.1.1.1 Ornamental Grove

In the southwestern corner of the Study Area 3.50 acres are covered by an ornamental grove planted decades ago. Many species of tree and shrub have become established and quite large, creating a dense canopy of varied, mostly nonnative species. Trees and shrubs in this area include African sumac (*Searsia lancea*), Italian buckhorn (*Rhamnus alaternus*), Coast live oak (*Quercus agrifolia var. agrifolia*), red ironbark (*Eucalyptus sideroxylon*), Lombardy poplar (*Populus nigra*), crimson bottlebrush (*Callistemon citrinus*), blackwood acacia (*Acacia melanoxylon*), white iron bark (*Eucalyptus leucoxylon*), Aleppo pine *(Pinus halepensis*), Chinese privet (*Ligustrum sinense*), Siberian elm (*Ulmus pumila*), and domestic almond (*Prunus dulcis*).

A total of 268 trees were inventoried in the Study Area. Of those, 12 trees are considered protected per the City of Antioch Tree Removal and Protection Ordinance. Of the 12 protected trees, four also meet the requirement of being landmark/heritage trees. A complete list of protected trees surveyed and a map of their locations within the Study Area is included in Appendix D. Protected tree species present within the Study Area include predominantly coast live oak, white iron bark, red iron bark, Lombardy poplar, and Siberian elm. Landmark/heritage tree species present within the Study Area include white iron bark, red iron bark, and Siberian elm.

The largest protected tree surveyed was a 51-inch multi-stem white iron bark (tree #4410). The largest single-trunk tree surveyed was a 52-inch white iron bark (tree #4458). Among all 12 protected trees surveyed, DBH ranged from 16.3 to 56.2 inches. Approximate height ranged from 7 to 60 feet. One hundred seventy five (175) trees had multiple stems originating below the 4.5-foot measuring height, most of which were African sumac and Italian buckthorn trees.

4.1.1.2 Developed/Disturbed

Most of the Study Area consists of developed/disturbed areas with little to no native soils. These include hardpan areas, riprap and gravel, access roads, and some cement foundations historically used for tanks. The limited amount of vegetation growing in these areas is primary non-native species that thrive in disturbed areas.

4.1.2 Sensitive Biological Communities

One sensitive biological community, common tarweed fields, was documented within the Study Area and is described below.

4.1.2.1 *Centromadia (pungens)* Herbaceous Alliance (Common Tarweed Fields)

This alliance is characterized by an intermittent herbaceous layer with tarweed as a dominant or conspicuous species, making up at least thirty percent of the total herbaceous layer and thus meets the relative cover requirement for inclusion in the *Centromadia* (*pungens*) Herbaceous Alliance (tar plant fields) ranking G2? and S2? [sic] by CDFW. The shrub layer may also contain some emergent plants at low cover, but the tree layer is nonexistent in this alliance. Typical habitats for this alliance include vernally wet areas such as the edges of vernal pools, bottoms of shallow pools, and alkaline flats subjected to periodic or intermittent water inundation. In these areas, soils are poorly drained fine alluvium derived from sedimentary or volcanic substrates, sometimes underlain by claypan or other impervious layers. Common tarweed can grow in elevations below approximately 3,000 feet above sea level.

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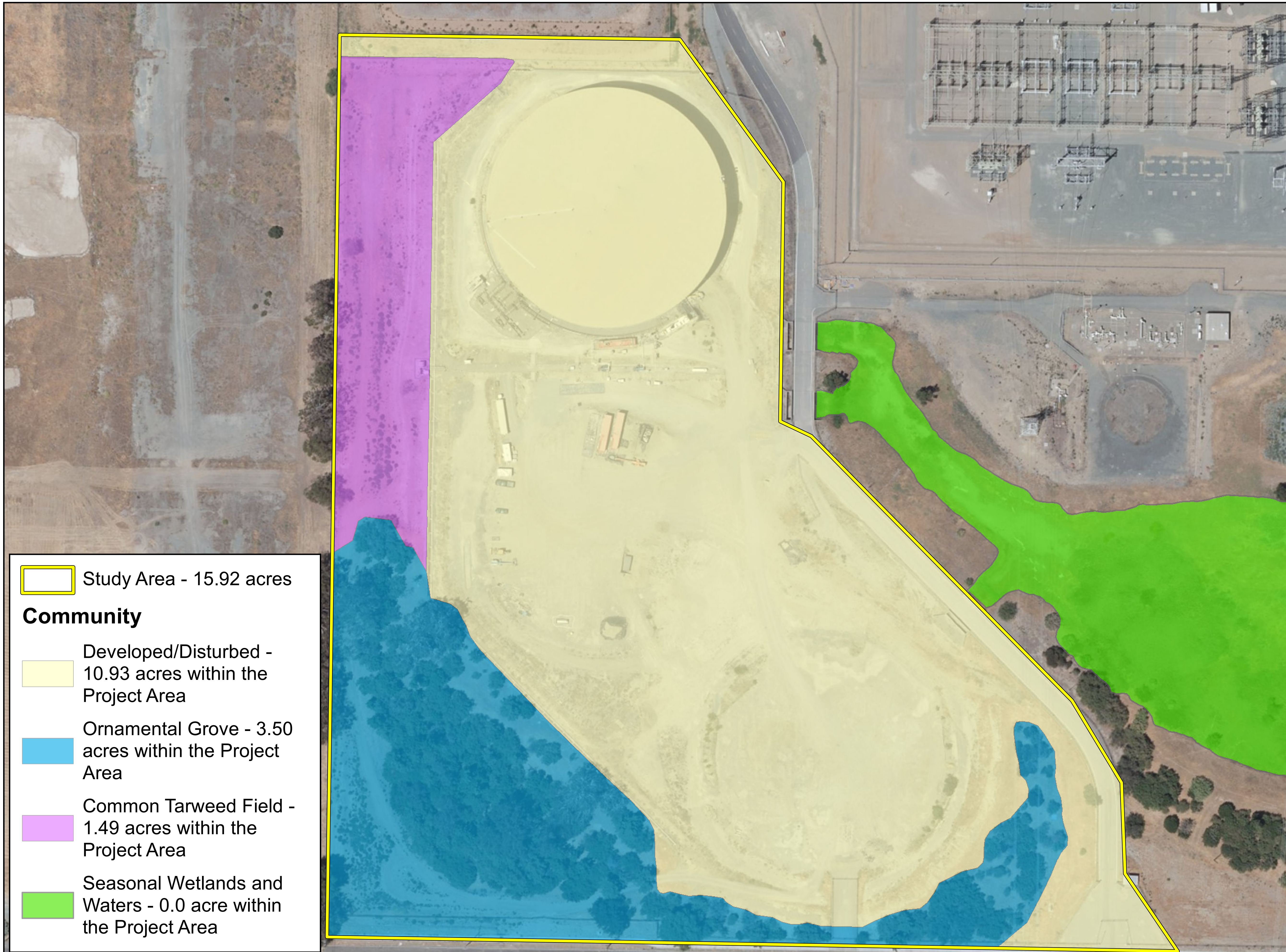
Marsh Landing
Solar Facility
Contra Costa County,
California

Figure 2.

Vegetation Communities



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Map Prepared Date: 12/31/2015
Map Prepared By: czumwalt
Base Source: SFEI, Quantum Spatial, 2014
Data Source(s): WRA

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It is a California native annual that blooms and fruits after most spring annuals have gone to seed (Sawyer 2009). While this area meets the criteria for a sensitive community, it is not a high quality representation of the alliance based on: the high number of non-native/invasive species (i.e. yellow star thistle); the lack of plant species typical of this alliance; the disturbed/developed nature of the Study Area; the small size of the tar plant field; and the absence of associated vernally wet habitat on the site. For this reason, any impacts to this community are not likely to be significant.

4.1.3 Sensitive Biological Communities Located Outside the Study Area

One potentially sensitive biological community classified as a man-made seasonal wetland is located in close proximity to the Study Area. Because the community may present constraints that affect work within the Study Area, it is included in this report and discussed below.

4.1.3.1 Depressional Seasonal Wetland

Outside the Study Area, a man-made seasonal depressional wetland lies adjacent to about half of the eastern Study Area boundary. A small buffer of upland area separates the wetland from the project boundary in all but three locations, where culverts under the Study Area's eastern road connect directly to the wetland. The wetland is shallow, created by a slight depression. The edges of the wetland show signs of drought in recent years, with upland species encroaching into lower areas than is probably normal for this area. This feature may be potentially under the Corps and/or RWQCB jurisdictions, though a formal wetland delineation was not performed at the time of the assessment.

4.2 Special-Status Species

4.2.1 Plants

Based upon a review of the resources and databases given in Section 3.2.1, 26 special-status plant species have been documented in the vicinity of the Study Area; the potential for each of these species to occur in the Study Area is summarized in Appendix B. CNDDB occurrences of special-status plants within 2.0 miles of the Study Area are shown in Figure 3. (Note: the current analysis included all species documented within the nine USGS quadrangle assessment area.)

One special status plant species, the federal and state listed Antioch dunes evening-primrose (*Oenothera deltoides* subsp. *howellii*), was observed within the Study Area and is described below. The 56 other plant species observed within the Study Area were non-native species frequently found in disturbed habitats, or were common native species without a special protective status.

The Study Area has a limited potential to support most special-status plant species documented in the vicinity of the Study Area. Most special status plants are likely only to occur in specific habitat types such as wetlands, which would be completely avoided by Project activities. The majority of the Study Area consists of imported fill soil or otherwise disturbed soil, and these areas are regularly disturbed during site management activities, rendering them unsuitable for most special-status plant species.

Antioch Dunes evening-primrose. Federal Endangered, State Endangered, CNPS Rank 1B.1. ECCC HCP/NCCP Plan Species. Present. The Antioch Dunes evening primrose is a Federal- and State-listed endangered plant in the evening primrose family. The short-lived perennial has large white flowers that open in the early evening and close in the morning and blooms from March to September. The only naturally-occurring population is known to occur at the Antioch Dunes National Wildlife Refuge and its immediate vicinity; its historic range is unknown due to the extent of land alteration. Historic threats were development, sand mining, and agricultural conversion, while the plant's threat today is competition with invasive plants that alter the sand dune ecosystem (CDFW 2013).

One Antioch Dunes evening-primrose plant was identified in the northwestern portion of the Study Area during a focused survey conducted by a WRA botanist in August 2011. This same plant was again identified in a senesced state during another focused survey for this species conducted during one of the 2015 site visits. Although no other evening-primrose plants have been identified on-site to date, the northwestern portion of the Study Area features a substrate of windblown sand (overlaying the disturbed soil layer typical of the site). Given that the 2015 surveys were conducted in the context of drought conditions, there is some potential for this species to further establish itself on sandy substrate within the Study Area.

4.2.2 Wildlife

Fifty-six special-status wildlife species have been recorded in the vicinity of the Study Area; the potential for each of these species to occur in the Study Area is summarized in Appendix B. CNDDB occurrences of special-status wildlife within 2.0 miles of the Study Area are shown in Figure 4. (Note: the current analysis included all species documented within the nine USGS quadrangle assessment area.) Eleven wildlife species were observed in the Study Area during the site visits, all of which were common species without a special protective status. No special-status wildlife species were observed during the site visits. Six special-status wildlife species were determined to have a moderate potential to occur in the Study Area, and are discussed below.

4.2.2.1 Wildlife Species With the Potential To Occur

Western red bat (*Lasiurus blossevillii*), CDFW Species of Special Concern, WBWG High Priority. Moderate Potential. This species is highly migratory and broadly distributed, ranging from southern Canada through much of the western United States. Western red bats are believed to make seasonal shifts in their distribution, although there is no evidence of mass migrations (Pierson et al. 2006). They are typically solitary, roosting primarily in the foliage of trees or shrubs. Day roosts are commonly in edge habitats adjacent to streams or open fields, in orchards, and sometimes in urban areas possibly and association with riparian habitat (particularly willows, cottonwoods, and sycamores; Pierson et al. 2006). It is believed that males and females maintain different distributions during pupping, where females take advantage of warmer inland areas and males occur in cooler areas along the coast.

Potential roost habitat is present in trees within the Study Area, most particularly the largest trees with the densest foliage and high leaf mass. Maternity (breeding) roosting by bats within tree foliage is very rare and thus any maternity roosting within the Study Area is unlikely.

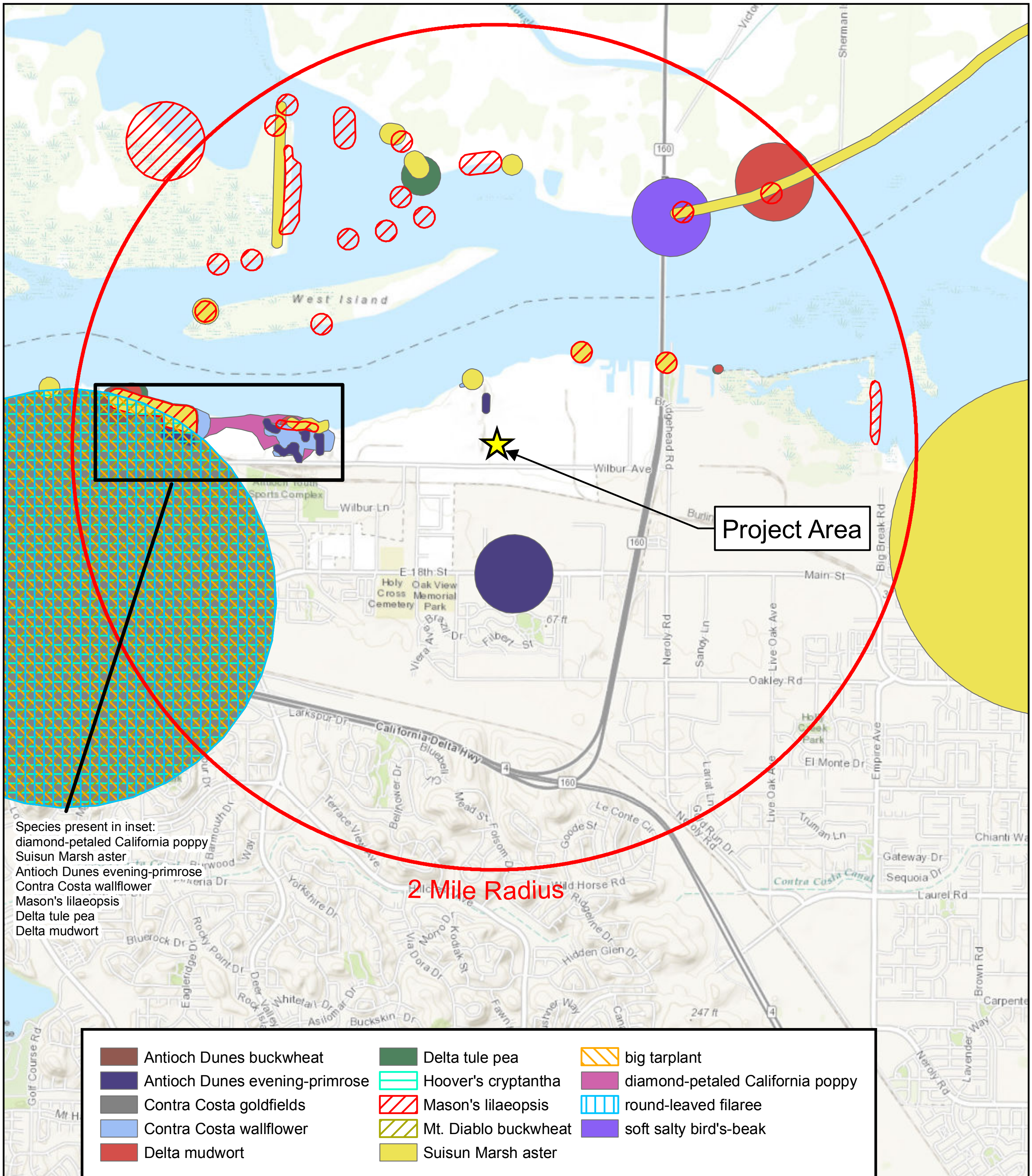

Figure 3. CNDDB Plant Occurrences within 2 Miles of the Study Area

Marsh Landing Solar Facility
Contra Costa County, California

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0 0.4 0.8
Miles

ENVIRONMENTAL CONSULTANTS

Date: December 2015
Map By: Chris Zumwalt
Basemap: ESRI World Topo

Path: L:\Acad 2000 Files\25000\25212\GIS\ArcMap\Fig 3 CNDDB Plant 2 mile.mxd

Burrowing owl (*Athene cunicularia*), CDFW Species of Special Concern; USFWS Bird of Conservation Concern. ECCC HCP/NCCP Plan Species. Moderate Potential. The burrowing owl occurs as a year-round resident and winter visitor in much of California's lowlands, inhabiting open areas with sparse or non-existent tree or shrub canopies. Typical habitat is annual or perennial grassland, although human-modified areas such as agricultural lands and airports are also used (Poulin et al. 1993). This species is dependent on burrowing mammals to provide the burrows that are characteristically used for shelter and nesting, and in northern California is typically found in close association with California ground squirrels (*Spermophilus beecheyi*). Manmade substrates such as pipes or debris piles may also be occupied in place of burrows. Prey consists of insects and small vertebrates. Breeding typically takes place from March to July.

There are several CNDDB occurrences of this species within 2.0 miles (CDFW 2015). The Study Area is flat and largely features sparse or absent vegetation, providing generally suitable habitat for burrowing owls. Ground squirrel burrows are also present, though relatively few in number. The tree grove in the southern portion of the Study Area provides a visual barrier for burrowing owls and thus likely precludes their presence in this area.

White-tailed kite (*Elanus leucurus*). CDFW Fully Protected Species. ECCC HCP/NCCP Plan Species. Moderate Potential. The white-tailed kite is resident in open to semi-open habitats throughout the lower elevations of California, including grasslands, savannahs, woodlands, agricultural areas and wetlands. Vegetative structure and prey availability seem to be more important habitat elements than associations with specific plants or vegetative communities (Dunk 1995). Nests are constructed mostly of twigs and placed in trees, often at habitat edges. Nest trees are highly variable in size, structure, and immediate surroundings, ranging from shrubs to trees greater than 150 feet tall (Dunk 1995). This species preys upon a variety of small mammals, as well as other vertebrates and invertebrates. Trees within the Study Area provide suitable nesting habitat for white-tailed kite; adjacent areas may provide suitable foraging habitat for this species.

Loggerhead shrike (*Lanius ludovicianus*). CDFW Species of Special Concern, USFWS Bird of Conservation Concern. Moderate Potential. The loggerhead shrike is a year-round resident and winter visitor in lowlands and foothills throughout California. This species is associated with open country with short vegetation and scattered trees, shrubs, fences, utility lines and/or other perches. Although they are songbirds, shrikes are predatory and forage on a variety of invertebrates and small vertebrates. Captured prey items are often impaled for storage purposes on suitable substrates, including thorns or spikes on vegetation, and barbed wire fences. This species nests in trees and large shrubs; nests are usually placed three to ten feet off the ground (Shuford and Gardali 2008). Trees and shrubs within the Study Area provide suitable nesting habitat for this species, and the Study Area and surrounding areas provide suitable foraging habitat.

Swainson's hawk (*Buteo swainsoni*). State Threatened, USFWS Bird of Conservation Concern. ECCC HCP/NCCP Plan Species. Moderate Potential. Swainson's hawk is a summer resident and migrant in California's Central Valley and scattered portions of the southern California interior. Nests are constructed of sticks and placed in trees located in otherwise largely open areas. Areas typically used for nesting include the edge of narrow bands of riparian vegetation, isolated patches of oak woodland, lone trees, and also planted and natural trees associated with roads, farmyards and sometimes adjacent residential areas. Foraging occurs in open habitats, including grasslands, open woodlands, and agricultural areas. While breeding, adults feed primarily on rodents (and other vertebrates); for the remainder of the year, large insects (e.g., grasshoppers, dragonflies) comprise most of the diet. In many areas, Swainson's hawks have adapted to foraging primarily in and around agricultural plots (particularly alfalfa, wheat and row crops), as prey is both numerous and conspicuous at harvest and/or during flooding or burning (Bechard et al. 2010).

The Study Area is located within a mile of a documented Swainson's hawk nest (CDFW 2015) and the larger trees within the on-site tree grove provide marginal nesting habitat. However, due to the disturbed nature of the site, the Study Area does not provide suitable foraging habitat, though potentially suitable foraging areas are located in the agricultural areas to the south.

Silvery legless lizard (*Anniella pulchra pulchra*), CDFW Species of Special Concern. ECCC HCP/NCCP Plan Species. Moderate Potential. The silvery legless lizard has a spotty distribution ranging from the Coast Ranges in Contra Costa County, California southward. This fossorial (burrowing) species is associated with sandy or loose organic soils or areas where there is abundant leaf litter and cover. Suitable habitat includes beaches, dunes, chaparral, pine-oak woodland, and stream terraces and washes. Legless lizards are often found under surface objects that lie barely covered in loose soil, such as logs and rocks. Because legless lizards are dependent on loose soil and soil moisture; their habitat can be greatly degraded by urbanization and agriculture. The primary source of food for this species is spiders and insects (Stebbins 2003).

There are several occurrences of silvery legless lizard in CNDDB within 3.0 miles of the Study Area including one located approximately 150 feet to the west (CDFW 2015). (Note: most of these occurrence locations, including the adjacent one, are not precise data points but rather based on general descriptions of older collection sites from the Antioch area.) While the Study Area does not contain any functioning dune habitat, the northwestern portion does contain sandy, friable soil which has likely been naturally deposited on-site by seasonal wind events from existing western dune habitat to the west. Although this substrate is poor-quality habitat for the species, the ostensibly nearby occurrence suggests that legless lizards have a moderate potential to occur within the Study Area during dispersal.

4.3 East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECCC HCP/NCCP or Plan)

The Study Area falls within the coverage boundary of the ECCC HCP/NCCP. Specifically, the Study Area is within the Plan's "Agricultural" fee zone, and has been mapped entirely as "Urban" in terms of landcover type. Five HCP planning species have a moderate potential to occur within the Study Area, and are detailed in Section 4.2. Recommendations on avoiding or minimizing impacts to these species are given in Section 5.2 and 5.3. A planning survey was conducted for Antioch Dunes evening-primrose during the 2015 site visits. Planning surveys for the additional four species have not been conducted.

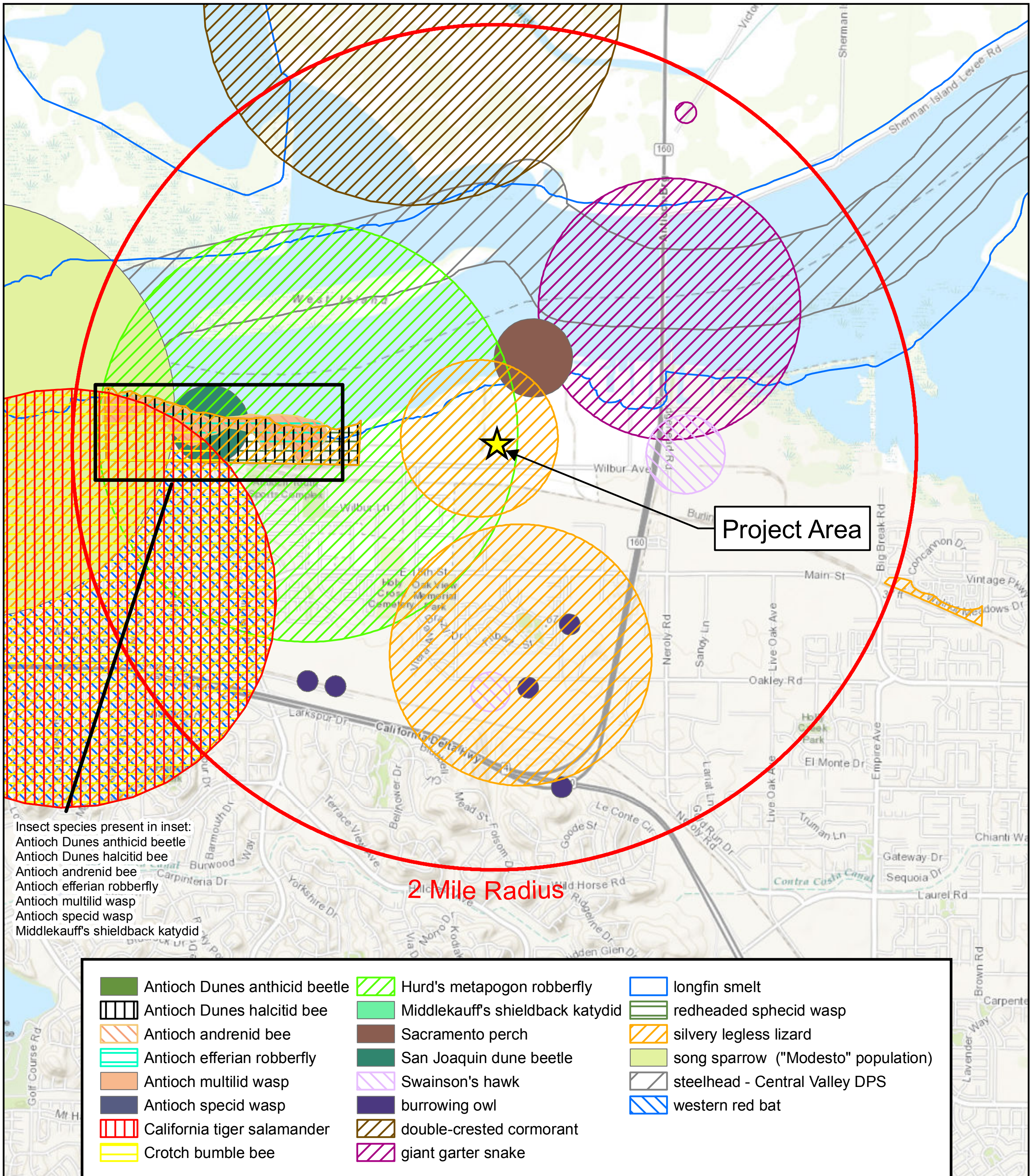


Figure 4. CNDDB Wildlife Occurrences within 2 Miles of the Study Area

N
W E
S

0 0.4 0.8
Miles

Marsh Landing Solar Facility
Contra Costa County, California

WRA ENVIRONMENTAL CONSULTANTS

Date: December 2015
Map By: Chris Zumwalt
Basemap: ESRI World Topo

Path: L:\Acad 2000 Files\25000\25212\GIS\ArcMap\Fig 4 CNDDB Wildlife 2 mile.mxd

5.0 SUMMARY AND RECOMMENDATIONS

One sensitive biological community was identified within the Study Area; another potentially sensitive community was identified immediately adjacent to the Study Area. One special-status plant species, Antioch Dunes evening-primrose, is known to occur in the northwest portion of the Study Area; other special-status plants are unlikely or have no potential to occur within the Study Area. No special-status wildlife species were observed within the Study Area, but six special-status wildlife species have a moderate potential to occur there. Potential constraints for the Project with regard to sensitive biological resources within the Study Area are depicted in Figure 5; the following sections present recommendations for future studies and/or measures to avoid or reduce impacts by Project activities to these sensitive habitats and species.

5.1 Biological Communities

As described in Section 4.1, one sensitive biological community occurs within the Study Area, and one sensitive biological community occurs adjacent to the Study Area.

5.1.1 Common tarweed fields

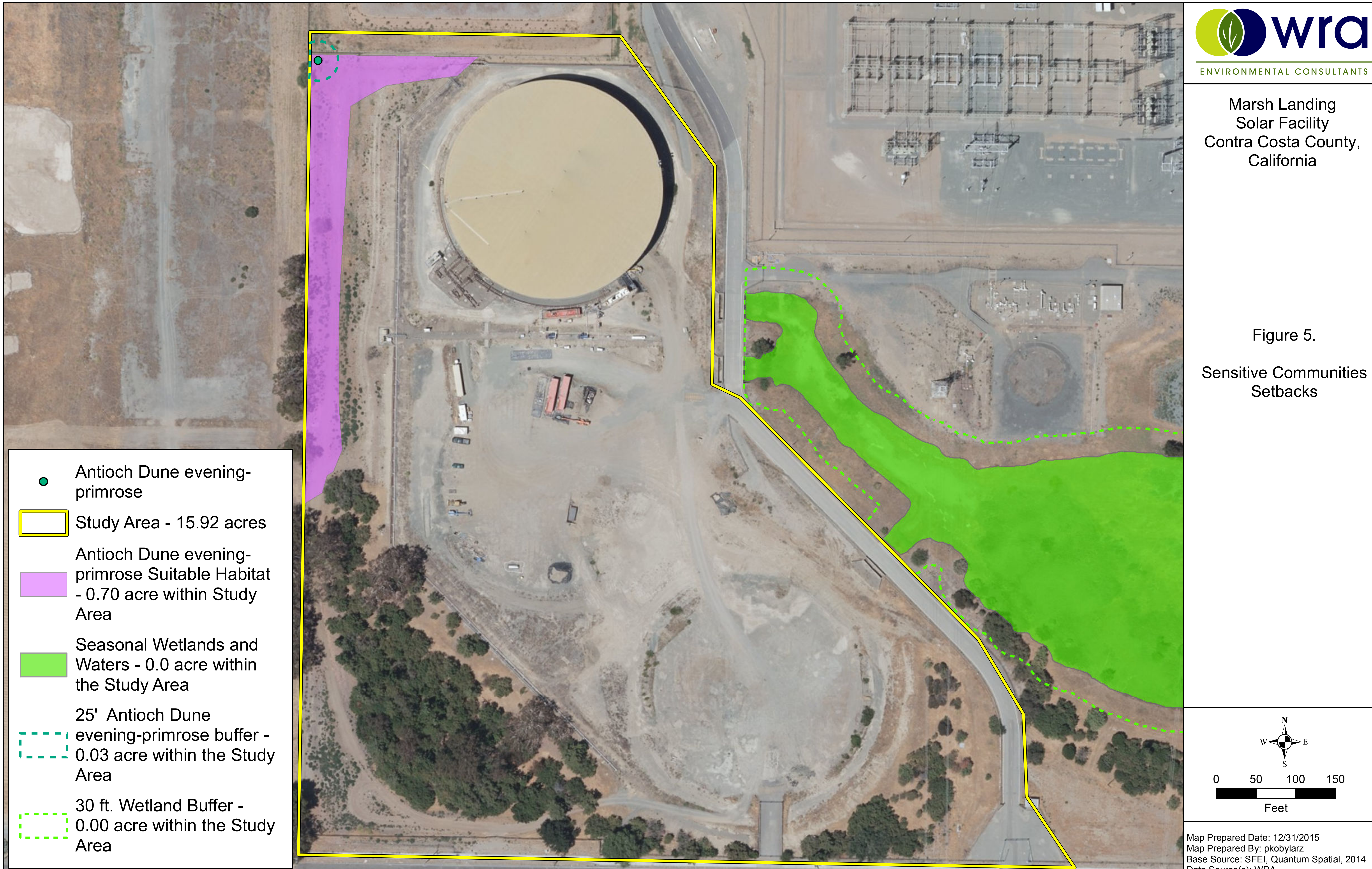
The sensitive common tarweed field community within the Study Area covers 1.49 acres. The Plan does not cover impacts to this community. CDFW regulates impacts to this sensitive community under CEQA, but a significance determination is not possible without specific details regarding the impact (e.g., number of plants or total acreage to be impacted, abundance of this community in the vicinity of the Study Area). The following general measures are recommended to avoid or otherwise mitigate impacts to this community, if impacts are determined to be significant:

- The on-site common tarweed field should be avoided completely to the fullest extent feasible.
- If avoidance is not possible, prior to ground disturbance in this area, seeds from the tarweed to be impacted should be collected by a qualified botanist and stored using appropriate methods. Following Project completion, the collected tarweed seeds should be broadcast in areas within and/or directly adjacent to the impact area as determined in the field by the qualified botanist.
- Relatively large-scale impacts (e.g., removing the entire community) may require some form of consultation with CDFW.

5.1.2 Seasonal wetlands and waters

Although this community is located outside of the Study Area, there is some potential for Project activities to impact the adjacent wetlands and waters. As such, WRA recommends the following:

- A 30-foot exclusion buffer should be placed around the seasonal wetland and waters community (Figure 5). A buffer of this distance should be adequate to prevent any indirect impacts to the wetlands caused by shading as a result of solar panels and related infrastructure that would be installed as a component of the Project. The buffer would also serve to prevent soil runoff into the wetlands from the limited, Project-related soil disturbance that is anticipated to occur. As indicated in Figure 5, the existing road along the eastern periphery of the Study Area does not need to be included in the exclusion buffer, as this road is developed and used for other purposes.



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5.2 Special-Status Plant Species

With the exception of the Antioch Dunes evening-primrose, the Project is unlikely or has no potential to impact special-status plant species. The following measures are recommended to avoid impacts to the federal and state listed Antioch Dunes evening-primrose:

- A 25-foot avoidance buffer should be placed around the existing evening-primrose plant (Figure 5), within which all Project-related work is precluded. The buffer should be clearly marked with orange construction fencing or a similar, high-visibility barrier. If the existing evening-primrose plant must be impacted, consultation with the USFWS and CDFW will likely be necessary.
- Because there is some potential for future germination of additional evening-primrose plants within the northwestern portion of the Study Area (Figure 5), WRA recommends that the Project avoid this area to the fullest extent feasible. Areas to be avoided should be clearly marked with orange construction fencing. If avoidance is not possible, a pre-construction survey by a qualified botanist should be conducted of all areas to be impacted during the species' blooming period of March to September. Any additional evening-primrose plants documented during this survey should be protected by a 25-foot exclusion buffer as described above. If avoidance is not possible, consultation with USFWS should be performed.

5.3 5.3 Special-Status Wildlife Species

Of the 56 special-status wildlife species known to occur in the vicinity of the Study Area, only six were determined to have a moderate potential to occur in the Study Area. Most of the species found in the review of background literature occur in habitats not found in the Study Area or the Study Area is out of the species' range. The lack of aquatic habitat within and in the vicinity of Study Area eliminates the potential for species such as Pacific pond turtles and California tiger salamander to occur. The Study Area is also located more than 1,000 feet from suitable marsh habitat for special-status marsh-related species; therefore, no impacts are anticipated to marsh species such as California black rail and Suisun song sparrow.

5.3.1 Burrowing Owl

Habitat conditions within the Study Area reduce the potential for burrowing owl to occur within the Study Area during the nesting season (February 1 through August 1). However, burrowing owl has potential to occur within the Study Area during the non-nesting season and in adjacent habitats throughout the year. Burrows occupied by burrowing owl are protected in both the nesting and non-nesting seasons (CDFG 2012). The following measures are recommended to avoid impacts to burrowing owl.

- Pre-construction surveys shall be conducted within 14 days prior to initiation of construction activities.
- If an occupied burrow is observed within or adjacent to the Study Area during the nesting season (February 1 through August 31) and is determined to contain an active nest, then a buffer will be established surrounding the nest burrow by a qualified biologist dependent upon nest location, baseline disturbance levels, and in accordance with CDFW guidelines (CDFG 2012). No work will occur within the buffer until the nest is determined to be inactive by the biologist.
- If occupied burrows are observed within or adjacent to the Study Area during the non-nesting season (September 1 through January 31) or if an occupied burrow is

determined to not be a nest burrow during the nesting season, then a buffer will be established surrounding the nest burrow by a qualified biologist dependent upon location, baseline disturbance levels, and in accordance with CDFW guidelines (CDFG 2012).

- If an occupied burrow cannot be avoided by Project activities (i.e., the burrow is within the limit of disturbance), a burrowing owl exclusion plan will be written and submitted to CDFW. The plan will be in accordance with CDFW guidelines and no exclusion activities will occur during the nesting season or until it has been determined all chicks have fledged.
- During Project activities, all pipes between 3 inches and 10 inches stored on-site shall be capped to prevent burrowing owl from establishing within the Study Area.

5.3.2 Special-Status and Non-Special-Status Nesting Birds

This assessment determined that additional special-status bird species may use the Study Area or immediately adjacent habitats for breeding and foraging. The four special-status bird species in addition to burrowing owl discussed above are Swainson's hawk, white-tailed kite, and loggerhead shrike. In addition, active nests of most native birds are protected under the MBTA and CFGC. The following measures are recommended to avoid impacts to active nests of special-status and non-special-status bird species.

- It is recommended that Project activities be initiated during the non-nesting season (September 1 through January 31).
- If Project activities are initiated during the nesting season (February 1 through August 31), a pre-construction nesting bird survey shall be conducted within 14 days of ground disturbance to avoid disturbance to active nests, eggs, and/or young of ground-nesting birds.
- If active nests are observed, then a qualified biologist will establish a no-disturbance buffer surrounding the active nest to be determined by species and nest location. No work shall occur within the buffer until the biologist determines the nest is inactive. Standard buffers for raptors and other special status birds (including white-tailed kite, northern harrier, and loggerhead shrike) are typically 250 feet, while buffers for other common migratory birds is typically 50 feet. The biologist may reduce the no-disturbance buffer in consultation with CDFW, if topography or other site conditions warrant such a reduction.
- If Project activities are halted for more than 14 days within the nesting season, then nesting bird surveys shall be conducted within 14 days prior to re-initiation of Project activities.

5.3.3 Western Red Bat

Western red bat has potential to roost in trees within the Study Area, though no maternity roosts are likely to be present. Avoidance measures such as work windows or roost surveys may be required. It is recommended that pre-construction surveys for this species by a qualified biologist take place no more than 48 hours prior to tree removal or trimming.

5.3.4 Silvery Legless Lizard

Areas to the west of the Study Area may contain suitable habitat for silvery legless lizard, although the Study Area has been heavily disturbed and contains only a small area of sandy, friable soil. While this species may use the Study Area for incidental dispersal, it is not likely to be found within the Study Area. It is recommended that a pre-construction survey be performed prior to any construction related activities. Additionally, an exclusion fencing (comprised of silt fence or similar non-pass through material) be installed along the northern and western perimeter of the Study Area prior to initiation of construction activities to exclude this species from dispersing onto the site.

6.0 CONCLUSION

Based on the results of the site assessment, it is not anticipated that the Project will result in impacts to sensitive biological communities, special-status plant species, or special-status wildlife species, assuming that certain precautions are observed. One sensitive biological community (common tarweed field) is present within the Study Area. However, given the quality of this community, potential impacts to it are unlikely to be considered significant. If impacts are found to be significant, it is recommended that the tarweed field be avoided, or (if necessary) that seeds from the impacted tarweed plants be collected and broadcast at appropriate areas near the impact site. Another sensitive biological community (seasonal wetland) is located outside of and adjacent to the Study Area; this community should be protected by a 30-foot radius exclusion buffer from any new development. One federal and state listed plant, Antioch Dunes evening primrose, was observed during the site visits, but no other special-status plant species are expected to occur within the Study Area; accordingly, it is recommended that a 25-foot buffer and fencing be established around the evening primrose plant to prevent impacts.

No special-status wildlife species were observed during the site visits. Six special-status wildlife species have a moderate potential to occur. Avoidance measures include pre-construction surveys for nesting birds, burrowing owl, roosting bats, and silvery legless lizard.. Additionally, installation of exclusion fencing (silt fencing) along the northern and western boundaries of the Study is recommended to prevent silvery legless lizards from dispersing into the site. Accordingly, all potential impacts to sensitive biological resources will be avoided for the proposed Project. The Study Area also contains 268 trees of which 12 are protected. Of those 12 trees, four also meet the requirement for being Landmark/Heritage trees. All protected and Landmark/Heritage trees will require approval from the City of Antioch prior to removal.

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APPENDIX A

LIST OF OBSERVED PLANT AND WILDLIFE SPECIES

Plant species observed in the Study Area, August 7, 2015.

Family	Scientific name	Common name	Life form	Origin	Rare Status[1]	Invasive Status[2]	Wetland indicator[3]
Anacardiaceae	*Searsia lancea*	African sumac	tree	non-native	--	--	NL
Asteraceae	*Baccharis pilularis ssp. pilularis*	coyote brush	shrub	native	--	--	NL
Asteraceae	*Carduus pycnocephalus*	Italian thistle	forb	non-native	--	moderate	NL
Asteraceae	*Centaurea solstitialis*	yellow star thistle	forb	non-native	--	high	NL
Asteraceae	*Centromadia pungens ssp. pungens*	common tarweed	forb	native	--	--	FAC
Asteraceae	*Cirsium vulgare*	bull thistle	forb	non-native	--	moderate	FACU
Asteraceae	*Dittrichia graveolens*	stinkwort	forb	non-native	--	moderate	NL
Asteraceae	*Erigeron canadensis*	Canadian horseweed	forb	native	--	--	FACU
Asteraceae	*Heterotheca grandiflora*	telegraphweed	forb	native	--	--	NL
Asteraceae	*Lactuca serriola*	prickly lettuce	forb	non-native	--	assessed	FACU
Asteraceae	*Silybum marianum*	milk thistle	forb	non-native	--	limited	NL
Asteraceae	*Sonchus oleraceus*	common sow thistle	forb	non-native	--	--	NL
Brassicaceae	*Hirschfeldia incana*	short podded mustard	forb	non-native	--	moderate	NL
Brassicaceae	*Lepidium latifolium*	perennial pepperweed	forb	non-native	--	high	FAC
Chenopodiaceae	*Salsola australis*	Russian thistle	forb	non-native	--	limited	FACU
Cyperaceae	*Cyperus eragrostis*	tall flatsedge	graminoid	native	--	--	FACW
Fabaceae	*Acacia longifolia*	Sydney golden wattle	tree	non-native	--	--	NL
Fabaceae	*Acmispon americanus var. americanus*	American lotus	forb	native	--	--	NL
Fabaceae	*Medicago polymorpha*	bur medic	forb	non-native	--	limited	FACU
Fabaceae	*Melilotus indicus*	yellow annual sweetclover	forb	non-native	--	--	FACU
Fabaceae	*Vicia sativa ssp. sativa*	pubescent common vetch	forb	non-native	--	--	FACU
Fagaceae	*Quercus agrifolia var. agrifolia*	coast live oak	tree	native	--	--	NL
Geraniaceae	*Erodium cicutarium*	redstem stork's bill	forb	non-native	--	limited	NL
Malvaceae	*Malva neglecta*	common mallow	forb	non-native	--	--	NL
Myrtaceae	*Callistemon citrinus*	crimson bottlebrush	shrub	non-native	--	--	NL
Myrtaceae	*Eucalyptus camaldulensis*	river redgum	tree	non-native	--	limited	FAC
Myrtaceae	*Eucalyptus globulus*	blue gum	tree	non-native	--	limited	NL

Family	Scientific name	Common name	Life form	Origin	Rare Status[1]	Invasive Status[2]	Wetland indicator[3]
Myrtaceae	*Eucalyptus leucoxylon*	white ironbark	tree	Non-native	--	limited	NL
Onagraceae	*Epilobium ciliatum ssp. ciliatum*	fringed willowherb	forb	native	--	--	FACW
Onagraceae	*Oenothera deltoides ssp. howellii*	Antioch dunes evening primrose	forb	native	FE, SE, Rank 1B.1	--	NL
Pinaceae	*Pinus pinea*	Italian stone pine	tree	non-native	--	--	NL
Pinaceae	*Pinus radiata*	Monterey pine	tree	native	Rank 1B.1	limited	NL
Plantaginaceae	*Plantago lanceolata*	English plantain	forb	non-native	--	limited	FAC
Poaceae	*Avena barbata*	slender oat	graminoid	non-native	--	moderate	NL
Poaceae	*Bromus diandrus*	ripgut brome	graminoid	non-native	--	moderate	NL
Poaceae	*Bromus hordeaceus*	soft chess	graminoid	non-native	--	limited	FACU
Poaceae	*Bromus madritensis ssp. madritensis*	foxtail chess	graminoid	non-native	--	--	UPL
Poaceae	*Cortaderia selloana*	Uruguayan pampas grass	graminoid	non-native	--	high	FACU
Poaceae	*Cynodon dactylon*	Bermuda grass	graminoid	non-native	--	moderate	FACU
Poaceae	*Distichlis spicata*	saltgrass	graminoid	native	--	--	FAC
Poaceae	*Festuca myuros*	rattail fescue	graminoid	non-native	--	moderate	FACU
Poaceae	*Festuca perennis*	Italian rye grass	graminoid	non-native	--	moderate	FAC
Poaceae	*Hordeum marinum ssp. gussoneanum*	Mediterranean barley	graminoid	non-native	--	moderate	FAC
Poaceae	*Hordeum murinum ssp. murinum*	wall barley	graminoid	non-native	--	moderate	FACU
Poaceae	*Paspalum dilatatum*	dallis grass	graminoid	non-native	--	--	FAC
Poaceae	*Polypogon monspeliensis*	rabbit's-foot grass	graminoid	non-native	--	limited	FACW
Poaceae	*Stipa miliacea var. miliacea*	smilo grass	graminoid	non-native	--	limited	NL
Polygonaceae	*Polygonum aviculare ssp. aviculare*	dooryard knotweed	forb	non-native	--	--	FACW
Rhamnaceae	*Rhamnus alaternus*	Italian buckthorn	shrub	non-native	--	--	FACU
Rosaceae	*Cotoneaster pannosus*	silverleaf cotoneaster	shrub	non-native	--	moderate	NL
Rosaceae	*Prunus dulcis*	domestic almond	tree	non-native	--	--	NL
Rosaceae	*Rubus armeniacus*	Himalayan blackberry	shrub	non-native	--	high	FACU
Salicaceae	*Populus nigra*	Lombardy poplar	tree	non-native	--	--	NL
Salicaceae	*Salix laevigata*	red willow	tree	native	--	--	FACW

Family	Scientific name	Common name	Life form	Origin	Rare Status[1]	Invasive Status[2]	Wetland indicator[3]
Solanaceae	*Solanum americanum*	American black nightshade	forb	native	--	--	FACU
Ulmaceae	*Ulmus parvifolia*	Chinese elm	tree	non-native	--	--	UPL
Zygophyllaceae	*Tribulus terrestris*	puncture vine	forb	non-native	--	--	NL

All species identified using the *Jepson Manual II: Vascular Plants of California* (Baldwin et al. 2012) and Jepson eFlora (Jepson Flora Project 2015); Nomenclature follows Jepson eFlora 2015.

[1]Rare Status: The CNPS Inventory of Rare and Endangered Plants (CNPS 2015)

FE: Federal Endangered
FT: Federal Threatened
SE: State Endangered
ST: State Threatened
SR: State Rare
Rank 1A: Plants presumed extirpated in California and either rare or extinct elsewhere
Rank 1B: Plants rare, threatened, or endangered in California and elsewhere
Rank 2A: Plants presumed extirpated in California, but more common elsewhere
Rank 2B: Plants rare, threatened, or endangered in California, but more common elsewhere
Rank 3: Plants about which we need more information – a review list
Rank 4: Plants of limited distribution – a watch list

[2]Invasive Status: California Invasive Plant Inventory (Cal-IPC 2015)

High: Severe ecological impacts; high rates of dispersal and establishment; most are widely distributed ecologically.
Moderate: Substantial and apparent ecological impacts; moderate-high rates of dispersal, establishment dependent on disturbance; limited-moderate distribution ecologically
Limited: Minor or not well documented ecological impacts; low-moderate rate of invasiveness; limited distribution ecologically
Assessed: Assessed by Cal-IPC and determined to not be an existing current threat

[3]Wetland Status: National List of Plant Species that Occur in Wetlands, California (Lichvar 2014)

OBL: Almost always found in wetlands; >99% frequency
FACW: Usually found in wetlands; 67-99% frequency
FAC: Equally found in wetlands and uplands; 34-66% frequency
FACU: Usually not found in wetlands; 1-33% frequency
UPL: Almost never found in wetlands; >1% frequency
NL: Not listed, assumed almost never found in wetlands; >1% frequency
NI: No information; not factored during wetland delineation

Wildlife species observed in the Study Area, August 7, 2015.

Common Name	Scientific Name
Birds	
Double-crested cormorant	*Phalacrocorax auritus*
Red-tailed hawk	*Buteo jamaicensis*
Eurasian collared-dove	*Streptopelia decaocto*
Mourning dove	*Zenaida macroura*
Barn swallow	*Hirundo rustica*
Anna’s hummingbird	*Calypte anna*
Acorn woodpecker	*Melanerpes formicivorus*
Western scrub-jay	*Aphelocoma californica*
Northern mockingbird	*Mimus polyglottos*
Bushtit	*Psaltriparus minimus*
Reptiles	
Western fence lizard	Sceloporus occidentalis

APPENDIX B

POTENTIAL FOR SPECIAL-STATUS SPECIES

TO OCCUR IN THE STUDY AREA

Appendix B. Potential for special-status species to occur in the Study Area. List compiled from the California Department of Fish and Wildlife (CDFW) Natural Diversity Database (CDFW 2015), U.S. Fish and Wildlife Service (USFWS) Species Lists, and California Native Plant Society (CNPS) Electronic Inventory search of the Antioch North, Antioch South, Birds Landing, Clayton, Denverton, Rio Vista, Honker Bay, Jersey Island, and Brentwood USGS 7.5-minute quadrangles and a review of other CDFW lists and publications (Jennings and Hayes 1994, Zeiner et al. 1990).

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
Mammals				
pallid bat *Antrozous pallidus*	SSC, WBWG	Found in deserts, grasslands, shrublands, woodlands, and forests. Most common in open habitats, forages along river channels. Roost sites include crevices in rocky outcrops and cliffs, caves, mines, trees and various human structures such as bridges, barns, and human-occupied as well as vacant buildings. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Unlikely.** Tree roosting sites are typically large cavities in conifer snags (ponderosa or redwoods) or boles in large oak trees (WBWG 2015). These roost site characteristics and tree species are not present within or near the Study Area.	No further recommendations.
Townsend's big-eared bat *Corynorhinus townsendii*	SC, SSC, WBWG, HCP	This species is associated with a wide variety of habitats from deserts to mid-elevation mixed coniferous-deciduous forest. Females form maternity colonies in buildings, caves and mines and males roost singly or in small groups. Foraging occurs in open forest habitats where they glean moths from vegetation.	**Unlikely.** No caves, mines, or other suitable roost habitat is present in the Study Area or vicinity.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
western red bat *Lasiurus blossevillii*	SSC, WBWG	This species is typically solitary, roosting primarily in the foliage of trees or shrubs. Day roosts are commonly in edge habitats adjacent to streams or open fields, in orchards, and sometimes in urban areas. There may be an association with intact riparian habitat (particularly willows, cottonwoods, and sycamores).	**Moderate Potential.** Suitable roost habitat is present in trees within the Study Area.	Pre-construction survey within 48 hours of tree removal or trimming.
big free-tailed bat *Nyctinomops macrotis*	SSC, WBWG	Occurs rarely in low-lying arid areas. Requires high cliffs or rocky outcrops for roosting sites.	**Unlikely.** No cliffs or other suitable roost habitat are present in the Study Area or vicinity.	No further recommendations.
salt-marsh harvest mouse *Reithrodontomys raviventris*	FE, SE, CFP, RP	Found only in the saline emergent wetlands of San Francisco Bay and its tributaries. Pickleweed is the primary habitat. Does not burrow, but builds loosely organized nests and requires higher areas for flood escape.	**No potential.** Suitable tidal habitat is greater than 1,000 feet from the Study Area, and no marsh habitat is present within the Study Area.	No further recommendations.
San Joaquin kit fox *Vulpes macrotis mutica*	FE, ST, HCP	Annual grasslands or grassy open stages with scattered shrubby vegetation. Need loose-textured sandy soils for burrowing, and suitable prey base.	**No Potential.** The Study Area is outside of the species' known range and separated from the nearest potentially occupied areas by urban barriers.	No further recommendations.
American badger *Taxidea taxus*	SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Requires friable soils and open, uncultivated ground. Preys on burrowing rodents.	**Unlikely.** The Study Area is highly disturbed, surrounded by industrial development.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
Birds				
golden eagle *Aquila chrysaetos*	CFP, BCC, HCP	Occurs year-round in rolling foothills, mountain areas, sage-juniper flats, and deserts. Cliff-walled canyons provide nesting habitat in most parts of range; also nests in large trees, usually within otherwise open areas.	**Unlikely.** The Study Area and vicinity do not contain suitable nesting habitat. This species may be observed foraging or flying over the Study Area.	No further recommendations.
burrowing owl *Athene cunicularia*	SSC, BCC, HCP	Year-round resident and winter visitor. Occurs in open, dry grasslands and scrub habitats with low-growing vegetation, perches and abundant mammal burrows. Preys upon insects and small vertebrates. Nests and roosts in old mammal burrows, most commonly those of ground squirrels.	**Moderate Potential.** Although disturbed, portions of the Study Area feature flat, open areas with sparse vegetation. Ground squirrels burrows are present, though few in number. There are several CNDDB occurrences of this species within 2.0 miles (CDFW 2015).	Pre-construction survey within 14 days of ground disturbance regardless of time of year.
short-eared owl *Asio flammeus*	SSC	Occurs year-round, but primarily as a winter visitor; breeding very restricted in most of California. Found in open, treeless areas (e.g., marshes, grasslands) with elevated sites for foraging perches and dense herbaceous vegetation for roosting and nesting. Preys mostly on small mammals, particularly voles.	**Unlikely.** The Study Area does not contain dense grassland or wetland vegetation and thus provides no suitable nesting habitat, and only poor-quality foraging habitat. Known local breeding is restricted to Suisun Marsh, on the north side of Suisun Bay (Shuford and Gardali 2008).	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
long-eared owl *Asio otus*	SSC	Occurs year-round in California. Nests in trees in a variety of woodland habitats, including oak and riparian, as well as tree groves. Requires adjacent open land with rodents for foraging, and the presence of old nests of larger birds (hawks, crows, magpies) for breeding.	**Unlikely.** Tree groves/lines within the Study Area provide moderate-quality nesting habitat, but surrounding areas are disturbed and semi-industrial, and there are no recent observations of this species in Antioch.	No further recommendations.
oak titmouse *Baeolophus inornatus*	BCC	Occurs year-round in woodland and savannah habitats where oaks are present, as well as riparian areas. Nests in tree cavities.	**Unlikely.** Trees within the Study Area lack suitable cavities for nesting. May occasionally forage within the Study Area.	No further recommendations.
ferruginous hawk *Buteo regalis*	BCC	Winter visitor to open habitats, including grasslands, sagebrush flats, scrub, and low foothills surrounding valleys. Preys on mammals. Does not breed in California.	**Unlikely.** The Study Area and adjacent areas are disturbed and semi-industrial, lacking grassland and wetlands.	No further recommendations.
Swainson's hawk *Buteo swainsoni*	ST, HCP	Summer resident in California's Central Valley and limited portions of interior southern California. Nests in tree groves and isolated trees in riparian and agricultural areas, including near buildings. Forages in grasslands and scrub habitats as well as agricultural fields, especially alfalfa.	**Moderate Potential.** Although nesting habitat is poor-quality overall, the Study Area is within this species' local breeding range, and there is a documented nesting occurrence within 1.0 mile (CDFW 2015). However, the Study Area is highly disturbed due to past uses of the site for tank storage and as such does not provide suitable foraging habitat.	Pre-construction survey within 14 days of ground disturbance during the nesting season between April 1 and July 30.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
northern harrier *Circus cyaneus*	SSC	Year-round resident and winter visitor. Found in open habitats including grasslands, prairies, marshes and agricultural areas. Nests on the ground in dense vegetation, typically near water or otherwise moist areas. Preys on small vertebrates.	**Unlikely.** The Study Area does not contain grassland, prairie or marsh habitat needed for nesting.	No further recommendations.
white-tailed kite *Elanus leucurus*	CFP	Year-round resident in coastal and valley lowlands with scattered trees and large shrubs, including grasslands, marshes and agricultural areas. Nests in trees, of which the type and setting are highly variable. Preys on small mammals and other vertebrates.	**Moderate Potential.** Trees within the Study Area provide suitable nesting habitat. Study Area is adjacent to suitable foraging habitat.	Pre-construction survey within 14 days of ground disturbance during the nesting season (February 1-August 31).
loggerhead shrike *Lanius ludovicianus*	SSC, BCC	Year-round resident in open woodland, grassland, savannah and scrub. Prefers areas with sparse shrubs, trees, posts, and other suitable perches for foraging. Preys upon large insects and small vertebrates. Nests are well-concealed in densely-foliaged shrubs or trees.	**Moderate Potential.** Trees and shrubs within a portion of the Study Area provide suitable nesting habitat. There are observations of this species within 5.0 miles of the Study Area (CDFW 2015, eBird 2015).	Pre-construction survey within 14 days of ground disturbance during the nesting season (February 1-August 31).
California black rail *Laterallus jamaicensis coturniculus*	ST, CFP, BCC	Resident in marshes (saline to freshwater) with dense vegetation within four inches of the ground. Prefers larger, undisturbed marshes close to a major water source. Extremely secretive and cryptic.	**No Potential.** The Study Area does not contain any marsh habitat. The nearest suitable marsh habitat is greater than 1,000 feet from the Study Area.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
Nuttall's woodpecker *Picoides nuttallii*	BCC	Year-round resident in lowland woodlands throughout much of California west of the Sierra Nevada. Typical habitat is dominated by oaks; also occurs in riparian woodland. Nests in tree cavities.	**Unlikely.** Trees within the Study Area lack suitable cavities for nesting. May occasionally forage within the Study Area.	No further recommendations.
California Ridgway's (clapper) rail *Rallus obsoletus obsoletus*	FE, SE, CFP	Year-round resident in tidal marshes of the San Francisco Bay estuary. Requires tidal sloughs and intertidal mud flats for foraging, and dense marsh vegetation for nesting and cover. Typical habitat features abundant growth of cordgrass and pickleweed. Feeds primarily on mollusks and crustaceans.	**No Potential.** The Study Area does not contain tidal marsh, and is outside of this species range (easternmost occurrences are at MOTCO, located greater than 12.0 miles to the west.)	No further recommendations.
California least tern *Sternula antillarum browni*	FE, SE, CFP	Summer resident along the coast and coastal estuaries from San Francisco Bay south to northern Baja California; inland breeding also very rarely occurs. Nests colonially on barren or sparsely vegetated areas with sandy or gravelly substrates near water, including beaches, islands, and gravel bars. In San Francisco Bay, has also nested on salt pond margins.	**No Potential.** The Study Area does not contain beaches, islands or sandbars and thus provides no nesting or foraging habitat for this species.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
bank swallow *Riparia riparia*	ST	Summer resident in riparian and other lowland habitats in western California. Nests colonially in burrows on vertical faces and cliffs and with fine-textured sandy soils near streams, rivers, lakes or the ocean. Currently known to breed in Siskiyou, Shasta, and Lassen Cos., and along Sacramento River from Shasta Co. south to Yolo Co.	**No Potential.** The Study Area and vicinity do not contain suitable cliff faces or riparian bank habitat for this species. The Study Area is outside the known breeding range.	No further recommendations.
San Francisco (saltmarsh) common yellowthroat *Geothlypis trichas sinuosa*	SSC, BCC	Year-round resident of the San Francisco Bay region, in fresh and salt water marshes. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	**No Potential.** The Study Area does not contain suitable marsh or wetland habitat. According to Shuford and Gardali (2008), common yellowthroats in the vicinity of Suisun Bay are of a different (non-status) subspecies.	No further recommendations.
grasshopper sparrow *Ammodramus savannarum*	SSC	Summer resident. Breeds in open grasslands (both native and non-native), generally with low- to moderate-height grasses and scattered shrubs. Well-hidden nests are placed on the ground.	**Unlikely.** The Study Area does not contain expanses of grassland.	No further recommendations.
song sparrow, Modesto population *Melospiza melodia*	SSC, BCC	Restricted to the Sacramento and extreme northern San Joaquin Valleys from Colusa County south to Stanislaus County. Associated with woody riparian habitat and freshwater marshes.	**Unlikely.** The Study Area does not contain suitable riparian or freshwater marsh nesting habitat; nearest occurrences are greater than 4.0 miles to the northeast (CDFW 2015).	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
Suisun song sparrow *Melospiza melodia maxillaris*	BCC, SSC	Resident of brackish-water marshes surrounding Suisun Bay. Inhabits cattails, tules and other sedges, and *Salicornia*; also known to frequent tangles bordering sloughs.	**Unlikely.** The Study Area does not contain any brackish marsh; nearest suitable habitat is greater than 1,000 feet away.	No further recommendations.
tricolored blackbird *Agelaius tricolor*	FC, SC, BCC, HCP	Nearly endemic to California, where it is most numerous in the Central Valley and vicinity. Highly colonial, nesting in dense aggregations over or near freshwater in emergent growth or riparian thickets. Also uses flooded agricultural fields. Abundant insect prey near breeding areas essential.	**Unlikely.** The Study Area does not contain suitable nesting or foraging habitat. This species may be seen flying over Study Area.	No further recommendations.
Reptiles and Amphibians				
California tiger salamander *Ambystoma californiense*	FT, ST, HCP	Inhabits grassland, oak woodland, ruderal and seasonal pool habitats. Seasonal ponds and vernal pools are crucial to breeding. Adults utilize mammal burrows as estivation habitat.	**No Potential.** No suitable breeding habitat is present in the Study Area or vicinity. The nearest occupied location is over 2.0 miles to the south (CDFW 2015) and separated from the Study Area by urban barriers.	No further recommendations.
California red-legged frog *Rana draytonii*	FT, SSC, HCP	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11 to 20 weeks of permanent water for larval development. Must have access to estivation habitat.	**No Potential.** No suitable breeding habitat is present in the Study Area or vicinity. The nearest occupied location is over 4 miles south and is separated from the Study Area by urban barriers.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
foothill yellow-legged frog *Rana boylii*	SSC, HCP	Found in or near rocky streams in a variety of habitats. Prefers partly-shaded, shallow streams and riffles with a rocky substrate; requires at least some cobble-sized substrate for egg-laying. Needs at least 15 weeks to attain metamorphosis. Feeds on both aquatic and terrestrial invertebrates.	**No Potential.** No suitable breeding habitat is present in the Study Area or vicinity.	No further recommendations.
Alameda whipsnake *Masticophis lateralis euryxanthus*	FT, ST, HCP	Endemic to chaparral and foothill-hardwood habitats in the eastern San Francisco Bay Area. Prefers south-facing slopes and ravines with rock outcroppings where shrubs form a vegetative mosaic with oak trees and grasses, and small mammal burrows provide basking and refuge.	**No Potential.** The Study Area is outside of the species' known range and does not contain any suitable chaparral or woodland habitat.	No further recommendations.
giant gartersnake *Thamnophis gigas*	FT, ST, HCP	Endemic to portions of the Central Valley. Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals and irrigation ditches. Highly aquatic.	**No Potential.** The Study does not contain suitable aquatic or marsh habitat and is surrounded by industrial development; nearest suitable habitat is greater than 1,000 feet.	No further recommendations.
Pacific pond turtle *Actinemys marmorata*	SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches with aquatic vegetation. Require basking sites such as partially submerged logs, vegetation mats, or open mud banks, and suitable upland habitat (sandy banks or grassy open fields) for egg-laying.	**Unlikely.** The Study Area and vicinity do not contain suitable aquatic habitat capable of supporting pond turtle; nearest suitable habitat is greater than 1,000 feet.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
Blainville's (coast) horned lizard *Phrynosoma blainvillii coronatum*	SSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Prefers friable, rocky, or shallow sandy soils for burial; open areas for sunning; bushes for cover; and an abundant supply of ants and other insects.	**Unlikely.** The Study Area contains friable and sandy soils suitable for this species; however the Study Area is outside of species range.	No further recommendations.
silvery legless lizard *Anniella pulchra pulchra*	SSC, HCP	Fossorial species, inhabiting sandy or loose loamy soils under relatively sparse vegetation. Suitable habitat includes dunes, stream terraces, and scrub and chaparral. Adequate soil moisture is essential.	**Moderate Potential.** A small portion of the Study Area contains sandy, friable soil that has likely been naturally deposited on-site from existing dune habitat to the west. There are several CNDDB occurrences within 3.0 miles of the Study Area, including one located immediately to the west (CDFW 2015). (Note: most of these occurrence locations, including the adjacent one, are not precise data points but rather based on general descriptions of older collection sites made in the Antioch area.). If present on the adjacent property, silvery legless lizard could potentially disperse onto the site during construction activities.	Conduct a pre-construction survey prior to any activities and install an exclusionary on the northern and western boundaries of the property to prevent individuals from dispersing onto the site during construction and installation.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
Fishes				
green sturgeon *Acipenser medirostris*	FT, SSC, NMFS	Anadromous. Spawns in the Sacramento and Klamath River systems. Lingering transients may be found throughout the San Francisco Bay Estuary, particularly juveniles.	**No Potential.** The Study Area does not contain aquatic habitat and has no hydrologic connectivity to the San Joaquin River.	No further recommendations.
Delta smelt *Hypomesus transpacificus*	FT, SE, RP	Lives in the Sacramento-San Joaquin estuary in areas where salt and freshwater systems meet. Occurs seasonally in Suisun Bay, Carquinez Strait and San Pablo Bay. Seldom found at salinities greater than 10 parts per trillion (ppt); most often at salinities less than 2 ppt.	**No Potential.** The Study Area does not contain aquatic habitat and has no hydrologic connectivity to the San Joaquin River.	No further recommendations.
Sacramento perch *Archoplites interruptus*	SSC	Historically found in the sloughs, slow-moving rivers, and lakes of the Central Valley. Prefer warm water. Aquatic vegetation is essential for young. Tolerate wide range of physio-chemical water conditions.	**No Potential.** The Study Area does not contain aquatic habitat and has no hydrologic connectivity to the San Joaquin River.	No further recommendations.
steelhead - Central Valley ESU *Oncorhynchus mykiss irideus*	FT, NMFS	The Central Valley ESU includes all naturally spawned populations (and their progeny) in the Sacramento and San Joaquin Rivers and their tributaries, excluding San Francisco and San Pablo bays and their tributaries. Preferred spawning habitat for steelhead is in cool to cold perennial streams with high dissolved oxygen levels and fast flowing water.	**No Potential.** The Study Area does not contain aquatic habitat and has no hydrologic connectivity to the San Joaquin River.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
Chinook salmon - Central Valley Spring-run ESU *Oncorhynchus tshawytscha*	FT,ST	Occurs in the Feather River and the Sacramento River and its tributaries, including Butte, Mill, Deer, Antelope and Beegum Creeks. Adults enter the Sacramento River from late March through September. Adults migrate upstream to spawn in cool, clear, well-oxygenated streams from mid-August through early October.	**No Potential.** The Study Area does not contain aquatic habitat and has no hydrologic connectivity to the Sacramento River	No further recommendations.
Chinook salmon - Central Valley Fall/late fall-run ESU *Oncorhynchus tshawytscha*	SSC, RP, NMFS	Populations spawning in the Sacramento and San Joaquin Rivers and their tributaries. Adults migrate upstream to spawn in cool, clear, well-oxygenated streams.	**No Potential.** The Study Area does not contain aquatic habitat and has no hydrologic connectivity to the Sacramento or San Joaquin Rivers.	No further recommendations.
Chinook salmon - Sacramento River Winter-run ESU *Oncorhynchus tshawytscha*	FE, SE, RP, NMFS	Occurs in the Sacramento River below Keswick Dam. Spawns in the Sacramento River but not in tributary streams. Adults migrate upstream to spawn in cool, clear, well-oxygenated streams.	**No Potential.** The Study Area does not contain aquatic habitat and has no hydrologic connectivity to the Sacramento River.	No further recommendations.
Sacramento splittail *Pogonichthys macrolepidotus*	SSC, RP	Endemic to the lakes and rivers of the Central Valley, but now confined to the Sacramento Delta, Suisun Bay and associated marshes. Occurs in slow moving river sections and dead end sloughs. Requires flooded vegetation for spawning and foraging for young.	**No Potential.** The Study Area does not contain aquatic or marsh habitats and is not contiguous with marsh habitat.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
longfin smelt *Spirinchus thaleichthys*	ST, SSC, RP	Euryhaline, nektonic and anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column. Prefer salinities of 15 to 30 ppt., but can be found in completely freshwater to almost pure seawater.	**No Potential.** The Study Area does not contain aquatic or estuarine habitats.	No further recommendations.
Invertebrates				
vernal pool fairy shrimp *Branchinecta lynchi*	FT, SSI, HCP	Endemic to the grasslands of the Central Valley, central coast mountains, and south coast mountains, in astatic rain-filled pools. Inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	**No Potential.** The Study Area and vicinity do not contain suitable vernal pool habitat.	No further recommendations.
vernal pool tadpole shrimp *Lepidurus packardi*	FE, SSI, HCP	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water. Pools commonly found in grass bottomed swales of unplowed grasslands. Some pools are mud-bottomed and highly turbid.	**No Potential.** The Study Area and vicinity do not contain vernal pool habitat.	No further recommendations.
longhorn fairy shrimp *Branchinecta longiantenna*	FE, SSI, HCP	Endemic to the eastern margin of the central coast mountains in seasonally astatic grassland vernal pools. Inhabit small, clear-water depressions in sandstone and clear-to-turbid clay/grass-bottomed pools in shallow swales.	**No Potential.** The Study Area and vicinity do not contain vernal pool habitat.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
midvalley fairy shrimp *Branchinecta mesovallensis*	SSI, HCP	Vernal pools in the Central Valley in Sacramento, Solano, Merced, Madera, San Joaquin, Fresno, and Contra Costa counties.	**No Potential.** The Study Area and vicinity do not contain vernal pool habitat.	No further recommendations.
vernal pool andrenid bee *Andrena blennospermatis*	SSI	A solitary, ground-nesting bee found in upland areas near vernal pools. Its host plant is *Blennosperma* spp. and does not forage far from the host plant. Range is Contra Costa, El Dorado, Lake, Placer, Sacramento, San Joaquin, Solano, Sonoma, Tehama, and Yolo counties.	**Unlikely.** The Study Area does not contain vernal pool habitat or host plant species.	No further recommendations.
Antioch andrenid bee *Perdita scitula antiochensis*	SSI	Antioch dunes. Visits flowers of *Eriogonum*, *Gutierrezia californica*, *Heterotheca grandiflora*, *Lessingia glandulifera*.	**Unlikely.** The Study Area is outside the known range of this species and does not contain dune habitat or associated flowering plants.	No further recommendations.
Antioch Dunes halcitid bee *Sphecodogastra antiochensis*	SSI	A rare, specialist foraging bee with a very restricted distribution—the Antioch Dunes of Contra Costa County, California.	**Unlikely.** The Study Area is outside the known range of this species and does not contain dune habitat.	No further recommendations.
Antioch sphecid wasp *Philanthus nasalis*	SSI	Known only from the Antioch dunes of the Sacramento-San Joaquin Delta area, in the vicinity of Antioch, Contra Costa County. Also collected in Santa Cruz County.	**Unlikely.** The Study Area is outside the known range of this species and does not contain dune habitat.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
Antioch Dunes anthicid beetle *Anthicus antiochensis*	SSI	This species is apparently extirpated from the type locality at Antioch Dunes (CDFW 2015). Stabilization of the dunes in the 1950s may have eliminated suitable habitat. It is also known at several sites along the Sacramento River in Glenn, Tehama, Shasta, and Solano Counties, and from one site at Nicolas on the Feather River in Sutter County.	**Unlikely.** The Study Area is outside the known range of this species and does not contain dune habitat.	No further recommendations.
molestan blister beetle *Lytta molesta*	SSI	Inhabits the Central Valley of California, from Contra Costa to Kern and Tulare counties. Lytta molesta has been collected on *Lupinus, Trifolium wormskioldii* in dried vernal pools, and on *Erodium*. Appears to be absent in nearby areas with nonvernal pool vegetation, but a lack of detailed collecting information makes it unclear whether the species is always or usually associated with dried vernal pools.	**Unlikely.** The Study Area does not contain vernal pool habitat.	No further recommendations.
Antioch efferian robberfly *Efferia antiochi*	SSI	Known only from Antioch, Fresno, and Scout Island in the San Joaquin River. (Virtually nothing known about biology and natural history.)	**Unlikely.** The Study Area does not contain functioning dune habitat.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
Lange's metalmark *Apodemia mormo langei*	FE, SSI	Endemic to Antioch Dunes in Contra Costa County, inhabiting stabilized dunes along the San Joaquin River. Primary host plant is *Eriogonum nudum* var. *auriculatum*; feeds on nectar of other wildflowers, as well as host plant.	**No Potential.** The Study Area does not contain functioning dune habitat or the primary host plant. As per a recent USFWS survey report, the eastern limit of both suitable habitat and this butterfly's range is located approximately 0.8 mile west of the Study Area (Euing 2015).	No further recommendations.
San Joaquin dune beetle *Coelus gracilis*	SSI	Inhabits fossil dunes along the western edge of San Joaquin Valley; extirpated from Antioch Dunes. Inhabits sites containing sandy substrates.	**Unlikely.** The Study Area does not contain Dune habitat.	No further recommendations.
Plants				
soft bird's-beak *Chloropyron molle* ssp. *molle*	FE, SR, Rank 1B.2	Marshes and swamps (coastal salt). Elevation ranges from 0 to 10 feet (0 to 3 meters). Blooms July-November.	**No Potential.** The Study Area does not contain potential habitat for this species.	No further recommendations.
Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	Rank 1B.2	Marshes and swamps (freshwater and brackish). Elevation ranges from 0 to 20 feet (0 to 5 meters). Blooms May-July (August), (September).	**No Potential.** The Study Area does not contain potential habitat for this species..	No further recommendations.
Suisun Marsh aster *Symphyotrichum lentum*	Rank 1B.2	Marshes and swamps (brackish and freshwater). Elevation ranges from 0 to 10 feet (0 to 3 meters). Blooms May-November.	**No Potential.** The Study Area does not contain potential habitat for this species.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
Bolander's water hemlock *Cicuta maculata* var. *bolanderi*	Rank 2B.1	Marshes and swamps, coastal, fresh or brackish water. Elevation ranges from 0 to 660 feet (0 to 200 meters). Blooms July-September.	**No Potential.** The Study Area does not contain potential habitat for this species..	No further recommendations.
Delta mudwort *Limosella australis*	Rank 2B.1	Marshes and swamps (freshwater or brackish), riparian scrub/usually mud banks. Elevation ranges from 0 to 10 feet (0 to 3 meters). Blooms May-August.	**No Potential.** The Study Area does not contain potential habitat for this species..	No further recommendations.
Mason's lilaeopsis *Lilaeopsis masonii*	SR, Rank 1B.1	Marshes and swamps (brackish or freshwater), riparian scrub. Elevation ranges from 0 to 30 feet (0 to 10 meters). Blooms April-November.	**No Potential.** The Study Area does not contain potential habitat for this species..	No further recommendations.
adobe navarretia *Navarretia nigelliformis* ssp *nigelliformis*	Rank 4.2 HCP	Valley and foothill grassland vernally mesic, vernal pools sometimes/clay, sometimes serpentine. Elevation ranges from 330 to 3280 feet (100 to 1000 meters). Blooms April-June.	**No Potential.** Typical habitat is not present within the Study Area; species is known from higher elevations than the Study Area.	No further recommendations.
Contra Costa wallflower *Erysimum capitatum* var. *angustatum*	FE, SE, Rank 1B.1	Inland dunes. Elevation ranges from 10 to 70 feet (3 to 20 meters). Blooms March-July.	**Unlikely.** Although the Study Area contains some wind deposited sand, typical dune habitat, preferred by this species, is not present.	No further recommendations
Antioch Dunes evening-primrose *Oenothera deltoides* ssp. *howellii*	FE, SE, Rank 1B.1	Inland dunes. Elevation ranges from 0 to 100 feet (0 to 30 meters). Blooms March-September.	**Present.** One individual plant was observed in the Study Area.	Continue avoidance measures and maintain a 25 foot buffer around plant

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
big tarplant *Blepharizonia plumosa*	Rank 1B.1 HCP	Valley and foothill grassland/usually clay. Elevation ranges from 100 to 1660 feet (30 to 505 meters). Blooms July-October.	**Unlikely.** Typical habitat is not present within the Study Area; species is known from higher elevations than the Study Area.	No further recommendations.
round-leaved filaree *California macrophylla*	Rank 1B.1 HCP	Cismontane woodland, valley and foothill grassland/clay. Elevation ranges from 50 to 3940 feet (15 to 1200 meters). Blooms March-May.	**Unlikely.** Typical habitat is not present within the Study Area; species is known from higher elevations than the Study Area.	No further recommendations.
showy golden madia *Madia radiata*	Rank 1B.1 HCP	Cismontane woodland, valley and foothill grassland. Elevation ranges from 80 to 3990 feet (25 to 1215 meters). Blooms March-May.	**Unlikely.** Typical habitat is not present within the Study Area; species is known from higher elevations than the Study Area.	No further recommendations.
San Joaquin spearscale *Extriplex joaquinana*	Rank 1B.2 HCP	Valley and foothill grassland (alkaline, clay). Elevation ranges from 0 to 3200 feet (0 to 975 meters). Blooms April-October.	**Unlikely.** Grassland portions of the Study Area largely consist of fill soil and have an ongoing history of disturbance such as disking, making this species unlikely to occur.	No further recommendations.
stinkbells *Fritillaria agrestis*	Rank 4.2	Chaparral, cismontane woodland, pinyon and juniper woodland, valley and foothill grassland/clay, sometimes serpentine. Elevation ranges from 30 to 5100 feet (10 to 1555 meters). Blooms March-June.	**Unlikely.** Typical habitat is not present within the Study Area; species is known from higher elevations than the Study Area.	No further recommendations.
Mt. Diablo manzanita *Arctostaphylos auriculata*	Rank 1B.3 HCP	Chaparral (sandstone), cismontane woodland. Elevation ranges from 440 to 2130 feet (135 to 650 meters). Blooms January-March.	**No Potential.** The Study Area does not contain potential habitat for this species.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
brittlescale *Atriplex depressa*	Rank 1B.2 HCP	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools/alkaline, clay. Elevation ranges from 0 to 1050 feet (1 to 320 meters). Blooms April-October.	**No Potential.** The Study Area does not contain potential habitat for this species.	No further recommendations.
Mt. Diablo fairy-lantern *Calochortus pulchellus*	Rank 1B.2 HCP	Chaparral, cismontane woodland, riparian woodland, valley and foothill grassland. Elevation ranges from 100 to 2760 feet (30 to 840 meters). Blooms April-June.	**Unlikely.** Typical habitat is not present within the Study Area; species is known from higher elevations than the Study Area.	No further recommendations.
Hoover's cryptantha *Cryptantha hooveri*	Rank 1A	Inland dunes, valley and foothill grassland (sandy). Elevation ranges from 30 to 490 feet (9 to 150 meters). Blooms April-May.	**Unlikely.** Typical habitat is not present within the Study Area; species is known from higher elevations than the Study Area.	No further recommendations.
Antioch Dunes buckwheat *Eriogonum nudum* var. *psychicola*	Rank 1B.1	Inland dunes. Elevation ranges from 0 to 70 feet (0 to 20 meters). Blooms July-October.	**No Potential.** The Study Area does not contain potential habitat for this species.	No further recommendations.
Mt. Diablo buckwheat *Eriogonum truncatum*	Rank 1B.1	Chaparral, coastal scrub, valley and foothill grassland/sandy. Elevation ranges from 10 to 1150 feet (3 to 350 meters). Blooms April-September (November), (December).	**Unlikely.** Grassland portions of the Study Area largely consist of fill soil and have an ongoing history of disturbance such as disking, making this species unlikely to occur.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
Diamond-petaled California poppy *Eschscholzia rhombipetala*	Rank 1B.1	Valley and foothill grassland (alkaline, clay). Elevation ranges from 0 to 3200 feet (0 to 975 meters). Blooms March-April.	**Unlikely.** Grassland portions of the Study Area largely consist of fill soil and have an ongoing history of disturbance such as disking, making this species unlikely to occur.	No further recommendations.
Diablo helianthella *Helianthella castanea*	Rank 1B.2 HCP	Broad-leafed upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland. Elevation ranges from 200 to 4270 feet (60 to 1300 meters). Blooms March-June.	**Unlikely.** Typical habitat is not present within the Study Area; species is known from higher elevations than the Study Area.	No further recommendations.
Brewer's western flax *Hesperolinon breweri*	Rank 1B.2 HCP	Chaparral, cismontane woodland, valley and foothill grassland/usually serpentine. Elevation ranges from 100 to 3100 feet (30 to 945 meters). Blooms May-July.	**No Potential.** The Study Area does not contain potential habitat for this species.	No further recommendations.
Contra Costa goldfields *Lasthenia conjugens*	FE, Rank 1B.1	Cismontane woodland, playas (alkaline), valley and foothill grassland, vernal pools/mesic. Elevation ranges from 0 to 1540 feet (0 to 470 meters). Blooms March-June.	**No Potential.** The Study Area does not contain potential habitat for this species.	No further recommendations.
shining navarretia *Navarretia nigelliformis* ssp. *radians*	Rank 1B.2	Cismontane woodland, valley and foothill grassland, vernal pools/sometimes clay. Elevation ranges from 250 to 3280 feet (76 to 1000 meters). Blooms April-July.	**Unlikely.** Typical habitat is not present within the Study Area; species is known from higher elevations than the Study Area.	No further recommendations.

Species	Status*	Habitat Requirements	Potential for Occurrence	Recommendations
recurved larkspur *Delphinium recurvatum*	Rank 1B.1 HCP	Alkaline. Chenopod scrub, cismontane woodland, or valley and foothill grassland. Elevation ranges from 10 to 2592 feet (3 to 790 meters). Blooms March-June.	**Unlikely.** Grassland portions of the Study Area largely consist of fill soil and have an ongoing history of disturbance such as disking, making this species unlikely to occur.	No further recommendations.

*** Key to status codes:**

FE	Federal Endangered
FT	Federal Threatened
FC	Federal Candidate
BCC	USFWS Birds of Conservation Concern
SE	State Endangered
ST	State Threatened
SC	State Candidate
SSC	CDFW Species of Special Concern
SSI	CDFW Special Status Invertebrate
CFP	CDFW Fully Protected Animal
RP	Species included in a USFWS Recovery Plan or Draft Recovery Plan
NMFS	Species under jurisdiction of NMFS
RPR 1B	CNPS California Rare Plant Rank 1B: Rare, threatened or endangered in California and elsewhere
RPR 2	CNPS California Rare Plant Rank 2: Rare, threatened, or endangered in California, but more common elsewhere
RPR 3	CNPS California Rare Plant Rank 3: Potentially rare species for which CNPS needs more information (a review list)
WBWG	Western Bat Working Group (High or Medium) Priority species
HCP	Eastern Contra Costa County Habitat Conservation Plan (and Natural Community Conservation Plan) Covered species

APPENDIX C

PHOTO APPENDIX

Photo 1. Developed /Disturbed portion the Project Area

Photo 2. Edge of common tarplant field looking toward the developed/disturbed area.

Photo 3. Ornamental grove.

Photo 4. The developed/disturbed area with the ornamental grove in the background.

Photo 5. Ornamental grove.

Photo 6. Landmark white iron bark tree

APPENDIX D

TREE SURVEY TABLE AND MAPBOOK

Appendix D-1. Marsh Landing Solar Generation Facility Protected Tree Survey August 2015

Tag ID	Species	Common Name	Protected	Landmark /Heritage	Multi-stem	Total DBH (inches)	Height* (feet)	Condition	Health	Structure
4388	*Acacia melanoxylon*	blackwood acacia	No	No	Yes	9.6	25	Poor	Poor	Poor
4404	*Acacia melanoxylon*	blackwood acacia	No	No	No	2.8	8	Fair	Fair	Fair
4467	*Acacia melanoxylon*	blackwood acacia	No	No	No	14.5	29	Poor	Poor	Poor
4201	*Acacia melanoxylon*	blackwood acacia	No	No	No	4.5	18	Poor	Poor	Poor
4209	*Acacia melanoxylon*	blackwood acacia	No	No	No	8.5	23	Fair	Fair	Poor
4215	*Acacia melanoxylon*	blackwood acacia	No	No	No	3.7	17	Poor	Poor	Poor
4216	*Acacia melanoxylon*	blackwood acacia	No	No	No	7.6	25	Fair	Fair	Poor
4263	*Acacia melanoxylon*	blackwood acacia	No	No	No	6.1	28	Poor	Poor	Poor
4274	*Acacia melanoxylon*	blackwood acacia	No	No	No	7.2	29	Fair	Poor	Fair
4313	*Acacia melanoxylon*	blackwood acacia	No	No	Yes	10.1	32	Poor	Poor	Fair
4205	*Callistemon citrinus*	crimson bottlebrush	No	No	Yes	9.4	NA	Poor	Poor	Poor
4214	*Callistemon citrinus*	crimson bottlebrush	No	No	No	3.7	NA	Fair	Fair	Fair
4217	*Callistemon citrinus*	crimson bottlebrush	No	No	No	5.4	NA	Fair	Fair	Fair
4219	*Callistemon citrinus*	crimson bottlebrush	No	No	No	7.5	NA	Fair	Fair	Fair
4220	*Callistemon citrinus*	crimson bottlebrush	No	No	No	8.9	NA	Poor	Fair	Fair
4221	*Callistemon citrinus*	crimson bottlebrush	No	No	No	5.7	NA	Poor	Poor	Poor
4244	*Callistemon citrinus*	crimson bottlebrush	No	No	No	8	NA	Fair	Fair	Fair
4251	*Callistemon citrinus*	crimson bottlebrush	No	No	No	4.2	NA	Fair	Fair	Fair
4405	*Eucalyptus leucoxylon*	white iron bark	Yes	No	No	34	35	Fair	Fair	Fair
4410	*Eucalyptus leucoxylon*	white iron bark	Yes	Yes	Yes	51	60	Fair	Fair	Poor
4449	*Eucalyptus leucoxylon*	white iron bark	No	No	No	17.2	35	Fair	Fair	Fair
4458	*Eucalyptus leucoxylon*	white iron bark	Yes	Yes	No	52	45	Poor	Fair	Fair
4272	*Eucalyptus leucoxylon*	white iron bark	No	No	No	26+	35	Fair	Fair	Poor
4309	*Eucalyptus leucoxylon*	white iron bark	No	No	No	11.5	35	Fair	Fair	Fair
4311	*Eucalyptus leucoxylon*	white iron bark	No	No	No	19	40	Fair	Fair	Fair
4384	*Eucalyptus sideroxylon*	red iron bark	No	No	No	13.5	30	Poor	Poor	Poor
4392	*Eucalyptus sideroxylon*	red iron bark	No	No	Yes	26+	30	Poor	Poor	Poor
4435	*Eucalyptus sideroxylon*	red iron bark	Yes	No	Yes	31.1	35	Fair	Fair	Fair
4442	*Eucalyptus sideroxylon*	red iron bark	No	No	Yes	21.5	30	Poor	Poor	Poor
4284	*Eucalyptus sideroxylon*	red iron bark	No	No	No	25.1	38	Poor	Fair	Fair
4291	*Eucalyptus sideroxylon*	red iron bark	Yes	Yes	Yes	56.2	40	Fair	Fair	Fair
4293	*Eucalyptus sideroxylon*	red iron bark	No	No	No	8.1	30	Poor	Fair	Poor
4307	*Eucalyptus sideroxylon*	red iron bark	Yes	No	No	36.2	35	Fair	Fair	Fair
4329	*Eucalyptus sideroxylon*	red iron bark	Yes	No	No	26.4	35	Poor	Poor	Fair
4202	*Ligustrum sinense*	Chinese privet	No	No	Yes	5.1	20	Poor	Poor	Poor
4344	*Pinus halepensis*	Aleppo pine	No	No	No	10	30	Poor	Poor	Fair
4346	*Pinus halepensis*	Aleppo pine	No	No	No	11.3	35	Fair	Fair	Fair
4349	*Pinus halepensis*	Aleppo pine	No	No	No	16.8	35	Fair	Fair	Fair
4357	*Pinus halepensis*	Aleppo pine	No	No	No	5.8	25	Poor	Poor	Fair
4359	*Pinus halepensis*	Aleppo pine	No	No	No	11	30	Fair	Fair	Fair
4396	*Pinus halepensis*	Aleppo pine	No	No	No	18.2	35	Fair	Poor	Fair
4398	*Pinus halepensis*	Aleppo pine	No	No	No	11.3	30	Fair	Poor	Fair
4415	*Pinus halepensis*	Aleppo pine	No	No	No	10.2	25	Fair	Poor	Fair
4424	*Pinus halepensis*	Aleppo pine	No	No	No	11.6	30	Fair	Poor	Fair
4450	*Pinus halepensis*	Aleppo pine	No	No	No	10.3	30	Fair	Fair	Fair
4230	*Pinus halepensis*	Aleppo pine	No	No	No	13.5	30	Fair	Fair	Fair
4240	*Pinus halepensis*	Aleppo pine	No	No	No	18.5	35	Fair	Fair	Good
4245	*Pinus halepensis*	Aleppo pine	No	No	No	11.3	30	Poor	Fair	Fair
4247	*Pinus halepensis*	Aleppo pine	No	No	No	13.5	35	Poor	Fair	Fair
4261	*Pinus halepensis*	Aleppo pine	No	No	No	15.6	35	Fair	Fair	Fair
4265	*Pinus halepensis*	Aleppo pine	No	No	No	18	35	Fair	Fair	Fair
4269	*Pinus halepensis*	Aleppo pine	No	No	No	18.3	35	Fair	Fair	Fair
4299	*Pinus halepensis*	Aleppo pine	No	No	No	10	30	Poor	Poor	Fair
4305	*Pinus halepensis*	Aleppo pine	No	No	No	11	30	Fair	Poor	Fair
4330	*Pinus halepensis*	Aleppo pine	No	No	No	9.7	25	Poor	Poor	Fair
4334	*Pinus halepensis*	Aleppo pine	No	No	No	13.2	30	Poor	Poor	Fair
4336	*Pinus halepensis*	Aleppo pine	No	No	No	15.9	35	Fair	Fair	Fair
4363	*Populus nigra*	Lombardy poplar	No	No	No	4.8	20	Poor	Poor	Fair
4364	*Populus nigra*	Lombardy poplar	No	No	No	14.2	35	Poor	Poor	Fair

Appendix D-1. Marsh Landing Solar Generation Facility Protected Tree Survey August 2015

Tag ID	Species	Common Name	Protected	Landmark /Heritage	Multi-stem	Total DBH (inches)	Height* (feet)	Condition	Health	Structure
4365	*Populus nigra*	Lombardy poplar	No	No	No	4	20	Fair	Fair	Fair
4366	*Populus nigra*	Lombardy poplar	No	No	No	4.9	25	Poor	Poor	Fair
4367	*Populus nigra*	Lombardy poplar	No	No	No	3.2	20	Poor	Poor	Fair
4371	*Populus nigra*	Lombardy poplar	No	No	No	5.5	25	Poor	Poor	Fair
4372	*Populus nigra*	Lombardy poplar	No	No	No	4.5	20	Poor	Poor	Fair
4373	*Populus nigra*	Lombardy poplar	No	No	No	6.5	25	Fair	Fair	Fair
4379	*Populus nigra*	Lombardy poplar	No	No	No	4	25	Fair	Fair	Fair
4380	*Populus nigra*	Lombardy poplar	No	No	No	4.4	25	Fair	Fair	Fair
4382	*Populus nigra*	Lombardy poplar	No	No	No	5.2	25	Fair	Fair	Fair
4418	*Populus nigra*	Lombardy poplar	Yes	No	Yes	33.6	35	Poor	Poor	Poor
4421	*Populus nigra*	Lombardy poplar	No	No	Yes	10	30	Fair	Poor	Fair
4425	*Populus nigra*	Lombardy poplar	No	No	Yes	13.3	25	Poor	Poor	Fair
4426	*Populus nigra*	Lombardy poplar	No	No	Yes	25.2	30	Fair	Fair	Fair
4427	*Populus nigra*	Lombardy poplar	No	No	No	4.5	20	Poor	Poor	Fair
4430	*Populus nigra*	Lombardy poplar	No	No	Yes	11.5	30	Poor	Poor	Poor
4441	*Populus nigra*	Lombardy poplar	No	No	Yes	13.9	30	Fair	Fair	Fair
4469	*Populus nigra*	Lombardy poplar	No	No	No	4.2	25	Fair	Fair	Fair
4232	*Populus nigra*	Lombardy poplar	No	No	Yes	9.4	25	Poor	Poor	Fair
4234	*Populus nigra*	Lombardy poplar	No	No	No	9	35	Poor	Fair	Fair
4304	*Populus nigra*	Lombardy poplar	No	No	No	6	30	Poor	Poor	Fair
4331	*Populus nigra*	Lombardy poplar	No	No	No	19	40	Poor	Poor	Fair
4374	*Prunus dulcis*	almond tree	No	No	No	3.3	15	Poor	Poor	Fair
4204	*Prunus dulcis*	almond tree	No	No	Yes	9.7	17	Fair	Fair	Fair
4206	*Prunus dulcis*	almond tree	No	No	Yes	8.2	15	Fair	Fair	Fair
4207	*Prunus dulcis*	almond tree	No	No	No	6.5	15	Fair	Fair	Poor
4210	*Prunus dulcis*	almond tree	No	No	Yes	6.5	15	Fair	Fair	Fair
4211	*Prunus dulcis*	almond tree	No	No	Yes	8.5	15	Fair	Fair	Fair
4212	*Prunus dulcis*	almond tree	No	No	No	4.7	15	Fair	Fair	Fair
4213	*Prunus dulcis*	almond tree	No	No	Yes	10.2	18	Poor	Fair	Poor
4218	*Prunus dulcis*	almond tree	No	No	Yes	17.9	15	Fair	Fair	Fair
4238	*Prunus dulcis*	almond tree	No	No	Yes	6.5	13	Poor	Poor	Fair
4248	*Prunus dulcis*	almond tree	No	No	Yes	7.3	15	Poor	Fair	Fair
4317	*Prunus dulcis*	almond tree	No	No	Yes	20.6	17	Poor	Fair	Fair
4264	*Prunus ilicifolia*	holly leaf cherry	No	No	Yes	7.5	21	Poor	Poor	Poor
4376	*Quercus agrifolia*	coast live oak	No	No	No	1.8	10	Poor	Fair	Poor
4402	*Quercus agrifolia*	coast live oak	No	No	No	1.4	7	Fair	Fair	Fair
4432	*Quercus agrifolia*	coast live oak	Yes	No	No	16.3	25	Fair	Fair	Fair
4465	*Quercus agrifolia*	coast live oak	No	No	No	2.6	9	Fair	Fair	Fair
4203	*Quercus agrifolia*	coast live oak	No	No	No	4.7	15	Fair	Fair	Poor
4231	*Quercus agrifolia*	coast live oak	No	No	No	5.4	15	Fair	Fair	Fair
4235	*Quercus agrifolia*	coast live oak	No	No	No	8.3	20	Fair	Fair	Fair
4243	*Quercus agrifolia*	coast live oak	No	No	No	3.9	15	Good	Fair	Fair
4260	*Quercus agrifolia*	coast live oak	Yes	No	No	30	25	Good	Good	Good
4275	*Quercus agrifolia*	coast live oak	No	No	No	6.2	20	Fair	Fair	Fair
4310	*Quercus agrifolia*	coast live oak	No	No	No	1.5	8	Fair	Fair	Fair
4343	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	16.9	NA	Fair	Fair	Fair
4348	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	15	NA	Fair	Fair	Fair
4351	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	16.8	NA	Poor	Fair	Fair
4353	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	11.1	NA	Poor	Poor	Poor
4355	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	14.6	NA	Fair	Fair	Fair
4361	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	14.2	NA	Fair	Fair	Fair
4362	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	12.4	NA	Poor	Poor	Fair
4368	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	9.2	NA	Fair	Fair	Fair
4369	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	6.5	NA	Poor	Fair	Fair
4375	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	18.1	NA	Fair	Fair	Fair
4377	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	13.9	NA	Fair	Fair	Fair
4381	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	9.6	NA	Fair	Fair	Fair
4383	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	15.2	NA	Poor	Fair	Fair
4386	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	16.1	NA	Fair	Fair	Fair

Appendix D-1. Marsh Landing Solar Generation Facility Protected Tree Survey August 2015

Tag ID	Species	Common Name	Protected	Landmark /Heritage	Multi-stem	Total DBH (inches)	Height* (feet)	Condition	Health	Structure
4387	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	18.6	NA	Fair	Fair	Fair
4391	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	0	NA	Fair	Fair	Fair
4395	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	17.2	NA	Fair	Fair	Fair
4400	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	17.1	NA	Fair	Fair	Fair
4401	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	13.1	NA	Fair	Fair	Fair
4403	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	17.6	NA	Fair	Fair	Fair
4407	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	12.8	NA	Poor	Poor	Fair
4409	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	14.3	NA	Fair	Fair	Fair
4412	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	18.8	NA	Fair	Fair	Fair
4414	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	15.6	NA	Fair	Fair	Fair
4422	*Rhamnus alaternus*	Italian buckthorn	No	No	No	4.4	NA	Fair	Fair	Fair
4429	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	11.3	NA	Fair	Fair	Fair
4433	*Rhamnus alaternus*	Italian buckthorn	No	No	No	4.6	NA	Fair	Fair	Fair
4434	*Rhamnus alaternus*	Italian buckthorn	No	No	No	5.2	NA	Fair	Fair	Fair
4436	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	15	NA	Fair	Fair	Fair
4438	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	7.5	NA	Fair	Fair	Fair
4439	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	5.6	NA	Poor	Fair	Poor
4440	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	5.6	NA	Fair	Fair	Fair
4444	*Rhamnus alaternus*	Italian buckthorn	No	No	No	3.8	NA	Fair	Fair	Fair
4446	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	9.9	NA	Fair	Fair	Fair
4451	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	3.8	NA	Fair	Fair	Fair
4453	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	7.3	NA	Fair	Fair	Fair
4455	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	7.2	NA	Fair	Fair	Fair
4459	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	13.3	NA	Fair	Fair	Fair
4461	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	9	NA	Fair	Fair	Fair
4237	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	14.8	NA	Fair	Fair	Fair
4242	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	9.4	NA	Fair	Fair	Fair
4268	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	13.5	NA	Poor	Fair	Poor
4271	*Rhamnus alaternus*	Italian buckthorn	No	No	No	7.2	NA	Poor	Poor	Fair
4277	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	15.3	NA	Fair	Fair	Fair
4280	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	26+	NA	Fair	Fair	Fair
4282	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	17.9	NA	Poor	Poor	Fair
4286	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	10.1	NA	Poor	Poor	Poor
4287	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	12.1	NA	Fair	Poor	Fair
4288	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	9.7	NA	Fair	Fair	Fair
4290	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	14.9	NA	Poor	Poor	Poor
4292	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	11.2	NA	Fair	Fair	Fair
4295	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	13.6	NA	Poor	Poor	Fair
4296	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	12.2	NA	Fair	Fair	Fair
4298	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	18.3	NA	Fair	Fair	Fair
4301	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	17.3	NA	Poor	Poor	Poor
4312	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	15.8	NA	Poor	Poor	Fair
4315	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	8.9	NA	Fair	Poor	Fair
4318	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	11.5	NA	Fair	Fair	Fair
4319	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	18	NA	Good	Fair	Good
4320	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	26+	NA	Fair	Fair	Fair
4321	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	13.1	NA	Fair	Fair	Fair
4322	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	14.1	NA	Fair	Fair	Fair
4323	*Rhamnus alaternus*	Italian buckthorn	No	No	No	5.6	NA	Fair	Fair	Fair
4324	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	10.8	NA	Fair	Fair	Fair
4326	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	13.9	NA	Fair	Fair	Fair
4327	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	15.6	NA	Poor	Poor	Fair
4332	*Rhamnus alaternus*	Italian buckthorn	No	No	No	6.3	NA	Fair	Fair	Fair
4333	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	26+	NA	Poor	Poor	Poor
4338	*Rhamnus alaternus*	Italian buckthorn	No	No	Yes	14.5	NA	Poor	Poor	Fair
4339	*Rhamnus alaternus*	Italian buckthorn	No	No	No	6.9	NA	Poor	Poor	Poor
4340	*Rhamnus alaternus*	Italian buckthorn	No	No	No	17.3	NA	Fair	Fair	Fair
4468	*Salix laevigata*	red willow	No	No	No	14.1	25	Poor	Poor	Fair
4341	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair

Appendix D-1. Marsh Landing Solar Generation Facility Protected Tree Survey August 2015

Tag ID	Species	Common Name	Protected	Landmark /Heritage	Multi-stem	Total DBH (inches)	Height* (feet)	Condition	Health	Structure
4342	*Searsia lancea*	African sumac	No	No	Yes	20.6	NA	Fair	Fair	Fair
4345	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4347	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4350	*Searsia lancea*	African sumac	No	No	Yes	6.8	NA	Poor	Poor	Poor
4342	*Searsia lancea*	African sumac	No	No	Yes	18.4	NA	Fair	Fair	Fair
4354	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4355	*Searsia lancea*	African sumac	No	No	Yes	20.5	NA	Fair	Fair	Fair
4358	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Poor	Poor	Poor
4360	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Poor	Fair	Poor
4370	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Poor	Fair	Fair
4385	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4389	*Searsia lancea*	African sumac	No	No	Yes	25.7	NA	Fair	Fair	Fair
4390	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Good	Fair
4393	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4394	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4397	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4399	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4406	*Searsia lancea*	African sumac	No	No	Yes	16.7	NA	Fair	Fair	Fair
4408	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4411	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4413	*Searsia lancea*	African sumac	No	No	Yes	15.7	NA	Fair	Fair	Fair
4416	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4417	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4419	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4420	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Poor	Fair
4423	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4428	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4431	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4437	*Searsia lancea*	African sumac	No	No	Yes	12.1	NA	Fair	Fair	Fair
4443	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Poor	Fair
4445	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4447	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4449	*Searsia lancea*	African sumac	No	No	Yes	14.3	NA	Fair	Fair	Fair
4452	*Searsia lancea*	African sumac	No	No	Yes	19.8	NA	Fair	Fair	Fair
4454	*Searsia lancea*	African sumac	No	No	Yes	24.3	NA	Fair	Fair	Fair
4456	*Searsia lancea*	African sumac	No	No	Yes	13.4	NA	Fair	Fair	Fair
4457	*Searsia lancea*	African sumac	No	No	Yes	15.8	NA	Fair	Fair	Fair
4460	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4462	*Searsia lancea*	African sumac	No	No	Yes	21.9	NA	Fair	Fair	Fair
4463	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4464	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4466	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4208	*Searsia lancea*	African sumac	No	No	Yes	30.1	NA	Fair	Fair	Poor
4222	*Searsia lancea*	African sumac	No	No	Yes	33.4	NA	Fair	Fair	Fair
4223	*Searsia lancea*	African sumac	No	No	Yes	44.3	NA	Fair	Fair	Fair
4227	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4228	*Searsia lancea*	African sumac	No	No	Yes	31.8	NA	Fair	Fair	Fair
4229	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4233	*Searsia lancea*	African sumac	No	No	Yes	32.7	NA	Poor	Fair	Fair
4236	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4241	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4246	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4249	*Searsia lancea*	African sumac	No	No	Yes	14.5	NA	Fair	Fair	Fair
4257	*Searsia lancea*	African sumac	No	No	Yes	16.7	NA	Fair	Fair	Fair
4258	*Searsia lancea*	African sumac	No	No	Yes	37.1	NA	Fair	Fair	Fair
4259	*Searsia lancea*	African sumac	No	No	Yes	16.1	NA	Fair	Fair	Fair
4262	*Searsia lancea*	African sumac	No	No	Yes	12.3	NA	Poor	Fair	Poor
4266	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Poor	Poor	Poor
4267	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Poor	Fair	Poor

Appendix D-1. Marsh Landing Solar Generation Facility Protected Tree Survey August 2015

Tag ID	Species	Common Name	Protected	Landmark /Heritage	Multi-stem	Total DBH (inches)	Height* (feet)	Condition	Health	Structure
4270	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Poor	Fair	Poor
4273	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Poor	Poor	Poor
4276	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4278	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Poor	Poor	Poor
4279	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4281	*Searsia lancea*	African sumac	No	No	Yes	26.3	NA	Poor	Poor	Poor
4283	*Searsia lancea*	African sumac	No	No	Yes	20.7	NA	Fair	Fair	Fair
4285	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4289	*Searsia lancea*	African sumac	No	No	Yes	16	NA	Poor	Fair	Poor
4294	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4297	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4300	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4302	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4303	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4306	*Searsia lancea*	African sumac	No	No	Yes	18.4	NA	Fair	Fair	Fair
4308	*Searsia lancea*	African sumac	No	No	Yes	20.3	NA	Fair	Fair	Fair
4314	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4325	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4328	*Searsia lancea*	African sumac	No	No	Yes	17.8	NA	Fair	Fair	Fair
4335	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Poor	Poor	Fair
4337	*Searsia lancea*	African sumac	No	No	Yes	26+	NA	Fair	Fair	Fair
4224	*Ulmus pumila*	Siberian elm	No	No	Yes	17.1	25	Fair	Fair	Fair
4225	*Ulmus pumila*	Siberian elm	No	No	Yes	26+	25	Poor	Poor	Poor
4226	*Ulmus pumila*	Siberian elm	No	No	Yes	26+	25	Fair	Fair	Fair
4239	*Ulmus pumila*	Siberian elm	No	No	No	6.9	20	Fair	Fair	Fair
4250	*Ulmus pumila*	Siberian elm	No	No	No	7.5	20	Fair	Fair	Fair
4252	*Ulmus pumila*	Siberian elm	Yes	Yes	Yes	48	35	Fair	Good	Good
4253	*Ulmus pumila*	Siberian elm	No	No	Yes	14.6	25	Fair	Fair	Fair
4254	*Ulmus pumila*	Siberian elm	No	No	No	6.5	20	Poor	Fair	Poor
4255	*Ulmus pumila*	Siberian elm	No	No	No	9.3	20	Fair	Fair	Fair
4256	*Ulmus pumila*	Siberian elm	Yes	No	Yes	28.6	28	Fair	Fair	Fair

* Height not recorded for shrub species

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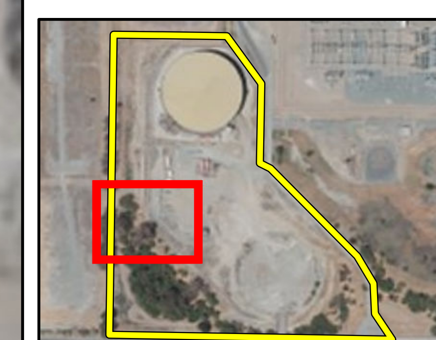
Marsh Landing
Solar Facility
Contra Costa County,
California

Figure D-1.

Tree Location Map



N
W E
S

0 10 20 30
Feet

Map Prepared Date: 12/28/2015
Map Prepared By: czumwalt
Base Source:
Data Source(s): WRA

Path: L:\Acad 2000 Files\25000\25212\GIS\ArcMap\Tree Mapbook.mxd

wra
ENVIRONMENTAL CONSULTANTS

Marsh Landing
Solar Facility
Contra Costa County,
California

Figure D-2.

Tree Location Map

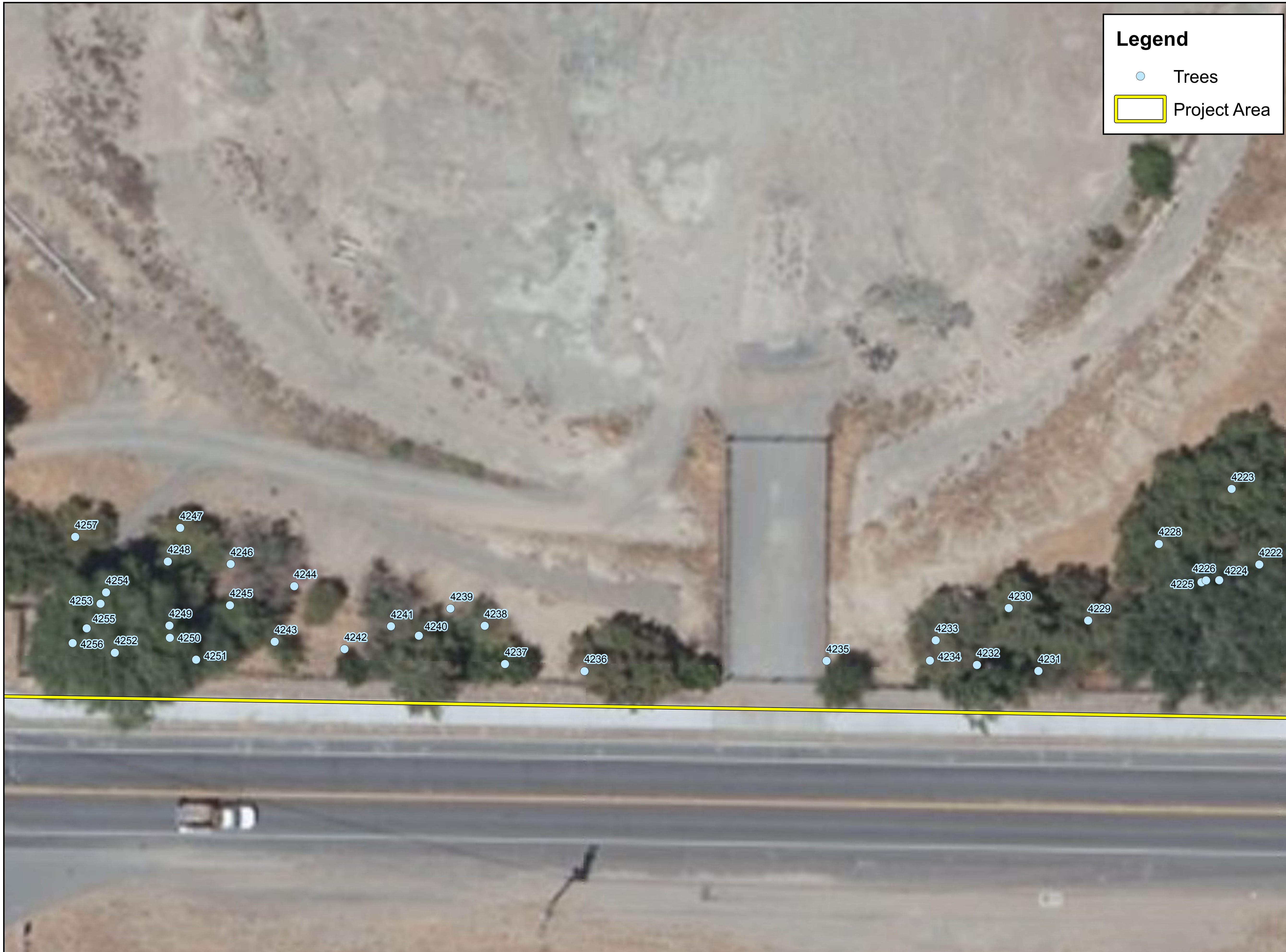
N
W E
S

0 10 20 30

Feet

Map Prepared Date: 12/28/2015
Map Prepared By: czumwalt
Base Source:
Data Source(s): WRA

Path: L:\Acad 2000 Files\25000\25212\GIS\ArcMap\Tree Mapbook.mxd

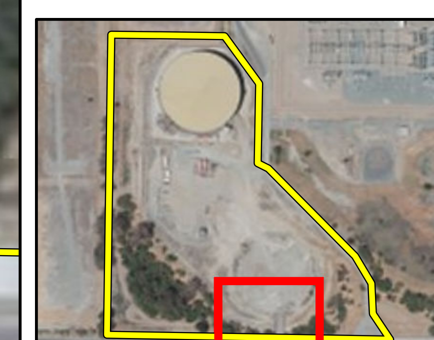


ENVIRONMENTAL CONSULTANTS

Marsh Landing
Solar Facility
Contra Costa County,
California

Figure D-3.

Tree Location Map



N
W E
S

0 10 20 30

Feet

Map Prepared Date: 12/28/2015
Map Prepared By: czumwalt
Base Source:
Data Source(s): WRA

Path: L:\Acad 2000 Files\25000\25212\GIS\ArcMap\Tree Mapbook.mxd

wra
ENVIRONMENTAL CONSULTANTS

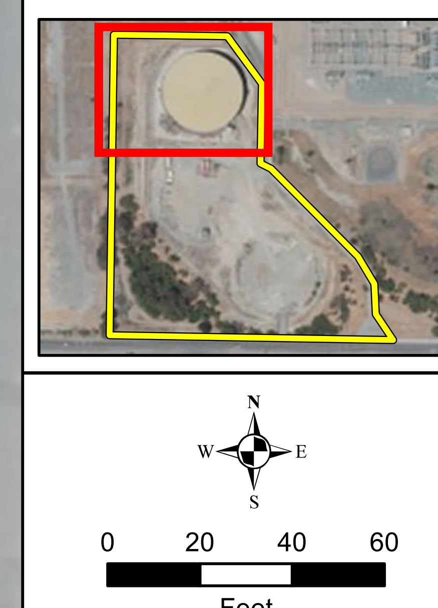
Marsh Landing
Solar Facility
Contra Costa County,
California

Figure D-4.

Tree Location Map

Map Prepared Date: 12/28/2015
Map Prepared By: czumwalt
Base Source:
Data Source(s): WRA

Path: L:\Acad 2000 Files\25000\25212\GIS\ArcMap\Tree Mapbook.mxd



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Marsh Landing
Solar Facility
Contra Costa County,
California

Figure D-5.

Tree Location Map

Map Prepared Date: 12/28/2015
Map Prepared By: czumwalt
Base Source:
Data Source(s): WRA

Path: L:\Acad 2000 Files\25000\25212\GIS\ArcMap\Tree Mapbook Page 5.mxd

APPENDIX C
NAHC AND NATIVE AMERICAN CORRESPONDENCE

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
(916) 373-3710
Fax (916) 373-5471

April 13, 2016

Susan Underbrink
TRC

Sent by Email: sunderbrink@trcsolutions.com
Number of Pages: 2

RE: Potential Solar Site, Antioch North, Contra Costa County

Dear Ms. Underbrink:

A record search of the Native American Heritage Commission (NAHC) *Sacred Lands File* was completed for the area of potential project effect (APE) referenced above with negative results. Please note that the absence of specific site information in the *Sacred Lands File* does not indicate the absence of Native American cultural resources in any APE.

I suggest you contact all of those listed, if they cannot supply information, they might recommend others with specific knowledge. The list should provide a starting place to locate areas of potential adverse impact within the APE. By contacting all those on the list, your organization will be better able to respond to claims of failure to consult. If a response has not been received within two weeks of notification, the NAHC requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact via email: Sharaya.souza@nahc.ca.gov.

Sincerely,

Sharaya Souza
Staff Services Analyst

Native American Contact
Contra Costa County
April 11, 2016

Amah MutsunTribal Band of Mission San Juan Bautista
Irenne Zwierlein, Chairperson
789 Canada Road — Ohlone/Costanoan
Woodside , CA 94062
amahmutsuntribal@gmail.com
(650) 400-4806 Cell

(650) 332-1526 Fax

Indian Canyon Mutsun Band of Costanoan
Ann Marie Sayers, Chairperson
P.O. Box 28 — Ohlone/Costanoan
Hollister , CA 95024
ams@indiancanyon.org
(831) 637-4238

Muwekma Ohlone Indian Tribe of the SF Bay Area
Rosemary Cambra, Chairperson
P.O. Box 360791 — Ohlone / Costanoan
Milpitas , CA 95036
muwekma@muwekma.org
(408) 314-1898
(510) 581-5194

The Ohlone Indian Tribe
Andrew Galvan
P.O. Box 3152 — Ohlone/Costanoan
Fremont , CA 94539 — Bay Miwok
chochenyo@AOL.com — Plains Miwok
(510) 882-0527 Cell — Patwin

(510) 687-9393 Fax

Wilton Rancheria
Raymond Hitchcock, Chairperson
9728 Kent Street — Miwok
Elk Grove , CA 95624
rhitchcock@wiltonrancheria-nsn.gov
(916) 683-6000 Office

(916) 683-6015 Fax

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Study for Potential Solar Site, Contra Costa County.

Wilton Rancheria

9728 Kent Street, Elk Grove, CA 95624

December 6, 2016

To: City of Antioch

RE: Tribal Cultural Resources under the California Environmental Quality Act, AB52 (Gatto, 2014). Tribal Consultation for Marsh Landing Solar Project, City of Antioch

Dear: Alexis Morris,

This letter constitutes a formal request for tribal consultation under the provisions of the California Environmental Quality Act (CEQA) (Public Resources Code section 21080.3.1 subdivisions (b), (d) and (e) for the mitigation of potential project impacts to tribal cultural resource for the above referenced project. Wilton Rancheria (Tribe) requested formal notice and information for all projects within your agency's geographical jurisdiction on July, 1, 2015 and received notification on November 28, 2016 regarding the above referenced project.

The Tribe requests consultation on the following topics checked below, which shall be included in consultation if requested (Public Resources Code section 21080.3.2, subd. (a):

_____ Alternatives to the project
__✓__ Define the Applicant (Lead Agency)
__✓__ Project funding
__✓__ Recommended mitigation measures
__✓__ Significant effects of the project
__✓__ Native American Inspector present during ground disturbance

The Tribe also requests consultation on the following discretionary topics checked below (Public Resources Code section 21080.3.2, subd. (a):

__✓__ Type of environmental review necessary
__✓__ Significance of tribal cultural resources, including any regulations, policies or standards used by your agency to determine significance of tribal cultural resources
__✓__ Significance of the project's impacts on tribal cultural resources
__✓__ Project alternatives and/or appropriate measures for preservation or mitigation that we may recommend, including, but not limited to:

(1) Avoidance and preservation of the resources in place, pursuant to Public Resources Code section 21084.3, including, but not limited to, planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks or other open space, to incorporate the resources with culturally appropriate protection and management criteria;

Ph: 916.683.6000 | Fax: 916.683.6015 | www.wiltonrancheria-nsn.gov

(2) Treating the resources with culturally appropriate dignity taking into account the tribal cultural values and meaning of the resources, including but not limited to the following:

a. Protecting the cultural character and integrity of the resource;
b. Protection the traditional use of the resource; and
c. Protecting the confidentiality of the resource.

(3) Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

(4) Protecting the resource.

Additionally, the Tribe would like to receive any cultural resources assessments or other assessments that have been completed on all or part of the project's area of potential effect (APE), and area surrounding the APE including, but not limited to:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:
   - A listing of any and all known cultural resources have already been recorded on or adjacent to the APE;
   - Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
   - If the probability is low, moderate, or high that cultural resources are located in the APE or surrounding the APE.
   - Whether the records search indicates a low, moderate or high probability that unrecorded cultural resources are located in the potential APE or surrounding the APE; and
   - If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.
     - ✦ The Tribe requests to be present at any survey conducted on the Applicants behalf.
2. The results of any archaeological inventory survey that was conducted, including:
   - Any reports that may contain site forms, site significance, and suggested mitigation measures.
   - Any reports or inventories found under the Native American Graves Protection and Repatriation Act.
     - ✦ All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure in accordance with Government Code Section 6254.10. All Wilton Rancheria correspondences shall be kept under this confidential section and only shared between the Tribe and lead agency.
3. The results of any Sacred Lands File (SFL) check conducted through Native American Heritage Commission. The request form can be found at http://www.nahc.ca.gov/slf_request.html. USGS 7.5-minute quadrangle name, township, range, and section required for the search.

4. Any ethnographic studies conducted for any area including all or part of the potential APE or areas surrounding the APE; and
5. Any geotechnical reports regarding all or part of the potential APE or areas surrounding the APE.
    - The Tribe shall be notified before any geotechnical testing is planned. Geotechnical testing has potential to impact Tribal Cultural Resources and should be part of this consultation.

The information gathered will provide us with a better understanding of the project and will allow the Tribe to compare your records with our database.

We would like to remind your agency that CEQA Guidelines section 15126.4, subdivision (b)(3) states that preservation in place is the preferred manner of mitigating impacts to archaeological sites. Section 15126.4, subd. (b)(3) of the CEQA Guidelines has been interpreted by the California Court of Appeal to mean that "feasible preservation in place must be adopted to mitigate impacts to historical resources of an archaeological nature unless the lead agency determines that another form of mitigation is available and provides superior mitigation of impacts." *Madera Oversight Coalition v. County of Madera* (2011) 199 Cal.App.4th 48, disapproved on other grounds, *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal.4th 439.

Please contact Ed Silva, Tribal Resources Coordinator via email at esilva@wiltonrancheria-nsn.gov to set up a meeting.

Sincerely,

Antonio Ruiz, Jr.
Cultural Resources Officer
Wilton Rancheria

Table 1. AB 52 Correspondence Summary

Date	Sent by	Recipient	Activity
11/28/2016	Alexis Morris City of Antioch	Antonio Ruiz Wilton Rancheria	Initial AB 52 project notification letter
12/6/2016	Antonio Ruiz Wilton Rancheria	Alexis Morris City of Antioch	Request for consultation letter
1/13/2017	Breana Campbell Rincon Consultants	Ed Silva Wilton Rancheria	Cultural resources records search results and request for potential meeting date sent on behalf of City of Antioch
1/17/2017	Breana Campbell Rincon Consultants	Ed Silva Wilton Rancheria	Follow-up email to confirm receipt of records search results
1/18/2017	Breana Campbell Rincon Consultants	Antonio Ruiz Wilton Rancheria	Voicemail left for Antonio Ruiz because Wilton Rancheria did not have a phone number on file for Ed Silva
1/23/2017	Breana Campbell Rincon Consultants	Steven Hutchison Wilton Rancheria	Attempted first to leave voicemail for Antonio Ruiz but his voicemail box was full; Voicemail left for Steven Hutchison
1/26/2017	Ed Silva Wilton Rancheria	Breana Campbell Rincon Consultants	Response to records search results and request for meeting dates
1/26/2017	Breana Campbell Rincon Consultants	Ed Silva Wilton Rancheria	Response providing meeting date options
1/31/2017	Breana Campbell Rincon Consultants	Ed Silva Wilton Rancheria	Phone call and voicemail left to confirm a meeting date
1/31/2017	Ed Silva Wilton Rancheria	Breana Campbell Rincon Consultants	Email confirming proposed dates of either 2/7/2017 or 2/8/2017 will work and statement that Mr. Silva would respond the following day with the chosen date
2/2/2017	Breana Campbell Rincon Consultants	Ed Silva Wilton Rancheria	Email to confirm a meeting for 2/7/2017 or 2/8/2017
2/6/2017	Breana Campbell Rincon Consultants	Ed Silva Wilton Rancheria	Follow-up via email and voicemail to confirm a meeting for 2/7/2017 or 2/8/2017
2/7/2017	Breana Campbell Rincon Consultants	Ed Silva Wilton Rancheria	Voicemail left to confirm a meeting for 2/8/2017
2/7/2017	Breana Campbell Rincon Consultants	Ed Silva Wilton Rancheria	Email to suggest a meeting for 2/14/2017
2/8/2017	Breana Campbell Rincon Consultants	Ed Silva Wilton Rancheria	Voicemail left to propose additional meeting dates
2/9/2017	Breana Campbell Rincon Consultants	Ed Silva Wilton Rancheria	Called to propose phone meeting, scheduled for 2/14/2017. Rincon resent the FTP documents to Mr. Silva.
2/13/2017	Ed Silva Wilton Rancheria	Breana Campbell Rincon Consultants	Emailed to cancel the meeting scheduled for 2/14/2017 and request to reschedule but no additional meeting dates proposed

March 1, 2017

Ed Silva
Tribal Resources Coordinator
Wilton Rancheria
9728 Kent Street
Elk Grove, CA 95624

RE: Notice to Terminate AB 52 Consultation for the Marsh Landing Solar Project, Antioch, Contra Costa County, California

Dear Mr. Silva:

This letter is to inform you that the City of Antioch is hereby terminating AB 52 Native American consultation with Wilton Rancheria for the Marsh Landing Solar Project. We value any input Wilton Rancheria may have regarding Native American cultural resources. However, we have made repeated efforts to hold a consultation meeting with Wilton Rancheria but these efforts have not succeeded (See Attachment 1).

As such, the City is closing consultation for this project. If you would like to provide any comments regarding the proposed project via letter or email, we will document them in the mitigated negative declaration (MND) currently being prepared for the proposed project. An Administrative Draft of the MND was shared with you in February and the public review draft of the MND will also be available for public comment in mid-March if you wish to review it. If you have any questions regarding this notice, please call me at (925) 779-6141 or email me at amorris@ci.antioch.ca.us.

Sincerely,

Alexis Morris
Planning Manager

Enclosure: Attachment 1. AB 52 Correspondence Summary

Marsh Landing Solar Project
Table 1. AB 52 Correspondence Summary

Date	Sent by	Recipient	Activity
11/28/2016	Alexis Morris City of Antioch	Antonio Ruiz Wilton Rancheria	Initial AB 52 project notification letter
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APPENDIX D
HYDROLOGY REPORT

Preliminary
Hydrology Study & Drainage Analysis

NRG Renew
Marsh Landing Solar Site
City of Antioch, CA
APN 051-031-020

Prepared For:

nrg
Renew

Mr. Zeb Toman
NRG Renew LLC
4900 N. Scottsdale Road Suite 5000
Scottsdale, AZ 85251
Phone: (480) 424-1233

Prepared By:

Joseph E. Bonadiman & Associates, Inc.
234 North Arrowhead Avenue
San Bernardino, CA 92408
Telephone: (909) 885-3806
Fax: (909) 381-1721

www.bonadiman.com

August 2015

Updated:
April 2016
December 2016
February 2017

REGISTERED PROFESSIONAL ENGINEER
JAMES T. STANTON
No. C-70944
Exp. 6-30-17
CIVIL
STATE OF CALIFORNIA

Table of Contents

Exhibits

Attachments

A. Introduction

1.1 Purpose & Scope

The following Hydrology & Hydraulics Study has been prepared for the development of a solar facility in the City of Antioch, CA and to satisfy the Hydrology/Hydraulics requirements per Contra Costa County Flood Control District, Hydrology Standards as found on County web site on August 12, 2015, for developments of this type.

The scope of this Study is as follows:

- Identification of existing conditions tributary drainage areas and calculation of total peak flow rates and run-on/run-off volumes impacting the project site.
- Identification of floodplain(s) impacting the site.
- Identification of proposed on-site hydrologic conditions & site/drainage plan.
- Identification of MS4/NPDES requirements for East Contra Costa County Municipal NPDES Permit, Order R5-2010-0102 NPDES Permit No. CAS083313 23 September 2010
- Summary of Findings & Conclusion

1.2 Project and Site Overview

The proposed project entails the development of a former tank site for use as a solar power plant. The site is located in the City of Antioch, Contra Costa County, California, just north of Wilbur Avenue. Only a small portion of the southwestern property located west of the southern entrance gate is proposed for development. The rest of the site will remain in its current state.

The property in question (PIQ, APN 051-031-020) contains approximately 86.36 acres total, based on county tax records. The parcel is within Sec. 17, Township 2 North, Range 2 East, M.D.B & M., within the "Focus Area" zone, as shown on the City's "General Plan". Base on City GIS information the site is not shown within the City boundary or the "Zoning Map" area (see Exhibit D). However, based on information provided by NRG it appears that area has recently been annexed into the City of Antioch per Resolution 2013/42 (see Attachment 2). Based on Ordnance No. 2071-C-S, provided by NRG Renew, it appears that the area has been zoned "Heavy Industrial" (M2) and "Open Space" (OS) (see Attachment 3). It also appears that the subject property has recently been the subject of a "Lot line Adjustment" (see Attachment 4) as research has found a discrepancy in the Assessor Parcel Numbers (APN). It appears that this has resulted in the APN changing from 051-031-014 to 051-031-020.

The area surrounding the site is composed of general flat topography sloping down to the north. The area south of the subject property consists mostly of agricultural lands with some industrial immediately adjacent to the site. The property to the west is currently vacant but, appears to have been an industrial site of some type in the past. The site has the remains of piping, asphalt, earthen containment berms and piping related to the former storage tanks that will be removed to allow for redevelopment. A review of historical photos did not show any significant drainage courses impacting the site. The ground is mostly covered with asphalt, grass and some areas of brush and trees. Although proposed grading was not presented with the proposed site layout it is assumed that grading of the site to remove the berms will most likely result in the majority of the solar arrays located on an area of high ground. Therefore, the proposed locations of the solar arrays and equipment do not appear to be significantly impacted by any drainage. It should be noted that any equipment located within the flood zone shall not obstruct flows and shall be elevated to provide 1' freeboard per FEMA requirements.

Property in Question

Site Location

1939 Historical Site Photo

1.3 Existing Conditions Off-Site Areas

The project site is bounded to the north by an existing power plant, to the east by an existing substation and wetlands and to the west by vacant land. Immediately south of the project site is an improved roadway, Wilbur Avenue. The western portion of the property, south of Wilbur Road, is bounded by industrial and the western portion of the property, south of Wilbur Road, is bounded by agricultural lands.

Offsite flows from the south are conveyed along Wilbur Avenue via existing curb and gutter on the north side of the roadway. It should be noted that the frontage of the project site is near level in a low lying area therefore, the curb has a number of openings that allow street flow to enter the property. It appears that a small tributary exist to the west of the site. No evidence was found during the field investigation to suggest that any significant off-site flows impact the site. A small rise in topography was also noted to the west of the southwest property corner, limiting the southern offsite tributary.

Photo 1 – Southeast corner of site along Wilbur Ave, looking northwest.

Photo 2 – Southeast corner of site along Wilbur Ave, looking southwest.

Photo 3 – Southwest corner of site along Wilbur Ave, looking northeast.

Photo 4 – Southwest corner of site along Wilbur Ave, looking southeast.

1.4 Existing Conditions On-Site Areas

The existing on-site project area was formerly the location of large storage tanks relating to the old power plant that is no longer in use. The ground cover on-site consists of a mix of grass, small brush, trees, gravel and asphalt. Significant earthen berms surround the former tank locations.

During our field investigation it was noted that three large drainage structures cross under the access road located to the east of the former tank locations, discharging to a large earthen basin east of the project site.. Field investigations did not find any significant tributary to warrant the size of these structures or any tributary outside of the tank containment berms. Based on a review of historical photos it appears that the drainage structures are sized to direct drainage and spills to the large earthen basin east of the project site and are sized adequately for the proposed development.

Overflow from the earthen basin is then directed north to the San Joaquin River via surface flow and various existing drainage ditches and structures. Based on the type of development proposed and the decrease in pervious areas on the project site impact to these structures are expected to be reduced. It should also be noted that drainage from and around the site is not proposed to be significantly altered and would not have any significant impact on downstream properties or facilities. It should also be noted that portions of the site and all the downstream facilities are below the "Base Flood Elevation" (BFE) of 14.00' (NAVD 88). Therefore further investigation of downstream drainage facilities is not warranted.

It should be noted that portions of the site sit lower than the roadway to the south of the site and that the south west corner of the site appears to be in a slight depression. Final development of the site will need to allow for drainage as to not create a ponding or drainage issue and to eliminate ponding where possible.

Photo 5: View of large drainage structure on –site, looking east.

Photo 6: Aerial view of site from 1993.

Photo 7: View of southwest corner of site, looking south.

Photo 8: View of containment wall along northern project boundary, looking west.

Photo 9: View of project site from northwest corner of site, looking southeast.

Refer to Exhibit "A" & "B" for the Project Watershed – Aerial Orthophoto & USGS Quadrangle.

1.5 References

The following documents have been made part of this Study by reference:

1.) Contra Cost County Flood Control District, Hydrology Standards as found on County web site, August 12, 2015.

2.) Site plans provided by NRG Renew dated; August 8, 2015.

B. Methodology

1.1 General Methodology

The requirements and recommendations found in the Contra Cost County Flood Control District, Hydrology Standards as found on the County web site on August 12, 2015, were used as the basis for the methodology and calculations found in this Study. Off-site and On-site calculations were performed using the rational methods calculations per county requirements.

1.2 Geographic Information System (GIS) Data

Publicly available Contra Costa County Geographic Information System (GIS) data was utilized to evaluate both on-site and off-site drainage tributaries and topographic features.

- Orthorectified aerial photography provided by USGS and Google Earth were used for verification of topographic features and identified low flows. Refer to Exhibit "A" for an aerial orthophoto of the project watershed.

- Major watershed and major watercourse shape file data were obtained from the USGS National Map Viewer and Download Platform for identification of major watershed(s) applicable to the project site, and to identify the major receiving waters for project site discharge. Refer to Exhibit "B" for general project watershed location.

- 2' topographic contours shape file data was obtained from Contra Costa County GIS Department.

1.3 Sources of Topography

For existing conditions on-site, 2' topographic contours shape file data was obtained from Contra Costa County GIS Department. For existing conditions off-site 10' topographic contours generated from USGS elevation data in addition to applicable USGS quadrangles were used for all elevation values (NAVD 88). A site investigation was also conducted on August 7, 2015 to confirm general topography and offsite drainage features. For the developed conditions on-site areas, no proposed grading was provided, it was assumed that the general topography would remain generally unchanged and grading would be limited to general smoothing of the existing topography.

For determination of the flood limits as denoted on the FIRM Map 1' topographic contours provided by Slooten Consulting Inc. were used, with a vertical datum based on HPGN D CA 04 HK, PID number AA3821, survey monument with a NAVD 88 ortho height of 16.0'.

1.4 FEMA Floodplain Identification & Considerations

Per FEMA Map No. 06013C0144G (Effective Date - September 30, 2015), the majority of the project site is located in a FEMA Flood unshaded Zone X, "areas of minimal flood hazard". However, a small portion of the project site is located in a FEMA Flood shaded Zone X, "0.2% annual chance flood, areas with 1% annual chance flood with average depths less than one foot or with drainage areas of less than one square mile."

Based on a review of FEMA Map No. 06013C0144G (Effective Date - September 30, 2015) and the "Flood Insurance Study" (FIS) No. 06013CV001B, Coastal Transect 2, per FIS page No. 182 & 186 the flood elevation for the project site is shown to be at an elevation of 14 feet above sea level (NADV 88) for the 100-year storm. Based on a review of the site topography provided by Slooten Consulting Inc. it appears that the FIRM map flood limits are not accurate. A comparison of the FIRM flood limits and the topography provided by Slooten Consulting Inc. can be found in Exhibit C1.

Refer to Exhibit "C" for surrounding area FIRM map used in this report.
Refer to Exhibit "C1" for a comparison of FIRM map flood elevations.

1.5 Watershed Precipitation

Precipitation values used in this report were obtained per Contra Cost County Flood Control District, Hydrology Standards as found on County web site on August 12, 2015, based on the following:

1) Calculate time of concentration by Kirpich Equation and use the time of concentration as the duration.
2) Determine the depth of rain for the duration based on the mean seasonal precipitation from the frequency-depth-duration curve and isohyet map.
3) Convert to intensity by multiplying the depth times 60-minutes/hour and dividing by the time of concentration in minutes.

Kirpich Equation: $t_c = 0.0078\ L^{1.155}/h^{0.385}$

t_c = Time of concentration in minutes
L = Length of main watercourse in feet
H = Fall between ridge and outlet in feet

Intensity Equation: $I = (P \times 60\ \text{min/hr}) / t_c$

I = Intensity (in/hr)
P = Precipitation depth in inches (in)
t_c = Time of concentration in minutes

Table 1 – Precipitation Values for Existing Conditions (Rational Method Calculations)

Area	Length (FT)	U.S. Elev. (FT)	D.S. Elev. (FT)	Δ Elev. (FT)	Time of Concentration (min)	Mean Seasonal Precipitation (in)	Storm Event	Precipitation Depth (in)	Rainfall Intensity (in/hr)
A	3,693	57.0	10.0	47.0	23.37	12.5	5	0.36	**0.92**
							10	0.42	**1.08**
							25	0.47	**1.21**
							50	0.54	**1.39**
							100	0.60	**1.54**
B	1,821	34.1	16.0	18.1	14.91	12.5	5	0.28	**1.13**
							10	0.33	**1.33**
							25	0.38	**1.53**
							50	0.42	**1.69**
							100	0.48	**1.93**
C	519	16.5	13.0	3.5	6.59	12.5	5	0.19	**1.73**
							10	0.23	**2.09**
							25	0.25	**2.28**
							50	0.29	**2.64**
							100	0.32	**2.91**
D	612	16.2	13.0	3.2	8.25	12.5	5	0.22	**1.60**
							10	0.25	**1.82**
							25	0.29	**2.11**
							50	0.33	**2.40**
							100	0.36	**2.62**
E	557	16.5	13.0	3.5	7.15	12.5	5	0.21	**1.76**
							10	0.24	**2.01**
							25	0.27	**2.27**
							50	0.30	**2.52**
							100	0.34	**2.85**

Table 2 – Precipitation Values for Developed Conditions (Rational Method Calculations)

Area	Length (FT)	U.S. Elev. (FT)	D.S. Elev. (FT)	Δ Elev. (FT)	Time of Concentration (min)	Mean Seasonal Precipitation (in)	Storm Event	Precipitation Depth (in)	Rainfall Intensity (in/hr)
A	3,755	57.0	10.0	47.0	23.97	12.5	5	0.36	**0.90**
							10	0.43	**1.07**
							25	0.48	**1.20**
							50	0.54	**1.35**
							100	0.60	**1.50**
B	1,881	34.1	16.0	18.1	15.48	12.5	5	0.29	**1.12**
							10	0.35	**1.36**
							25	0.39	**1.51**
							50	0.44	**1.70**
							100	0.50	**1.94**
C	580	18.8	12.4	6.4	5.94	12.5	5	0.19	**1.92**
							10	0.22	**2.22**
							25	0.25	**2.53**
							50	0.28	**2.83**
							100	0.31	**3.13**
D	771	16.6	11.9	4.7	9.29	12.5	5	0.23	**1.49**
							10	0.27	**1.74**
							25	0.31	**2.00**
							50	0.34	**2.20**
							100	0.38	**2.45**

Refer to Exhibit "D" for the Contra Costa County Mean Seasonal Isohyetal Maps & Precipitation Duration-Frequency-Depth Curves used in this report.

1.6 Runoff Coefficients

Runoff coefficients used in this report were obtained per Contra Cost County Flood Control District, Hydrology Standards as found on County web site on August 12, 2015. Runoff coefficients for the on-site existing conditions have been adjusted from the recommended 0.90 per CCCFDCD Standard - Runoff Coefficients to 0.60 to account for the mix of compacted gravel and asphalt that currently exist on-site. A runoff coefficient of 0.45 was used for the proposed development area to account for the revegetated area under the arrays (85%), proposed gravel roads (14%) and equipment pads (1%) per County Flood Control requirements. The values used in this report are as follows:

Table 3 – Runoff coefficients

Area	Land Use	Runoff Coefficients
A & B	R-40	0.45
C, D & E (Existing)	Industrial	0.60
C (Developed)	R-40	0.45

Refer to Exhibit "E" for the Contra Costa County Runoff Coefficients used in this report.

C. Existing Conditions Hydrology Calculations

1.1. Existing Conditions Rational Method Calculations

Rational Method Calculations flow rates were obtained per Contra Cost County Flood Control District, Hydrology Standards as found on County web site on August 12, 2015, based on the following:

Rational Method Formula: $Q = Cf\,iA$

Q = Peak flow rate in cubic feet/second (cfs)
C = Runoff coefficient
f = Adjustment Factor for 25, 50 and 100-year storms
i = Rainfall intensity in inches/hour
A = Watershed area in acres (ac)

Adjustment Factors: $Q_{25} = 1.10$
$Q_{50} = 1.20$
$Q_{100} = 1.25$

Note: The product of Cf must be less than 1.0

Input values for the existing conditions rational method calculations prepared for this report are tabulated below:

Table 4 – Existing Conditions (Rational Method Calculations)

Area	Storm Event	Land Use	C Runoff Coefficients	f Adjustment Factor	i Rainfall Intensity (in/hr)	A Size (ac)	Q (CFS)
A	5	R-40	0.45	1.00	0.92	66.11	**27.37**
	10			1.00	1.08		**32.13**
	25			1.10	1.21		**39.60**
	50			1.20	1.39		**49.62**
	100			1.25	1.54		**57.27**
B	5	R-40	0.45	1.00	1.13	17.73	**9.02**
	10			1.00	1.33		**10.61**
	25			1.10	1.53		**13.43**
	50			1.20	1.69		**16.18**
	100			1.25	1.93		**19.25**
C	5	Industrial	0.60	1.00	1.73	2.87	**2.98**
	10			1.00	2.09		**3.60**
	25			1.10	2.28		**4.32**
	50			1.20	2.64		**5.46**
	100			1.25	2.91		**6.26**
D	5	Industrial	0.60	1.00	1.60	3.32	**3.19**
	10			1.00	1.82		**3.63**
	25			1.10	2.11		**4.62**
	50			1.20	2.40		**5.74**
	100			1.25	2.62		**6.52**
E	5	Industrial	0.60	1.00	1.76	3.00	**3.17**
	10			1.00	2.01		**3.62**
	25			1.10	2.27		**4.49**
	50			1.20	2.52		**5.44**
	100			1.25	2.85		**6.41**

* Cf exceeds 1.00.

Refer to Exhibit "E" for the Existing Conditions Hydrology Study Map.

D. Developed Conditions Hydrology Calculations

1.1 Developed Conditions Rational Method Calculations

Proposed grading was not presented with the proposed site layout. However, it is assumed that the site would be graded to remove the existing berms and to allow for drainage to the existing northern drainage structure. It was also assumed that the asphalt onsite would be removed or ground and used for road base. Furthermore, it was assumed that final stabilization of the soil would mimic natural conditions resulting in a runoff coefficient for natural conditions.

Rational Method Calculations flow rates were obtained per Contra Cost County Flood Control District, Hydrology Standards as found on County web site on August 12, 2015, based on the following:

Rational Method Formula: $Q = Cf\,iA$

Q = Peak flow rate in cubic feet/second (cfs)
C = Runoff coefficient
f = Adjustment Factor for 25, 50 and 100-year storms
i = Rainfall intensity in inches/hour
A = Watershed area in acres (ac)

Adjustment Factors: $Q_{25} = 1.10$
$Q_{50} = 1.20$
$Q_{100} = 1.25$

Note: The product of Cf must be less than 1.0

Input values for the existing conditions rational method calculations prepared for this report are tabulated below:

Table 5 – Developed Conditions (Rational Method Calculations)

Area	Storm Event	Land Use	Runoff Coefficients	Adjustment Factor	Rainfall Intensity (in/hr)	Size (ac)	Q (CFS)
A	5	R-40	0.45	1.00	0.90	64.85	**26.26**
	10			1.00	1.07		**31.23**
	25			1.10	1.20		**38.52**
	50			1.20	1.35		**47.28**
	100			1.25	1.50		**54.72**
B	5	R-40	0.45	1.00	1.12	14.49	**7.30**
	10			1.00	1.36		**8.87**
	25			1.10	1.51		**10.83**
	50			1.20	1.70		**13.30**
	100			1.25	1.94		**15.81**
C	5	R-40	0.45	1.00	1.92	6.37	**5.50**
	10			1.00	2.22		**6.36**
	25			1.10	2.53		**7.98**
	50			1.20	2.83		**9.73**
	100			1.25	3.13		**11.22**
D	5	R-40	0.45	1.00	1.49	7.32	**4.91**
	10			1.00	1.74		**5.73**
	25			1.10	2.00		**7.25**
	50			1.20	2.20		**8.70**
	100			1.25	2.45		**10.09**

Refer to Exhibit "F" for the Final Conditions Hydrology Study Map.

E. MS4, NPDES and BMP Requirements

1.1 MS4/NPDES Requirements

Based on a review of Section C3 of the "*East Contra Costa County Municipal NPDES Permit Waste Discharge Requirements Order R5-2010-0102 NPDES Permit No. CAS083313, 23 September 201*." The project is not subject to the regulations of "New Development and Redevelopment" due to the fact that the project does not create 5,000 sf or more of impervious surface. Impervious surfaces will be limited to approximately 1,000 sf for equipment pads. The existing asphalt areas, of approximately 200,000 sf, will be removed and returned to pervious area.

1.2 Proposed Best Management Practices (BMPs)

The Best Management Practices (BMPs) on the following page are proposed for the project in accordance with California State Water Board requirements.

Table 6 – Overview of Project Best Management Practices (BMPs)

BMP NO.*	Objective	BMP Name	Summary
SD-10	Site Design	Site Design & Landscape Planning	Vast majority of site to remain pervious space. Proposed on-site roadways to be compacted native soil. Existing sheet flow through site to be maintained. No impervious swales/channels are proposed.
SD-32	Site Design	Trash Storage Areas & Litter Control	Trash storage area to be segregated from surrounding site drainage.
-	-	On-site Roadways/ Parking Areas	Roadways/parking areas to be kept clean & free of trash/debris. Repair roadways/parking areas as necessary.

* Per the California Stormwater Quality Association (CASQA) BMP Handbook for New Development & Redevelopment, current edition.

1.3 Additional Water Quality Measures

In addition to the BMPs specified above, the following additional site design measures are recommended for Water Quality purposes:

- The imperious footprint of the project site has been kept to a minimum, as the proposed PV fields are elevated on platforms above the underlying ground surface. Proposed redevelopment will remove the existing asphalt paving, increasing the overall perviousness of the site.
- The proposed access road shall be designed to the minimum width necessary per City of Pittsburg and Contra Costa County Fire requirements. Gravel on-site roadways are proposed in lieu of pavement.
- Concrete areas shall be kept to a minimum throughout.
- Hard-lined channels shall be avoided.
- The proposed site layout and grading/drainage plan shall limit the overall impact of the proposed project on the existing (undeveloped) area and downstream conveyances. Proposed grading follows the existing site drainage, construction of impervious surfaces shall be limited to small equipment structures totaling approximately 1,000 sf. The actual day-to-day site operations are to be minimal.

1.4 Post-Construction BMP Operations & Maintenance (O&M)

The BMPs identified in this section will require post-construction Operations and Maintenance (O&M) to ensure their continued effectiveness throughout the life of the project. It is anticipated that all BMP O&M will commence immediately following construction of the project and be maintained throughout the life of the project.

F. Summary & Conclusion

1.1 Summary & Conclusion

A summary of the combined total flow rates for the existing and developed areas area as follows:

Table 7 – Existing vs. Developed Conditions Total Combined Flow Rates (Rational Method Calculations)

STORM EVENT	Existing Q Areas A, B, C, D & E (CFS)	Developed Q Areas A, B, C & D (CFS)	INCREASED DISCHARGE VOLUME (CFS)
2	45.72	43.98	**-1.74**
10	53.58	52.19	**-1.39**
25	66.46	64.58	**-1.89**
50	82.44	79.01	**-3.43**
100	95.72	91.83	**-3.88**

Per the findings of this Study, the proposed Marsh Landing Solar Site will not have a negative material impact on the quantity or direction of flows in accordance with Contra Costa County Flood Control District, Hydrology Standards requirements. Overall site runoff is expected to decrease as a result of the proposed development as compared to its existing condition. Final site design shall be in compliance with County Title 9 (Title 9: 911-2.010), the design storm based on the watershed area draining to the creek of drainage facility as follows:

- Area < 1.0 sq. mi. Contain, with sufficient freeboard, a ten year frequency of average recurrence interval (10-year)
- 1.0 sq. mi. ≤ Area ≤ 4 sq. mi. Contain, with sufficient freeboard, a 25-year frequency of average recurrence interval (25-year)
- 4.0 sq. mi.≥ Area Contain, with sufficient freeboard, a 50-year frequency of average recurrence interval (50-year) OR Contain the 100-year frequency of average recurrence interval (100-year)

Per FEMA Map No. 06013C0144G (Effective Date - September 30, 2015), the majority of the project site is located in a FEMA Flood unshaded Zone X, "areas of minimal flood hazard". However, a small portion of the project site is located in a FEMA Flood shaded Zone X, "0.2% annual chance flood, areas with 1% annual chance flood with average depths less than one foot or with drainage areas of less than one square mile." Any structures built in the shaded "Zone X" shall be on piles and provide the required freeboard per FEMA requirements. Any obstruction or horizontal cross members shall be elevated at least 1' above the 14.00 elevation (NAVD 88) per FEMA requirements as to not impact the flood plain.

Proposed grading was not presented with the proposed site layout. However, it is assumed that grading of the site to remove the berms will most likely result in the placement of the solar arrays and equipment on high ground. It was also assumes that the existing pavement on-site would be removed or crushed and used as road base and the areas under the solar array would be scarified and revegetated in order to comply with

NPDES requirements. Both of which would result in the elimination of impervious surface, increasing infiltration and lessening drainage impact from the existing condition. It was also assumed that the existing drainage areas would remain relatively the same. Based on these assumptions the solar arrays and equipment would have no off-site tributary therefore, the potential for scour is negligible.

It is recommended that the site be designed to allow for drainage along the southern and western edges of the site as to not create a ponding or drainage issue. Impervious areas shall be limited to approximately 1,000 sf as to not adversely affect site runoff. If a significant amount of impervious area is required (5,000 sf or more) mitigation may be required. All areas of disturbance shall be restabilized at the end of construction to maximize infiltration. It should be noted that any direct discharge to wetlands may require additional mitigation beyond the scope of this report. It is further recommended that a "Final" hydrology study be conducted based on the final proposed grading to confirm site drainage and any off-site impact to the site or the surroundings.

With the above mitigation measure the development of the site will not have a negative impact on downstream properties or facilities.

(END)

EXHIBIT "A"

Project Watershed – Aerial Orthophoto

AERIAL ORTHOPHOTO EXHIBIT

MARSH LANDING SOLAR

IN THE CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA

PREPARED BY:

BONADIMAN
JOSEPH E. BONADIMAN & ASSOCIATES, INC.
ENGINEERS - G.I.S. - SURVEYING - PLANNING
TEL. (909) 885-3806
234 NORTH ARROWHEAD AVE.
SAN BERNARDINO, CA 92408
FAX (909) 381-1721
www.bonadiman.com

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PREPARED FOR:

BY	MARK	REVISION DESCRIPTION	DATE

PREPARED FOR:	NRG RENEW
JOB NO:	154219
PREPARED BY:	JTS
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AERIAL ORTHOPHOTO EXHIBIT
MARSH LANDING SOLAR
IN THE CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA

A

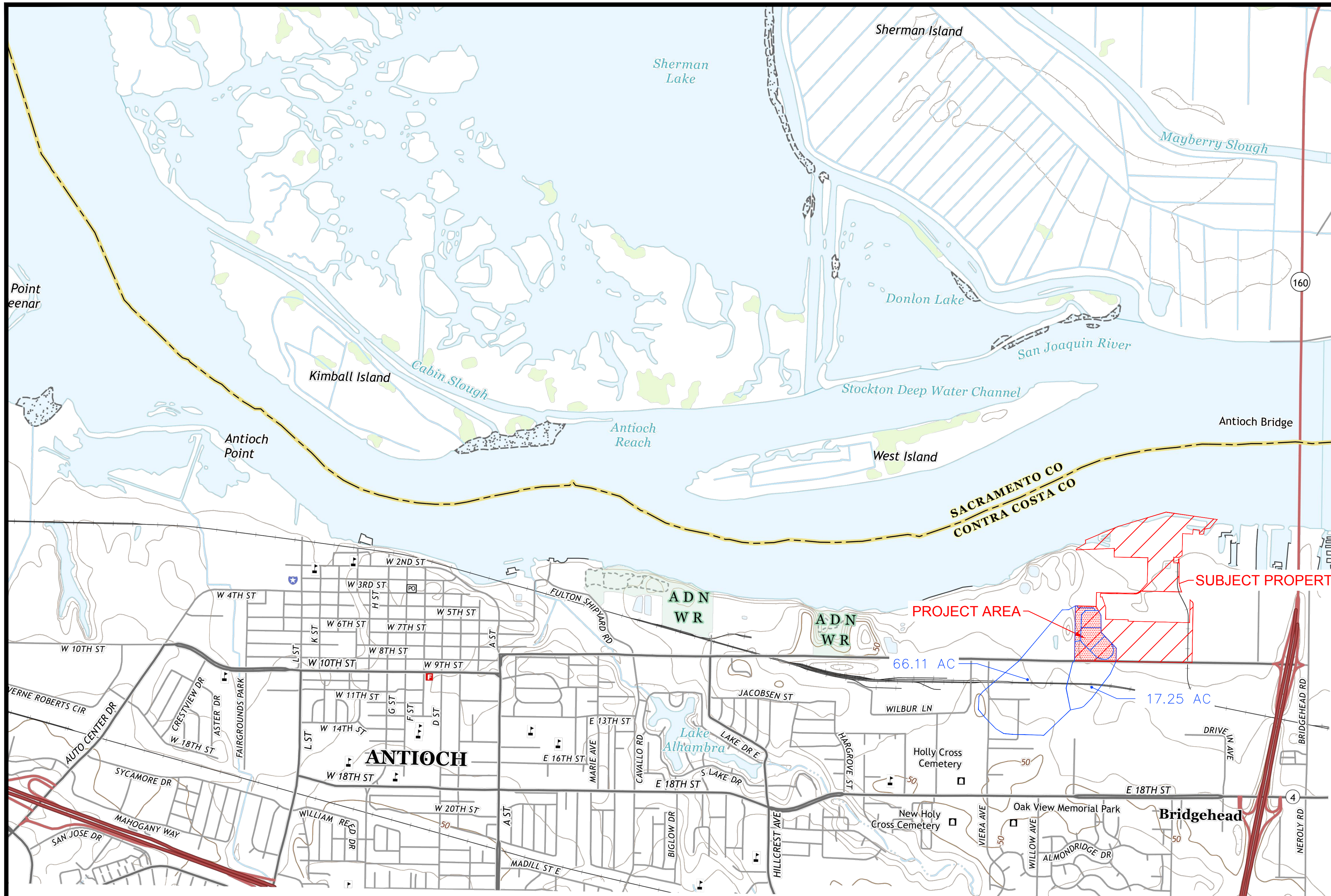
DISREGARD PRINTS BEARING EARLIER REVISION DATES

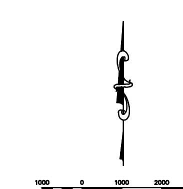
08–12–15

SHEET 1 OF 1

EXHIBIT “B”

Project Watershed – USGS Quadrangle





PROJECT WATESHED QUADRANGLES:

"HONKER BAY" & "CLAYTON"

USGS QUADRANGLE EXHIBIT

MARSH LANDING SOLAR

IN THE CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA

PREPARED BY:

BONADIMAN — JOSEPH E. BONADIMAN & ASSOCIATES, INC. ENGINEERS • G.I.S. • SURVEYING • PLANNING

CIVIL DESIGN

PREPARED FOR:

nrg. Renew

BY	MARK	REVISION DESCRIPTION	DATE

PREPARED FOR:	NRG RENEW
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USGS QUADRANGLE EXHIBIT
MARSH LANDING SOLAR
IN THE CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA

B

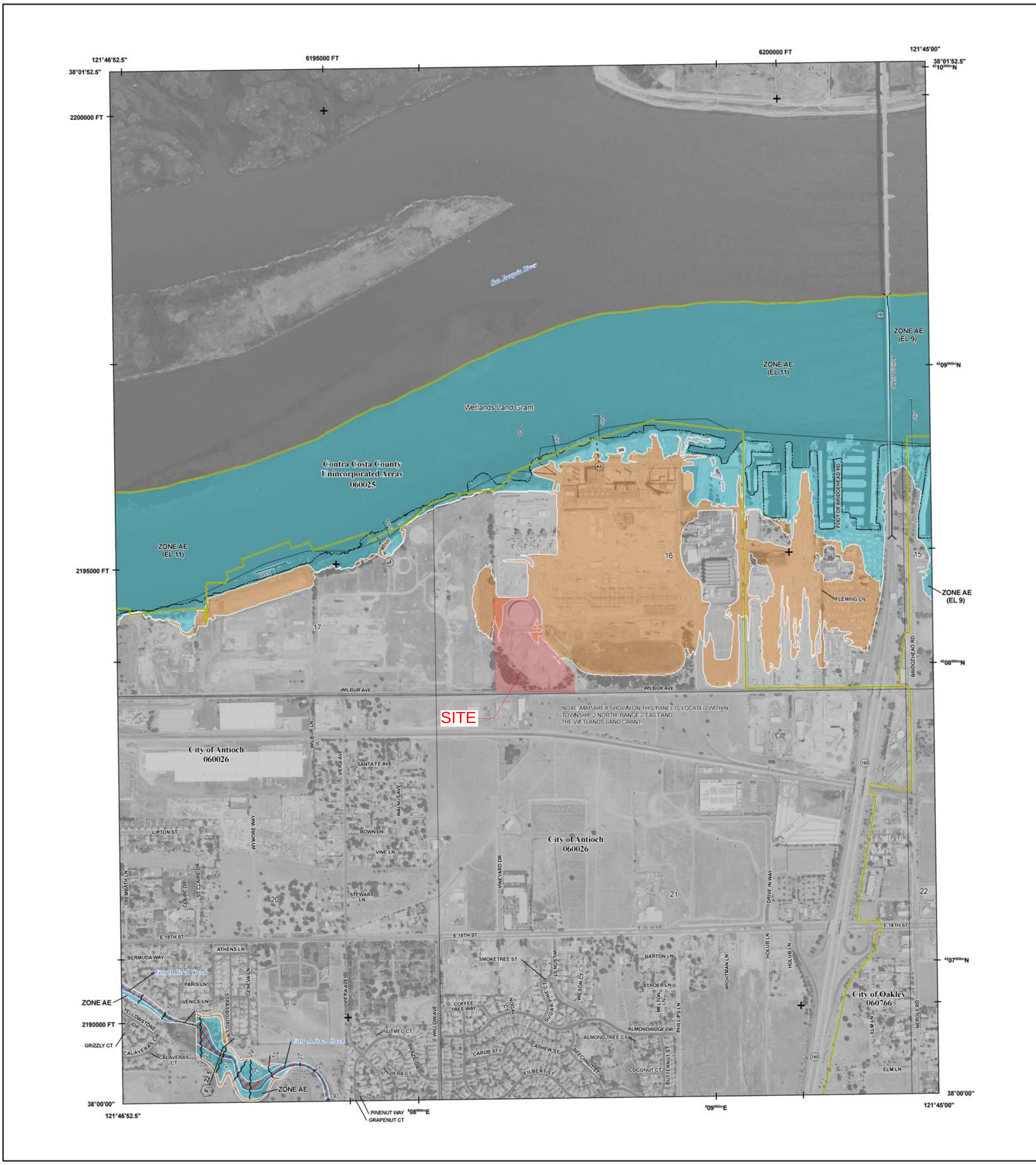
DISREGARD PRINTS BEARING EARLIER REVISION DATES

08–14–15

SHEET 1 OF 1

EXHIBIT “C”

FEMA Floodplain Map
&
Flood Elevation Exhibit



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTP://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A, V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes *Zone X*
OTHER AREAS	NO SCREEN Areas of Minimal Flood Hazard *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike or Floodwall
	Non-accredited Levee, Dike or Floodwall
	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
OTHER FEATURES	513 Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was derived from Coastal California LiDAR and Digital Imagery dated 2011. USDA NAIP 2012 imagery is used in areas not covered by the Coastal California imagery.

SCALE

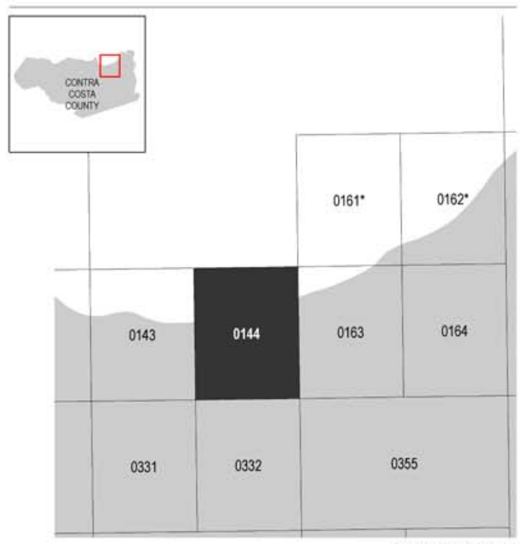
Map Projection:
Universal Transverse Mercator Zone 10N; North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 250 500 750 1,000 2,000 Feet

0 125 250 500 Meters

PANEL LOCATOR



*PANEL NOT PRINTED

FEMA National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

CONTRA COSTA COUNTY, CALIFORNIA
and Incorporated Areas

PANEL 144 OF 602

Panel Contains:

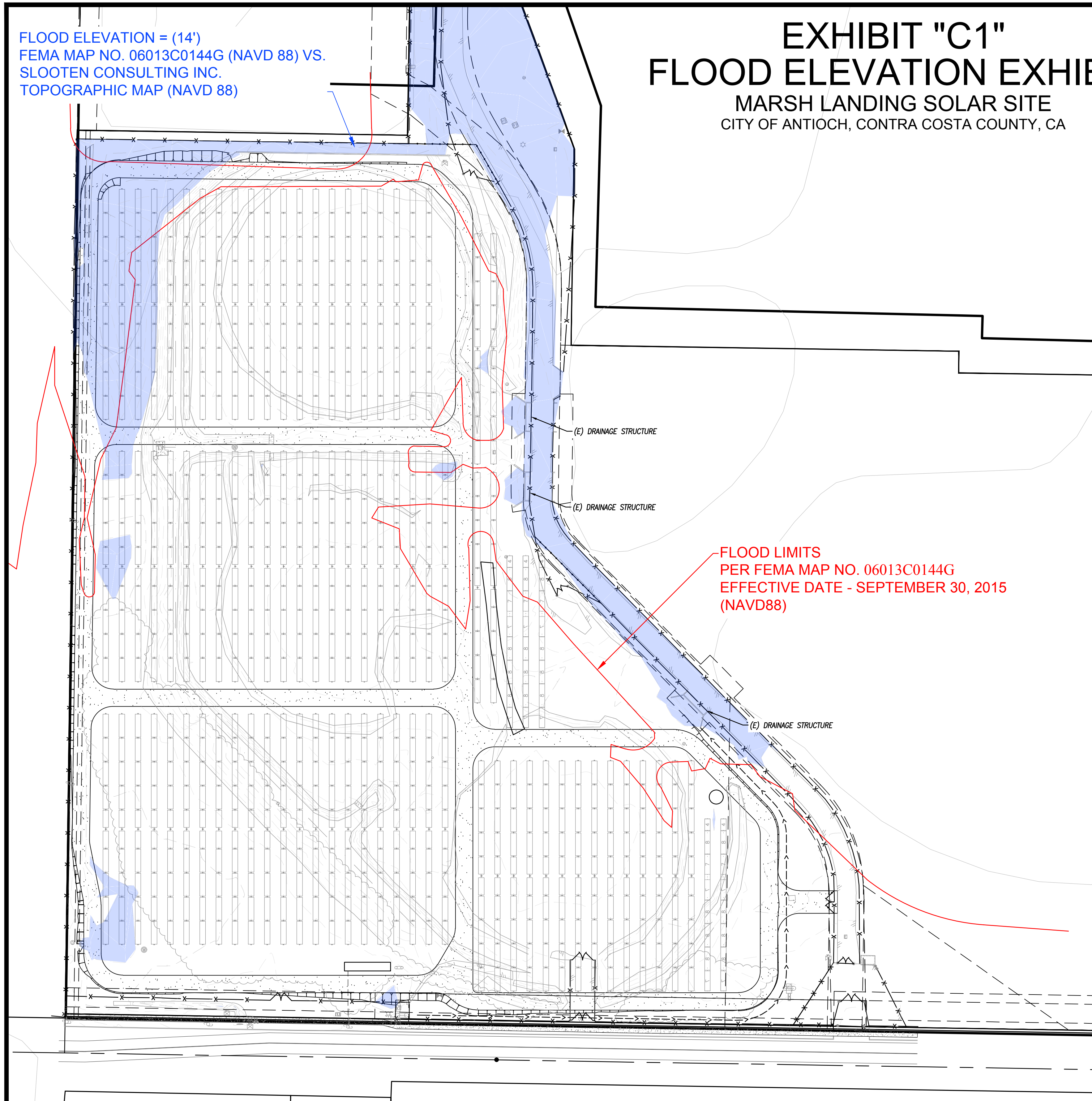
COMMUNITY	NUMBER	PANEL	SUFFIX
ANTIOCH, CITY OF	060026	0144	G
CONTRA COSTA COUNTY	060025	0144	G
OAKLEY, CITY OF	060766	0144	G

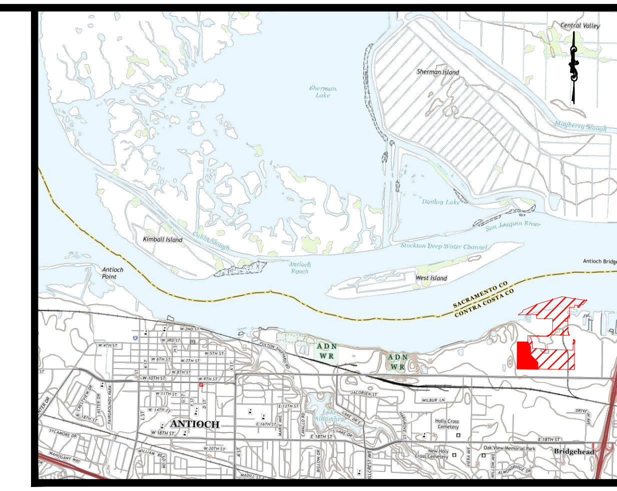
VERSION NUMBER
2.3.2.0

MAP NUMBER
06013C0144G

MAP REVISED
SEPTEMBER 30, 2015

EXHIBIT "C1"
FLOOD ELEVATION EXHIBIT
MARSH LANDING SOLAR SITE
CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA





VICINITY MAP

SOURCE OF TOPOGRAPHY:

TOPOGRAPHY INFORMATION SHOWN ON THIS PLAN IS BASED ON ALTA SURVEY DATA BY SLOOTEN CONSULTING INC. DATED SEPTEMBER 23, 2015 AND PROVIDED BY NRG RENEW. WITH A VERTICAL DATUM BASED ON HPGN D CA 04 HK, PID NUMBER AA3821, SURVEY MONUMENT WITH A NAVD 88 ORTHO HEIGHT OF 16.0'.

FLOOD ZONE NOTE:

BY GRAPHIC PLOTTING ONLY, THIS PROPERTY IS LOCATED IN ZONE "UNSHADED X & SHADED X" OF THE FLOOD INSURANCE RATE MAP, COMMUNITY PANEL NO. 06095C0144G (NAVD 88), WHICH BEARS AN EFFECTIVE DATE OF 9/30/2015. PORTIONS OF THE SITE ARE IN A SPECIAL FLOOD HAZARD AREA. NO FIELD SURVEYING WAS PERFORMED TO DETERMINE THIS ZONE AND AN ELEVATION CERTIFICATE MAY BE NEEDED TO VERIFY THIS DETERMINATION OR APPLY FOR A VARIANCE FROM THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

ZONE "UNSHADED X" DENOTES "AREAS OF MINIMAL FLOOD HAZARD".

ZONE "SHADED X" DENOTED "AREAS OF 0.2-PERCENT-ANNUAL-CHANCE (OR 500-YEAR) FLOOD, AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTH LESS THAN ONE FOOT OR WITH DRAINAGE AREAS OF LASS THAN ONE SQUARE MILE".

VERTICAL DATUM:

TOPOGRAPHIC DATA SHOWN HEREON IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

FLOOD ELVATION EXHIBIT
MARSH LANDING SOLAR SITE
CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA

PREPARED BY:
BONADIMAN
JOSEPH E. BONADIMAN & ASSOCIATES, INC.
ENGINEERING • G.I.S. • SURVEYING • PLANNING

PREPARED FOR:
nrg. Renew

BY	MARK	REVISION DESCRIPTION	DATE

PREPARED FOR:	NRG RENEW, LLC
JOB NO:	154219
PREPARED BY:	JTS
CHECKED BY:	JTS

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FLOOD ELEVATION EXHIBIT
MARSH LANDING SOLAR SITE
IN THE CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA

DISREGARD PRINTS BEARING EARLIER REVISION DATES

02-15-17

C1

SHEET 1 OF 1

EXHIBIT "D"

Contra Costa County
Runoff Coefficients,
Mean Seasonal Isohyetal Maps
&
Precipitation Duration-Frequency-Depth Curves

CCCFCD STANDARD - RUNOFF COEFFICIENTS

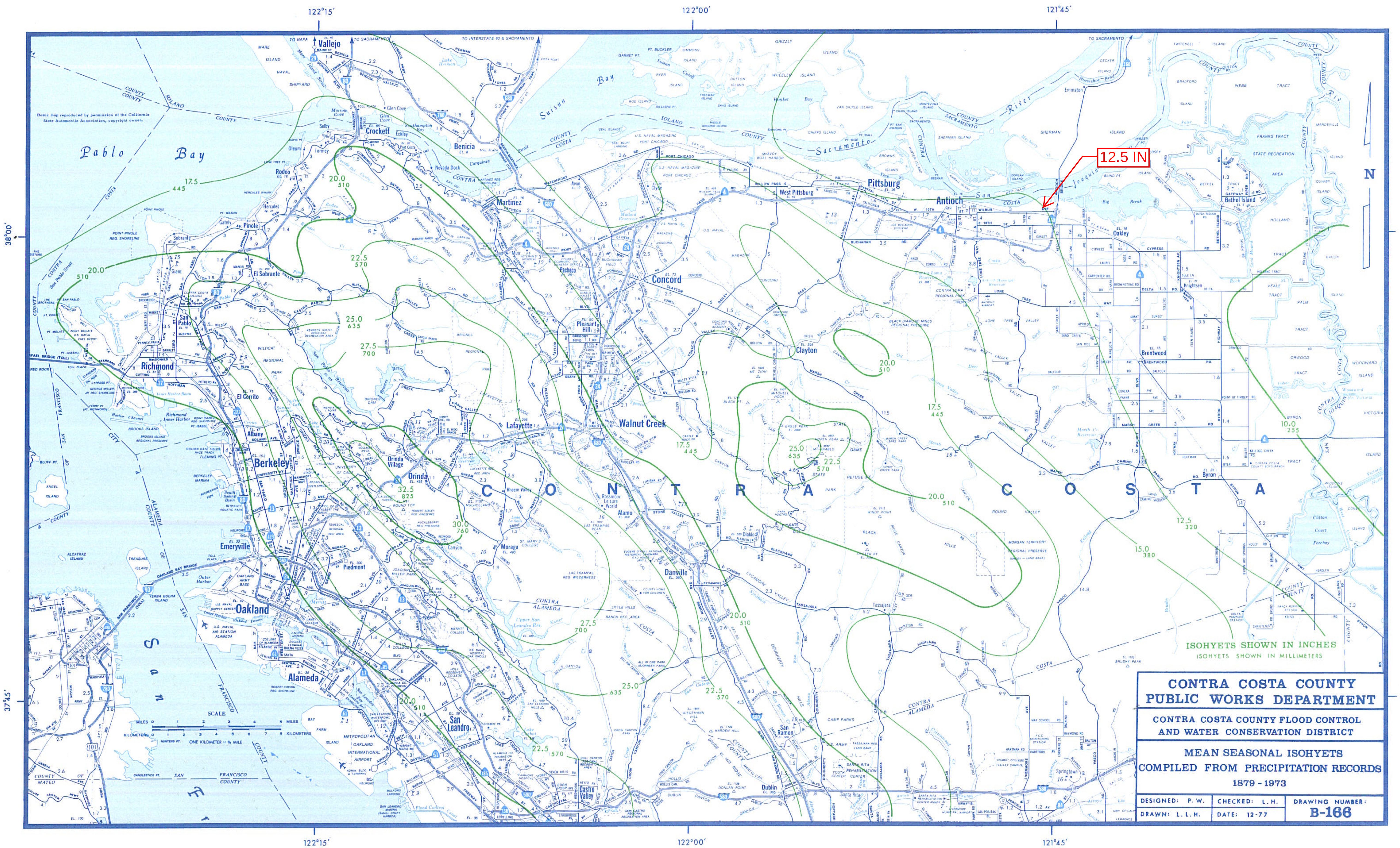
Rational Formula

Land Use	Runoff Coefficient		Average Impervious Area (%)	Time of Concentration- Roof to Gutter (min)
Residential:				
R - 6	.50 - .70		76	3 - 5
R - 10	.45 - .60		53	5 - 7
R - 20	.40 - .50		35	6 - 8
R - 40	.35 - .45		25	8 - 10
Apartment	.60 - .80			3 - 10
Commercial	.70 - .95			3 - 8
Industrial	.60 - .90	.60		3 - 10
Open	.20 - .40			
Street:				
Asphalt	.75 - .95			
Concrete	.80 - .95			
Drives and Walks	.80 - .95			
Roofs	.75 - .95			

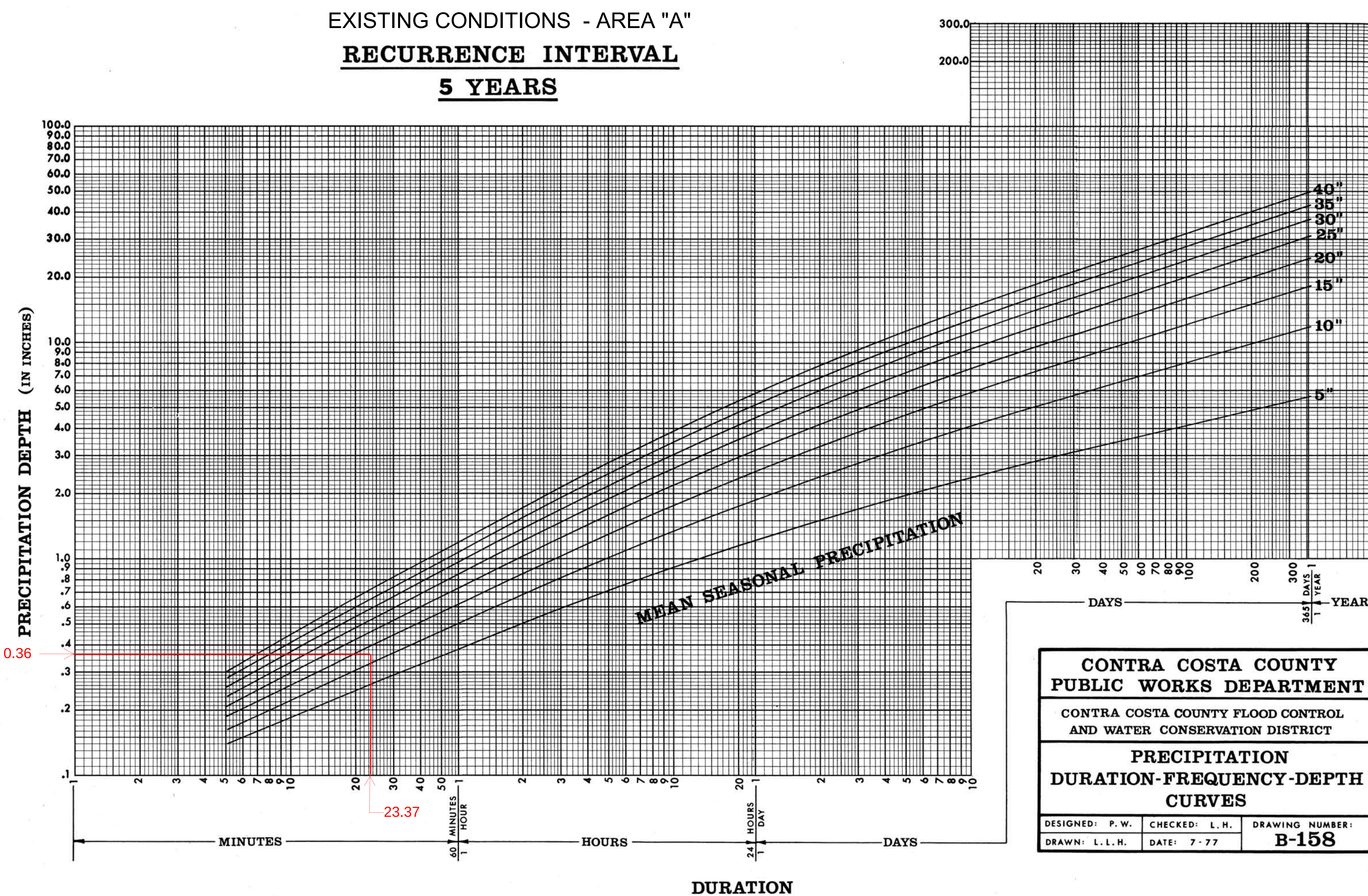
Legend

R - 6 = 6,000 ft^2 Lot
R - 10 = 10,000 ft^2 Lot
R - 20 = 20,000 ft^2 Lot
R - 40 = 40,000 ft^2 Lot

Note: For Contra Costa County Land Uses use the highest runoff coefficient in the range. This more closely approximates the peak flows calculated by the Unit Hydrograph method developed for Contra Costa County and calibrated with local rainfall and runoff data.



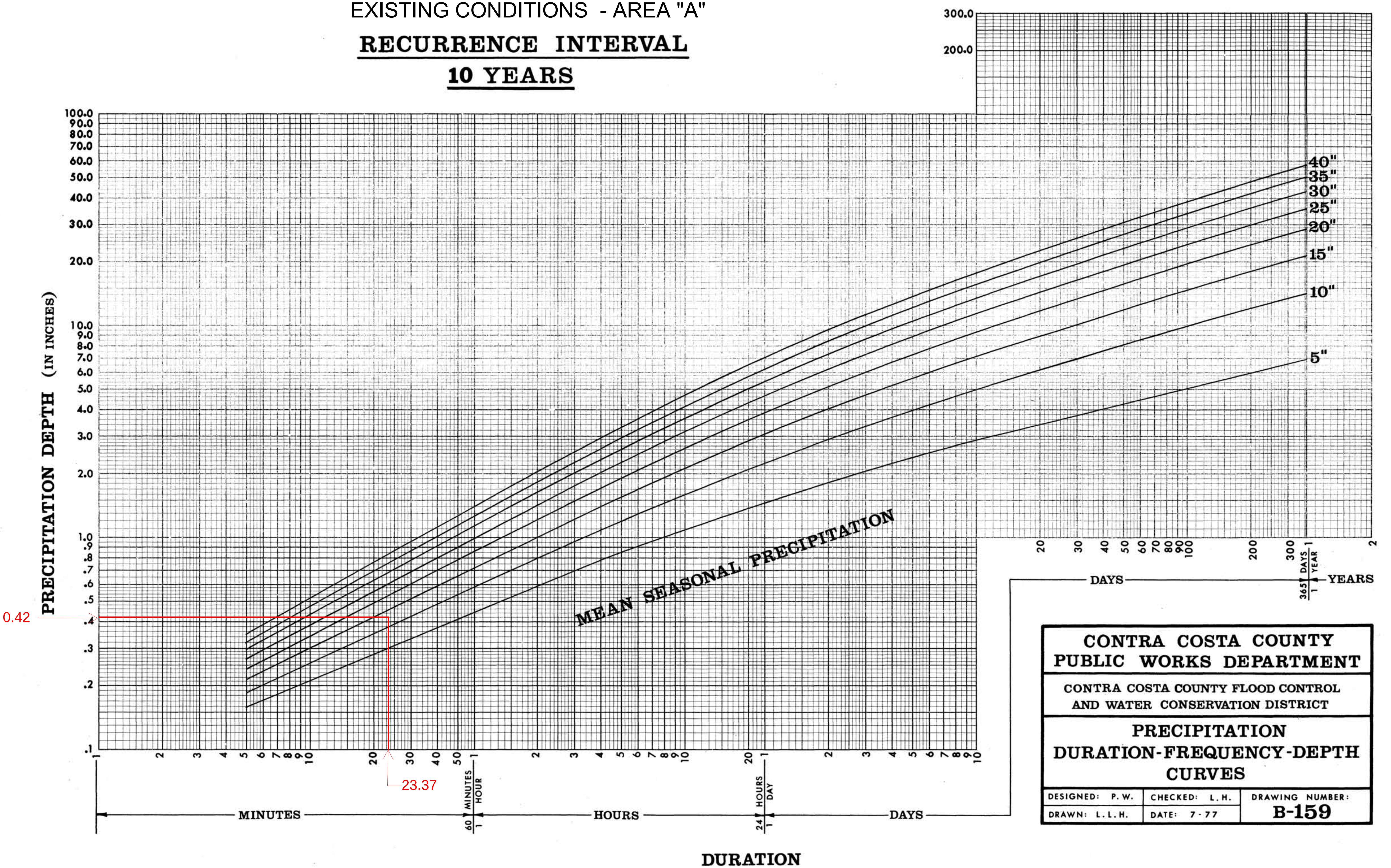
CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
MEAN SEASONAL ISOHYETS COMPILED FROM PRECIPITATION RECORDS
1879 - 1973
DESIGNED: P. W.
CHECKED: L. H.
DRAWN: L. L. H.
DATE: 12-77
DRAWING NUMBER: B-166
ISOHYETS SHOWN IN INCHES
ISOHYETS SHOWN IN MILLIMETERS
12.5 IN
Basic map reproduced by permission of the California State Automobile Association, copyright owner.


EXISTING CONDITIONS - AREA "A"
RECURRENCE INTERVAL
5 YEARS
PRECIPITATION DEPTH (IN INCHES)
DURATION
MINUTES
HOURS
DAYS
YEARS
MEAN SEASONAL PRECIPITATION
40"
35"
30"
25"
20"
15"
10"
5"
0.36
23.37
60 MINUTES
1 HOUR
24 HOURS
1 DAY
365 DAYS
1 YEAR
CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT
CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
PRECIPITATION
DURATION-FREQUENCY-DEPTH
CURVES
DESIGNED: P. W.
CHECKED: L. H.
DRAWING NUMBER:
DRAWN: L. L. H.
DATE: 7-77
B-158

EXISTING CONDITIONS - AREA "A"

RECURRENCE INTERVAL

10 YEARS



CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

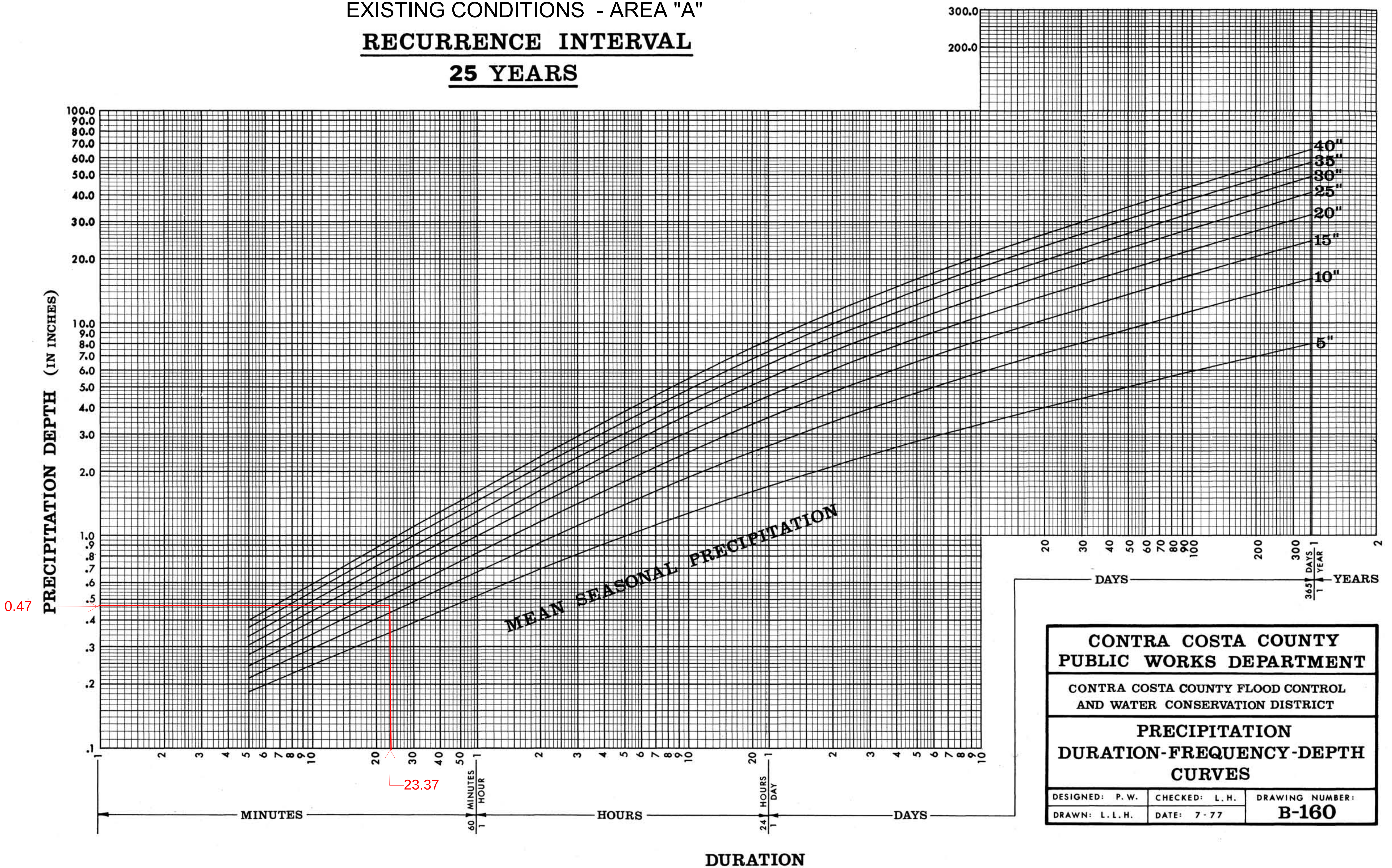
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7 - 77	B-159

EXISTING CONDITIONS - AREA "A"

RECURRENCE INTERVAL
25 YEARS



CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

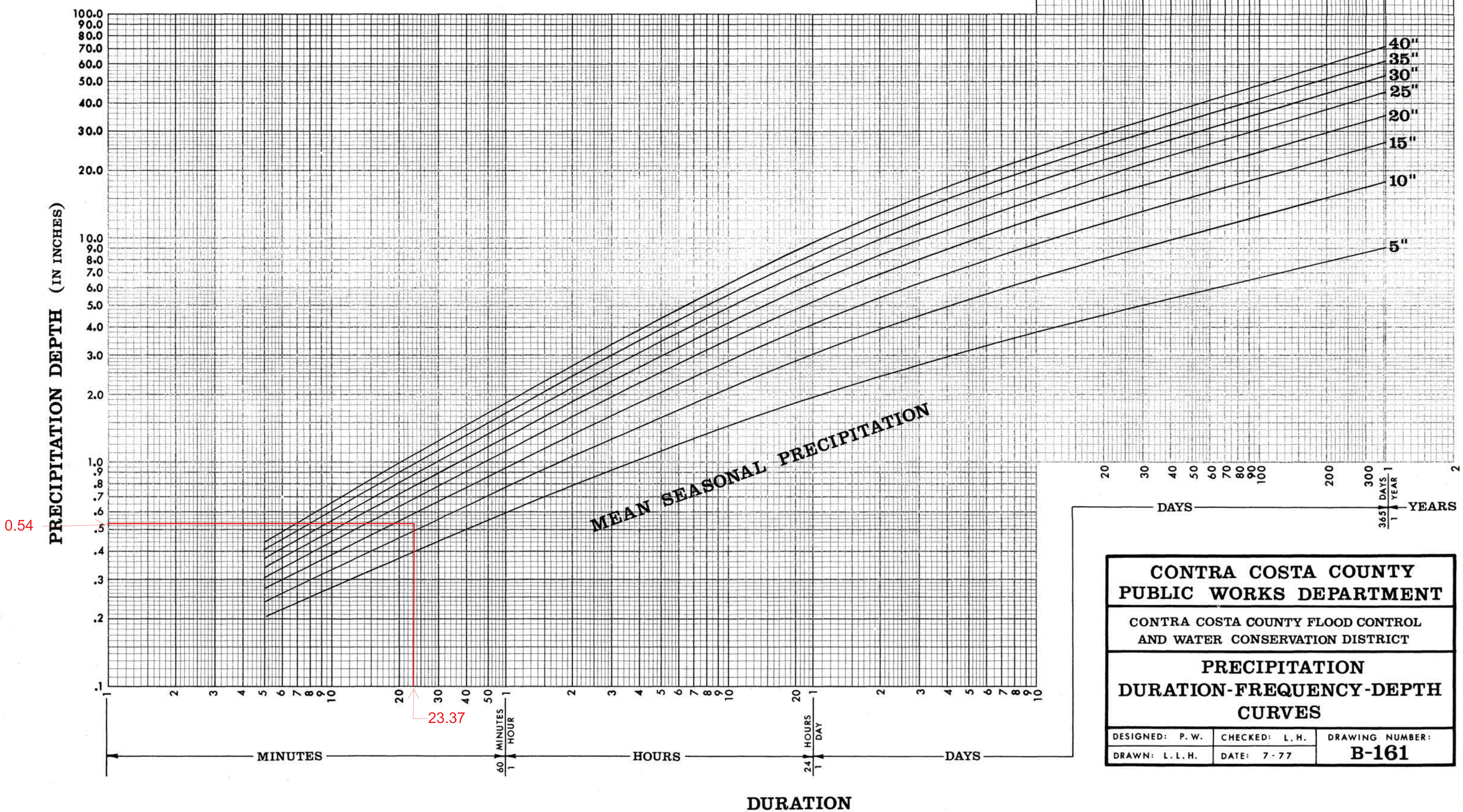
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-160

EXISTING CONDITIONS - AREA "A"

RECURRENCE INTERVAL

50 YEARS



CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

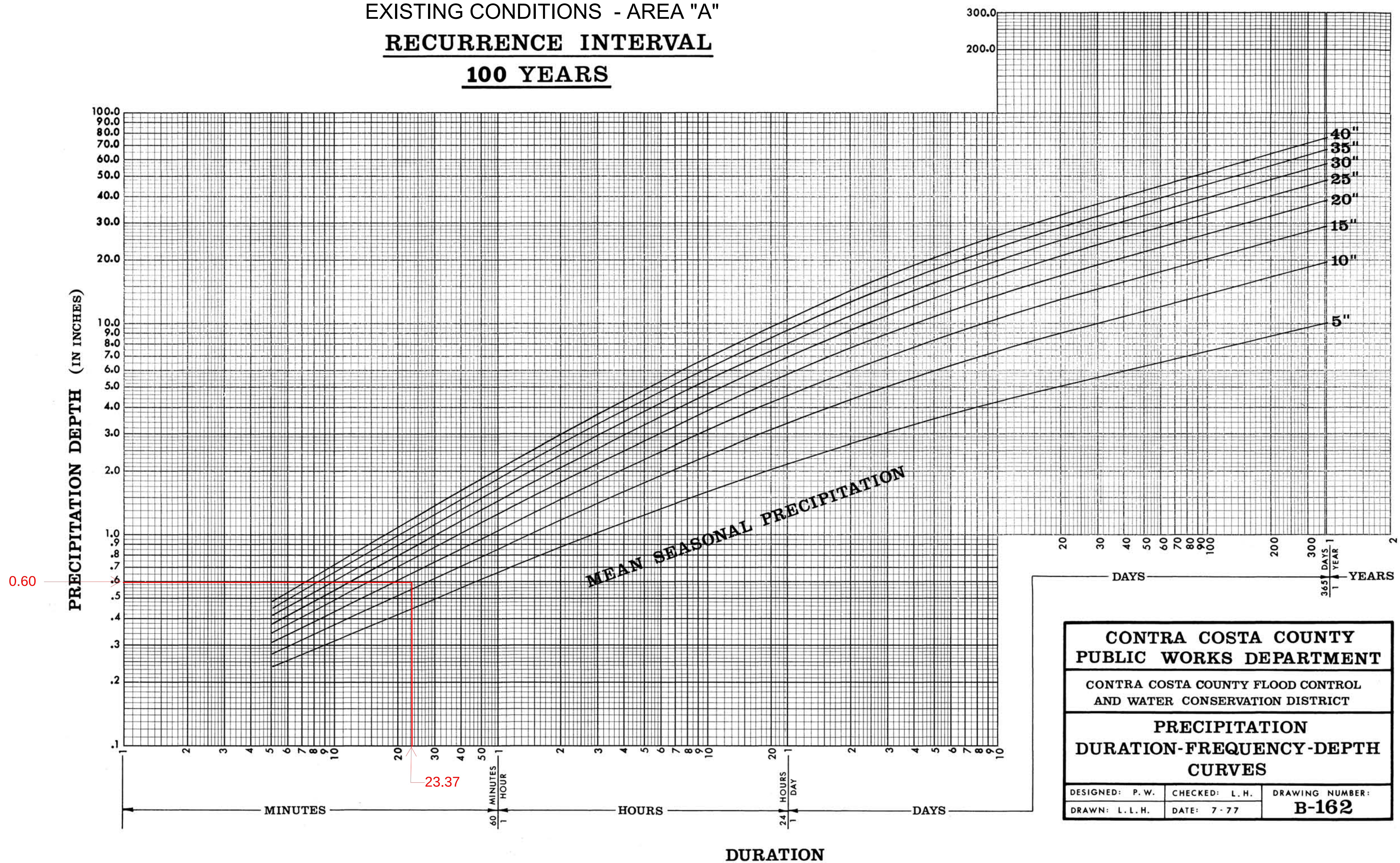
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-161

EXISTING CONDITIONS - AREA "A"

RECURRENCE INTERVAL

100 YEARS



CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

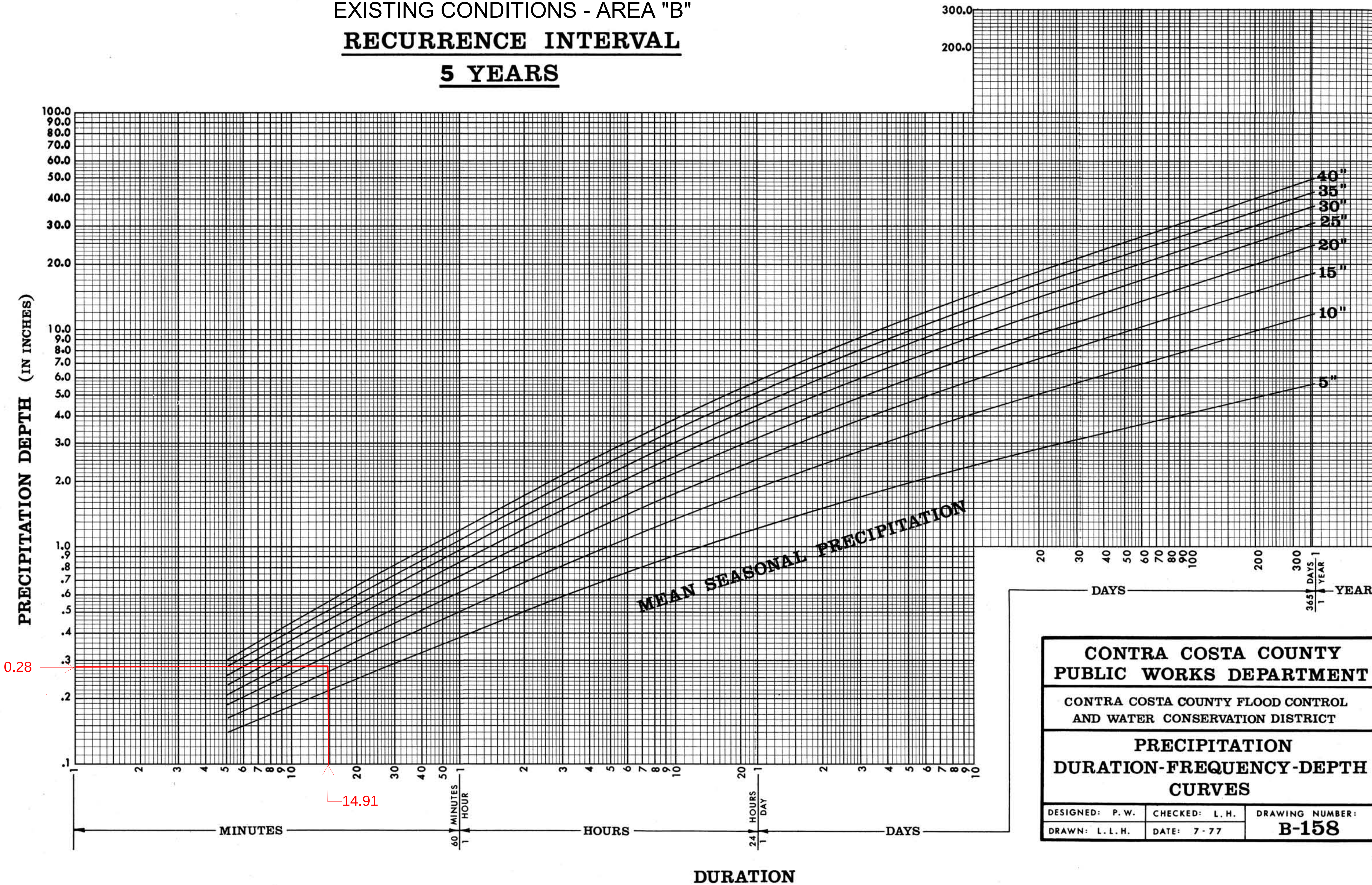
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-162

EXISTING CONDITIONS - AREA "B"

RECURRENCE INTERVAL

5 YEARS



CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

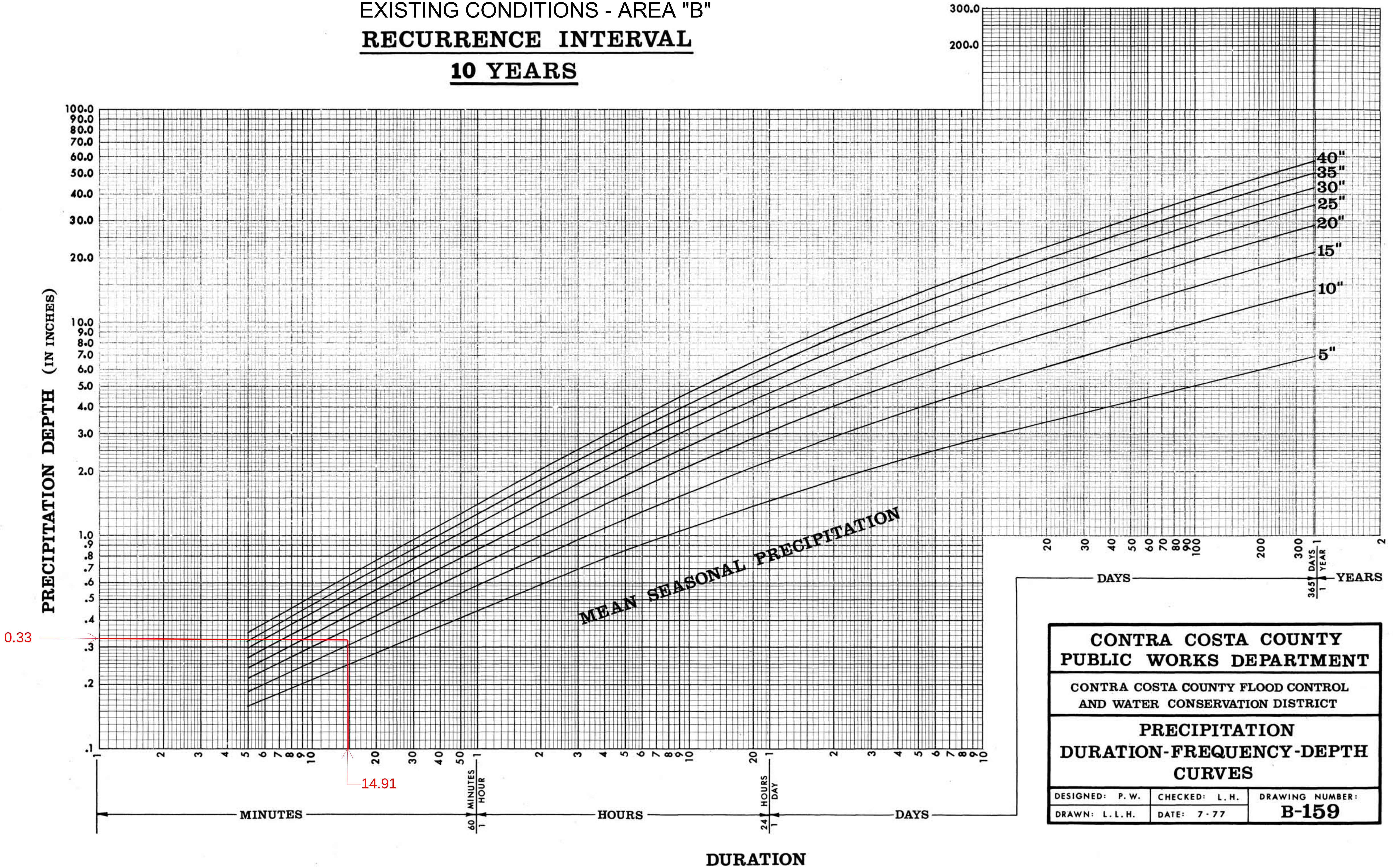
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-158

EXISTING CONDITIONS - AREA "B"

RECURRENCE INTERVAL

10 YEARS



CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

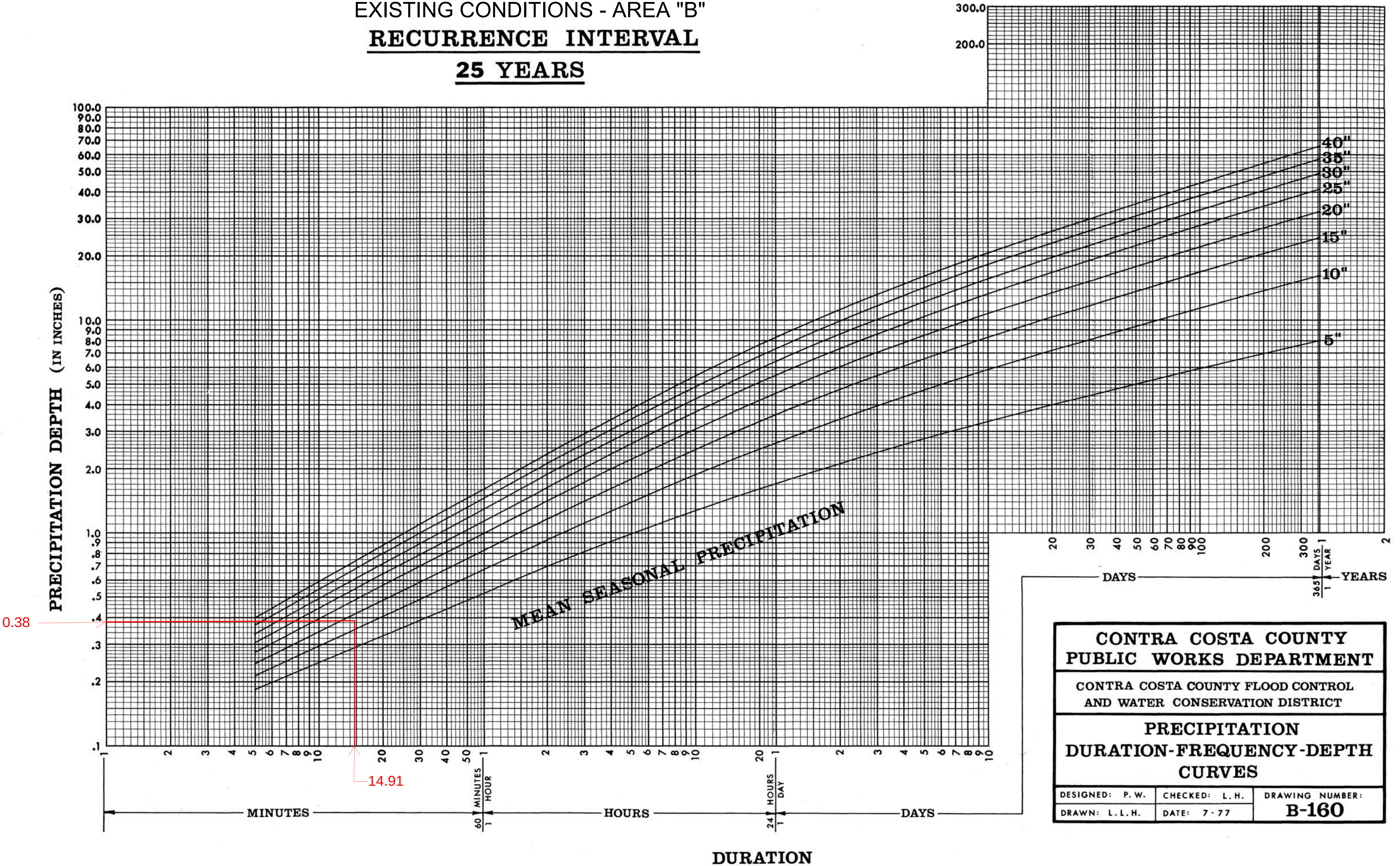
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-159

EXISTING CONDITIONS - AREA "B"

RECURRENCE INTERVAL

25 YEARS

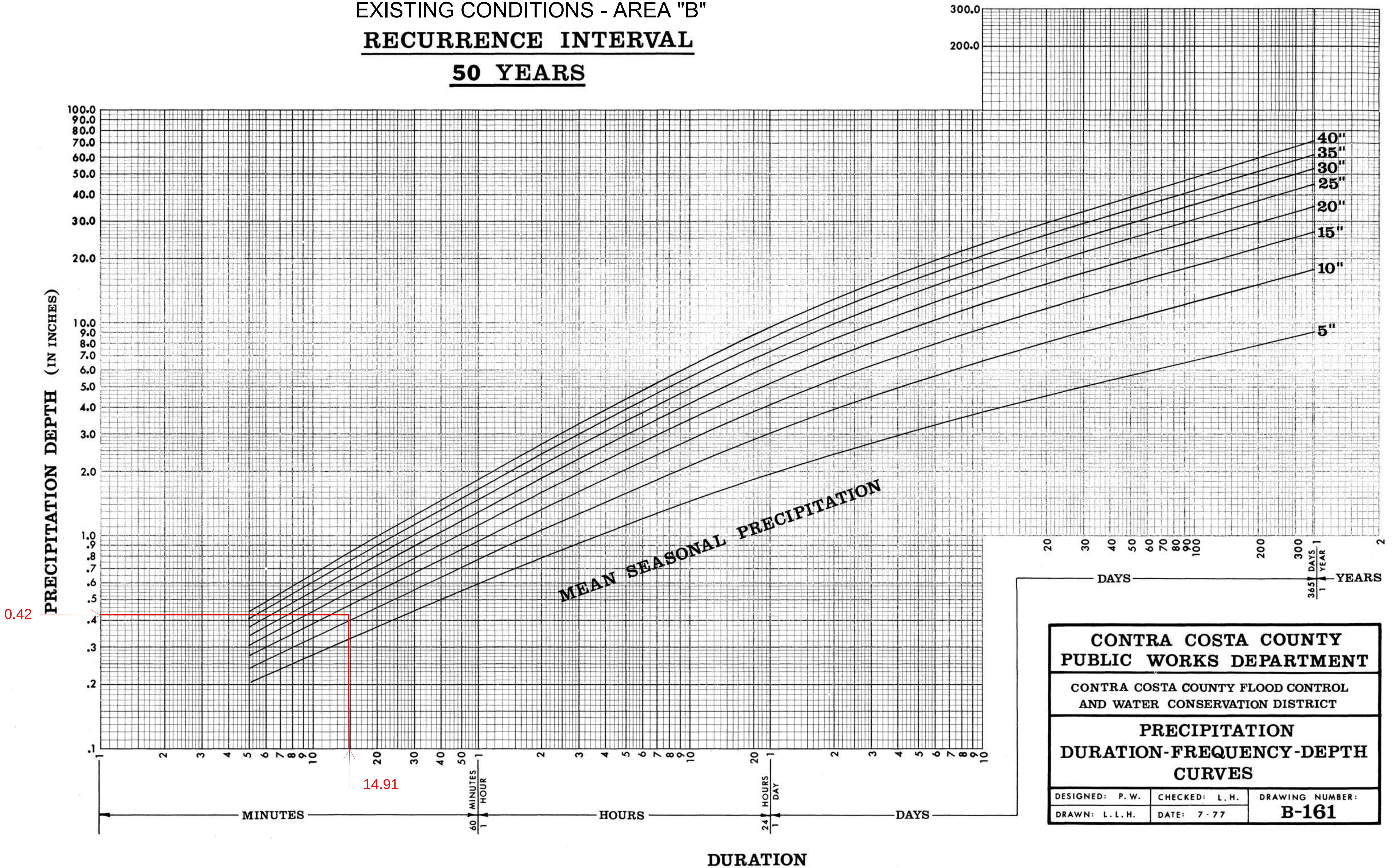


CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT		
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES		
DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER: B-160
DRAWN: L. L. H.	DATE: 7-77	

EXISTING CONDITIONS - AREA "B"

RECURRENCE INTERVAL

50 YEARS



CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

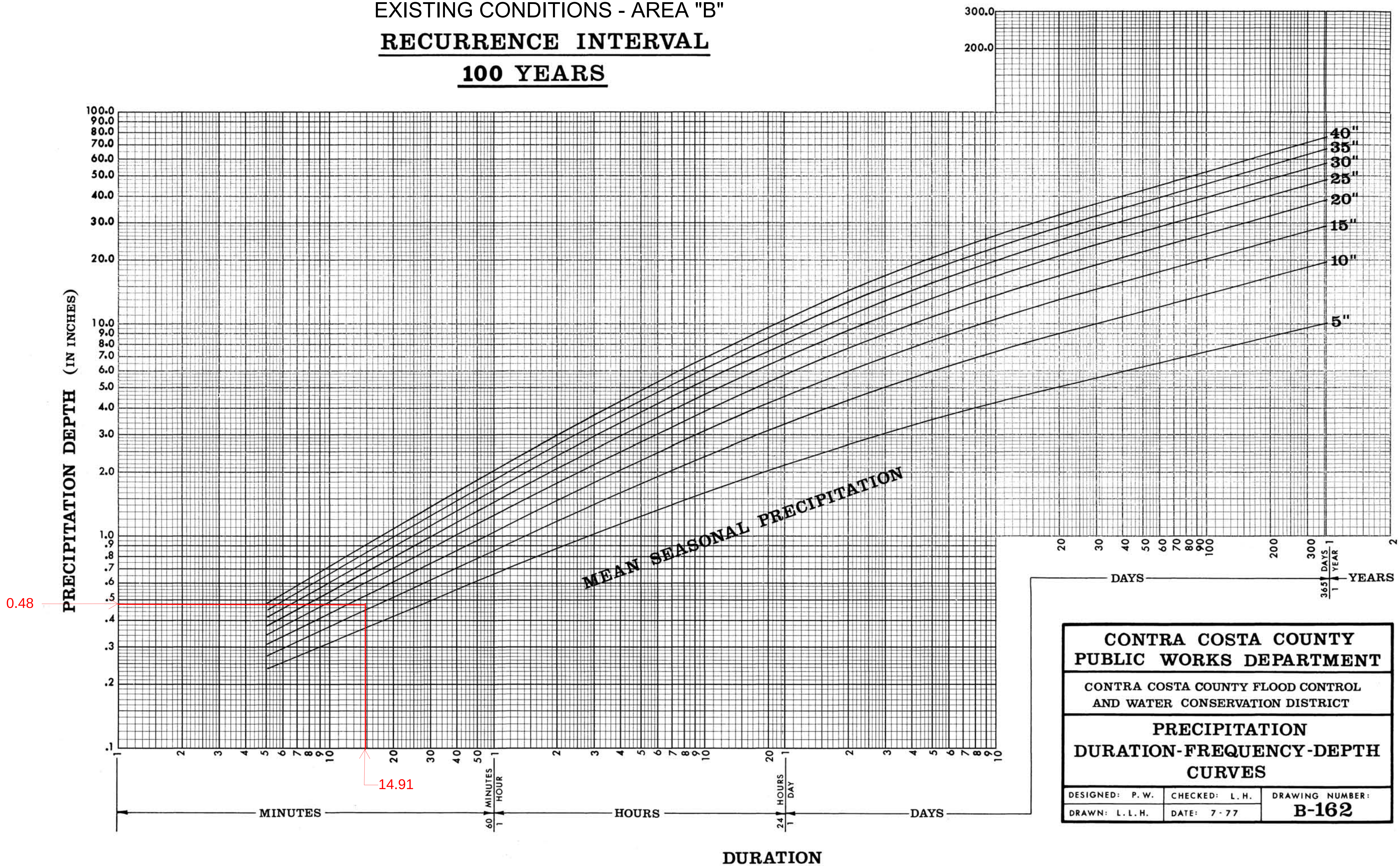
CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-161

EXISTING CONDITIONS - AREA "B"

RECURRENCE INTERVAL 100 YEARS



CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

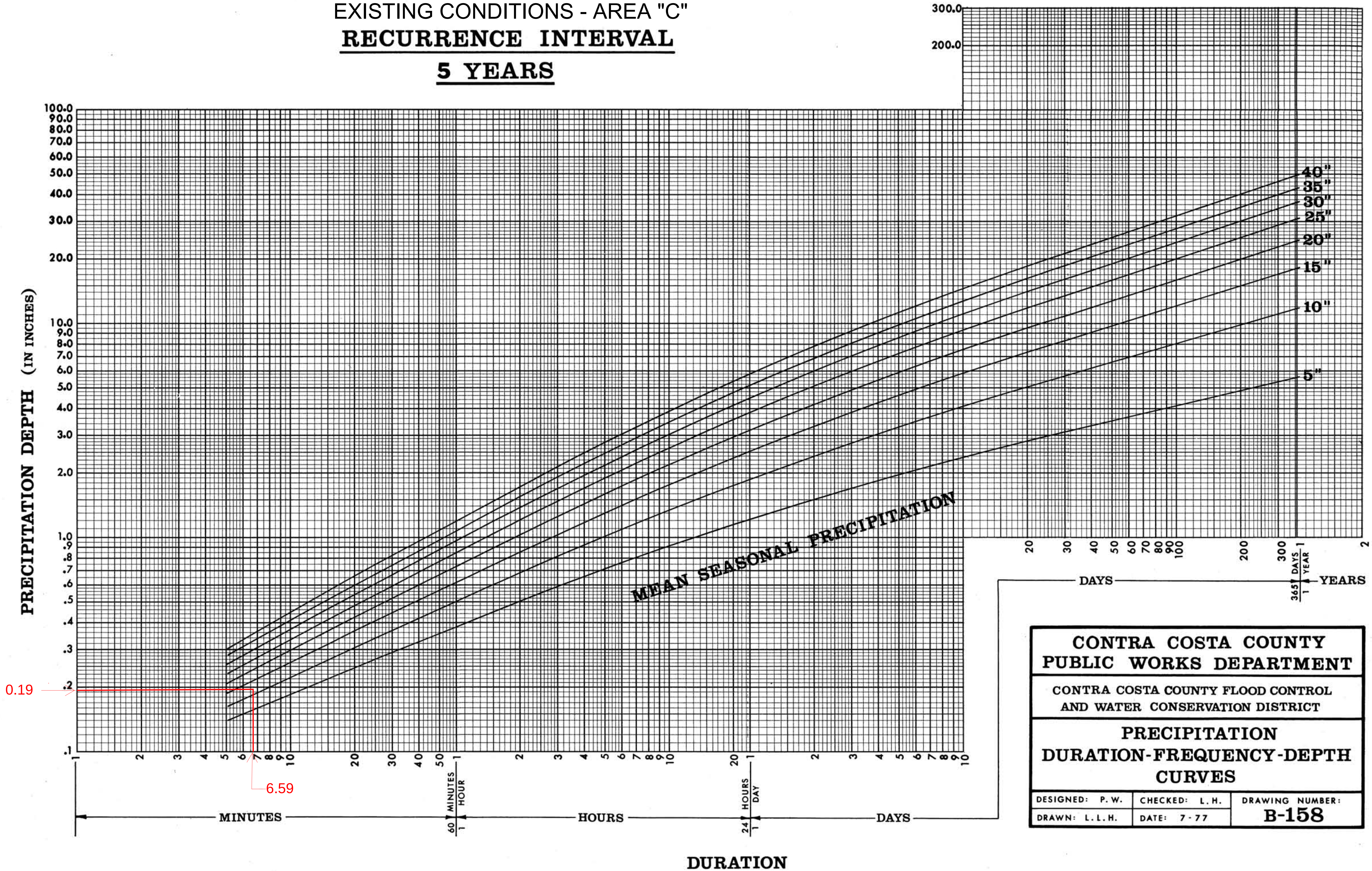
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-162

EXISTING CONDITIONS - AREA "C"

RECURRENCE INTERVAL

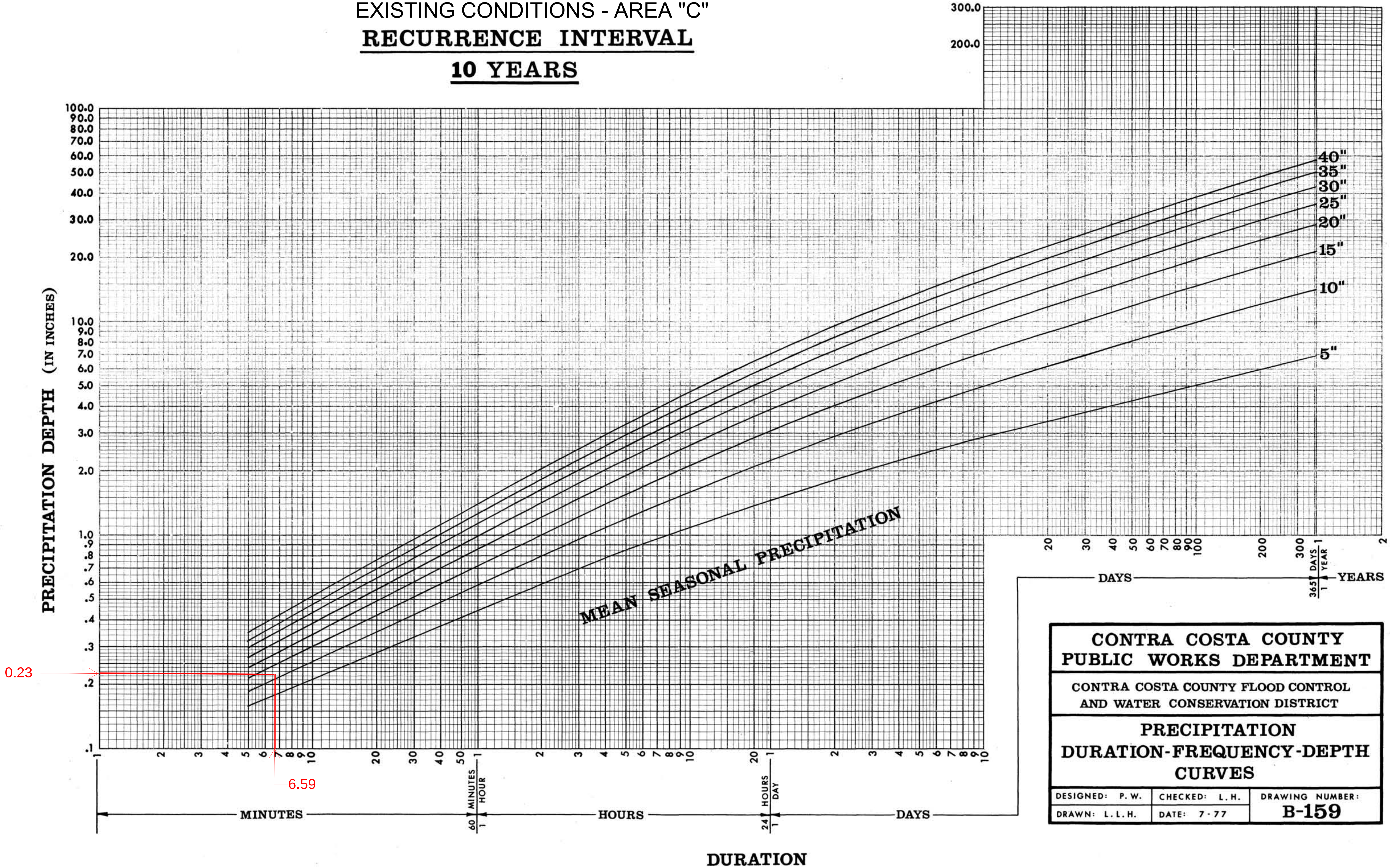
5 YEARS



EXISTING CONDITIONS - AREA "C"

RECURRENCE INTERVAL

10 YEARS

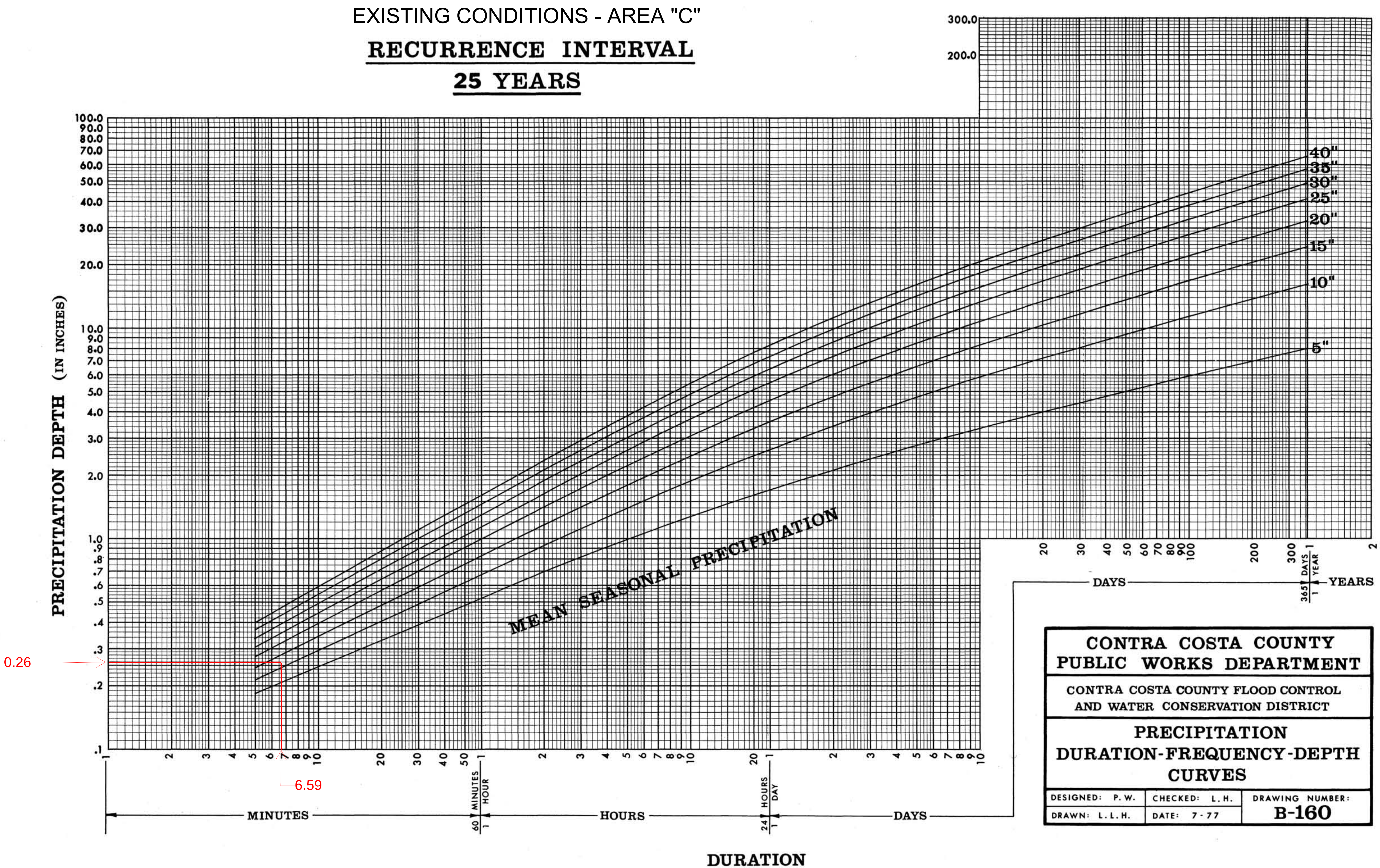


CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

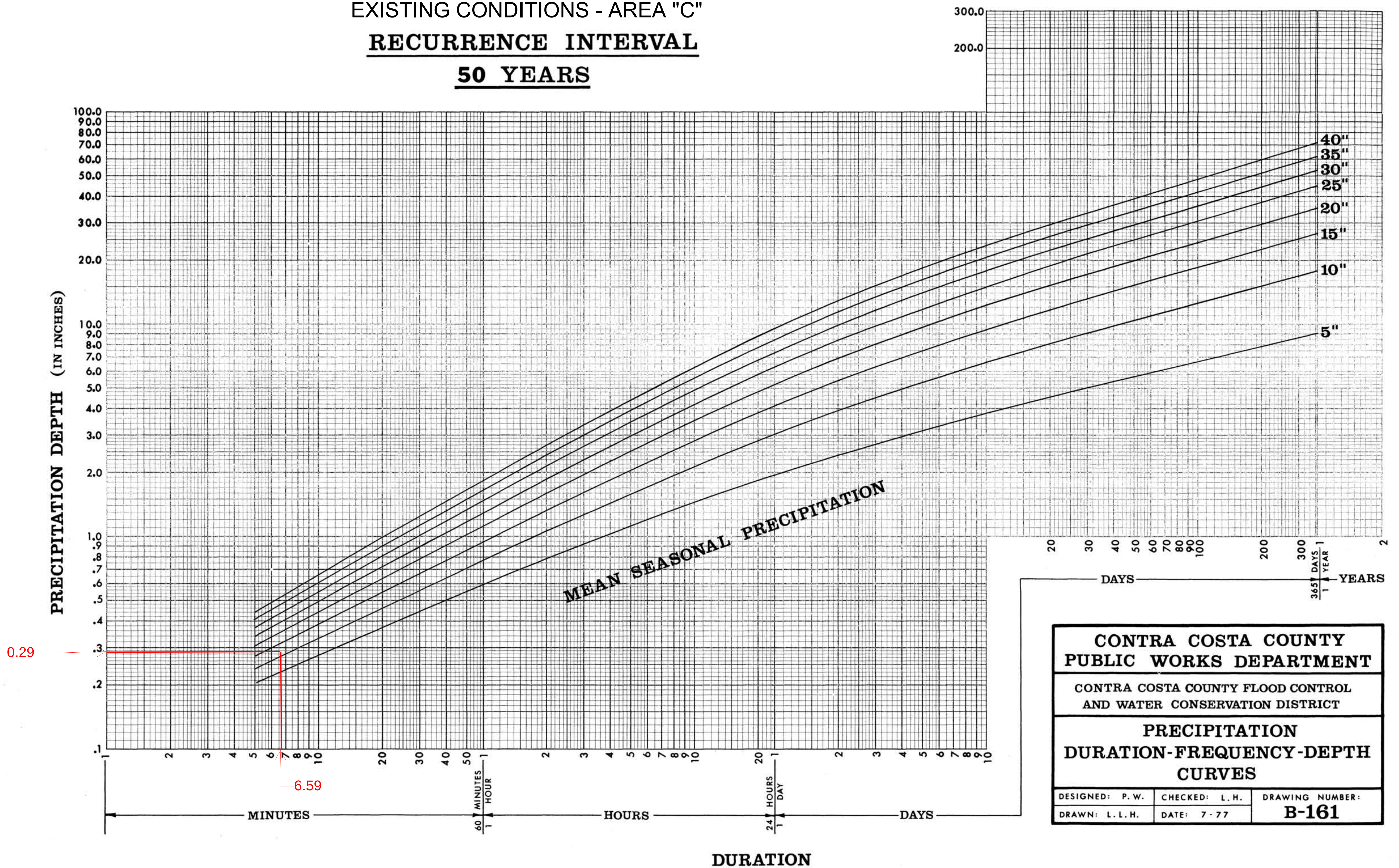
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-159

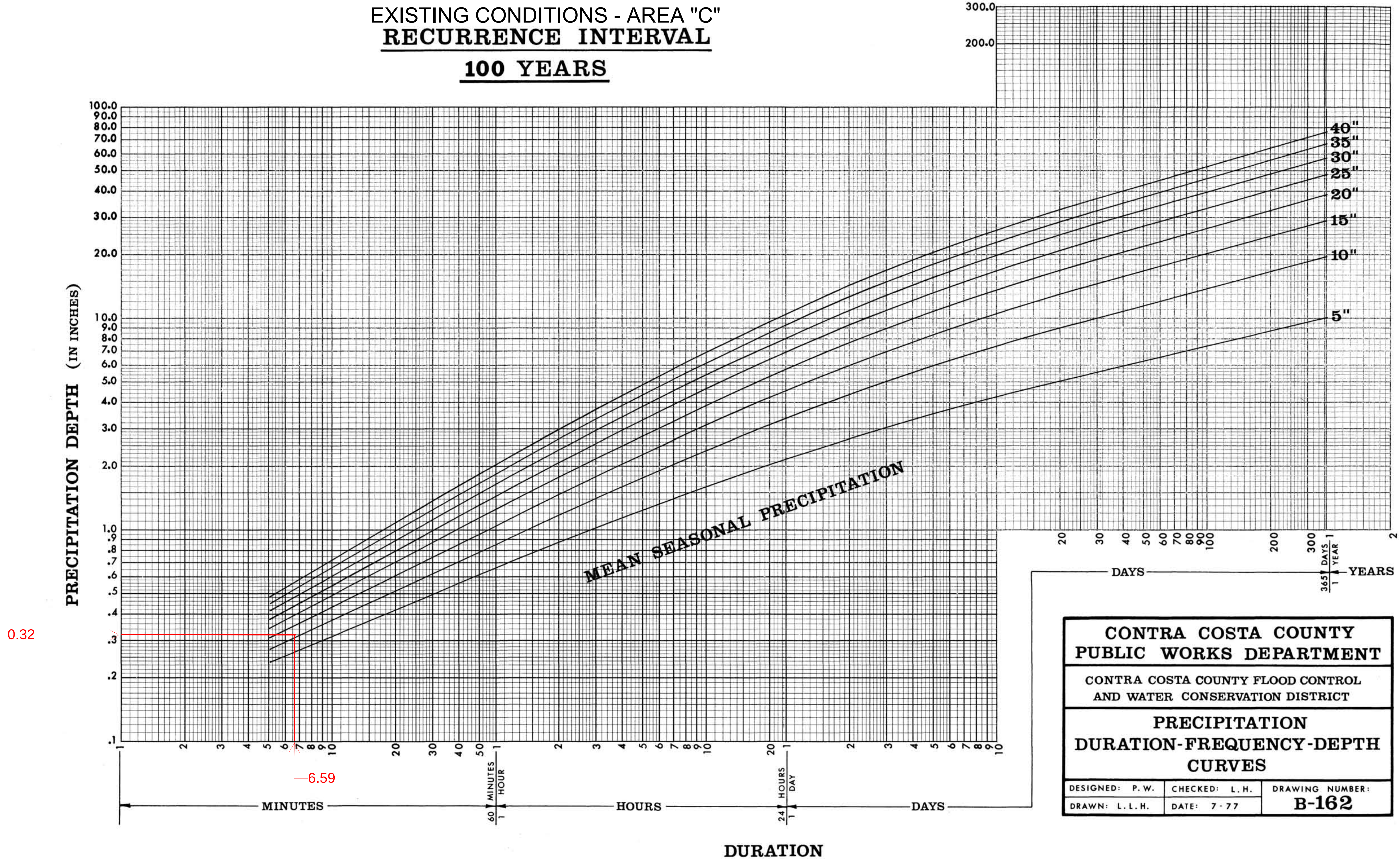

EXISTING CONDITIONS - AREA "C"
RECURRENCE INTERVAL
25 YEARS
PRECIPITATION DEPTH (IN INCHES)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
300.0
200.0
40"
35"
30"
25"
20"
15"
10"
5"
MEAN SEASONAL PRECIPITATION
0.26
6.59
MINUTES
60 MINUTES
1 HOUR
HOURS
24 HOURS
1 DAY
DAYS
365 DAYS
1 YEAR
YEARS
DURATION
CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT
CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
PRECIPITATION
DURATION-FREQUENCY-DEPTH
CURVES
DESIGNED: P. W.
CHECKED: L. H.
DRAWING NUMBER:
B-160
DRAWN: L. L. H.
DATE: 7-77

EXISTING CONDITIONS - AREA "C"

RECURRENCE INTERVAL
50 YEARS



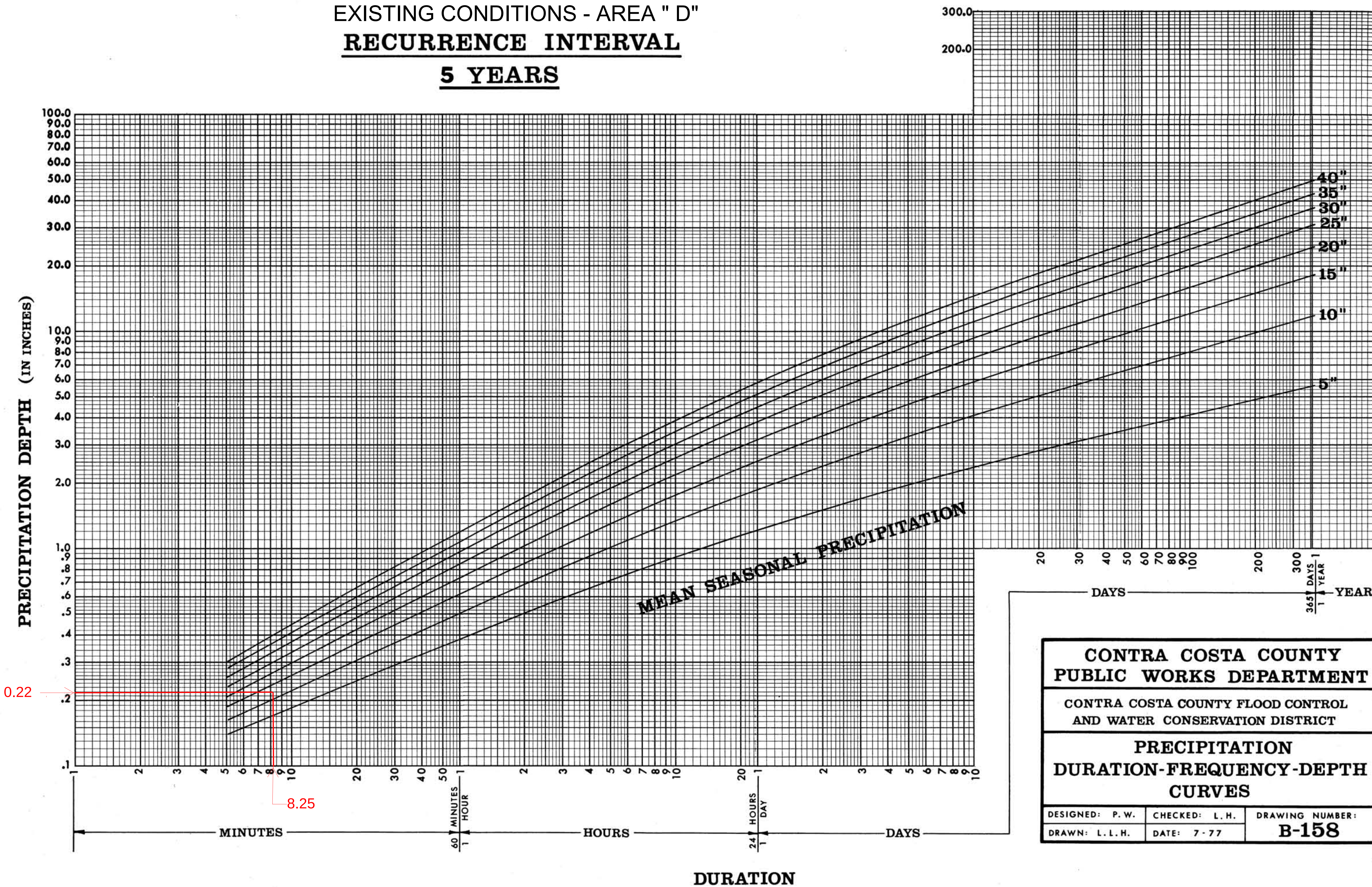
CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT		
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES		
DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-161


EXISTING CONDITIONS - AREA "C"
RECURRENCE INTERVAL
100 YEARS
PRECIPITATION DEPTH (IN INCHES)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
300.0
200.0
40"
35"
30"
25"
20"
15"
10"
5"
MEAN SEASONAL PRECIPITATION
0.32
6.59
MINUTES
60 MINUTES
1 HOUR
HOURS
24 HOURS
1 DAY
DAYS
365 DAYS
1 YEAR
YEARS
DURATION
CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT
CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
PRECIPITATION
DURATION-FREQUENCY-DEPTH
CURVES
DESIGNED: P. W.
CHECKED: L. H.
DRAWING NUMBER:
B-162
DRAWN: L. L. H.
DATE: 7-77

EXISTING CONDITIONS - AREA " D"

RECURRENCE INTERVAL

5 YEARS



CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

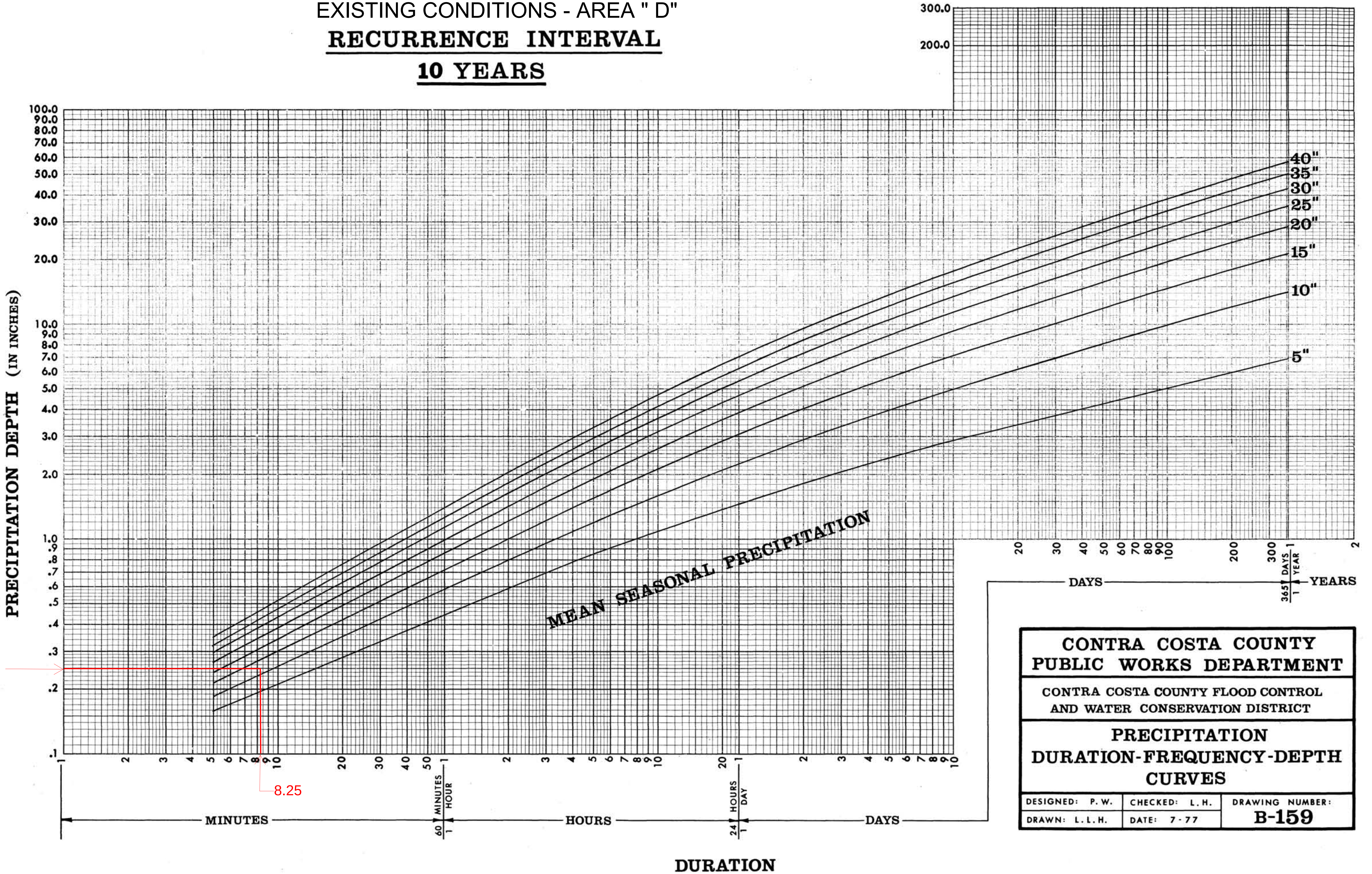
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-158

EXISTING CONDITIONS - AREA " D"

RECURRENCE INTERVAL

10 YEARS

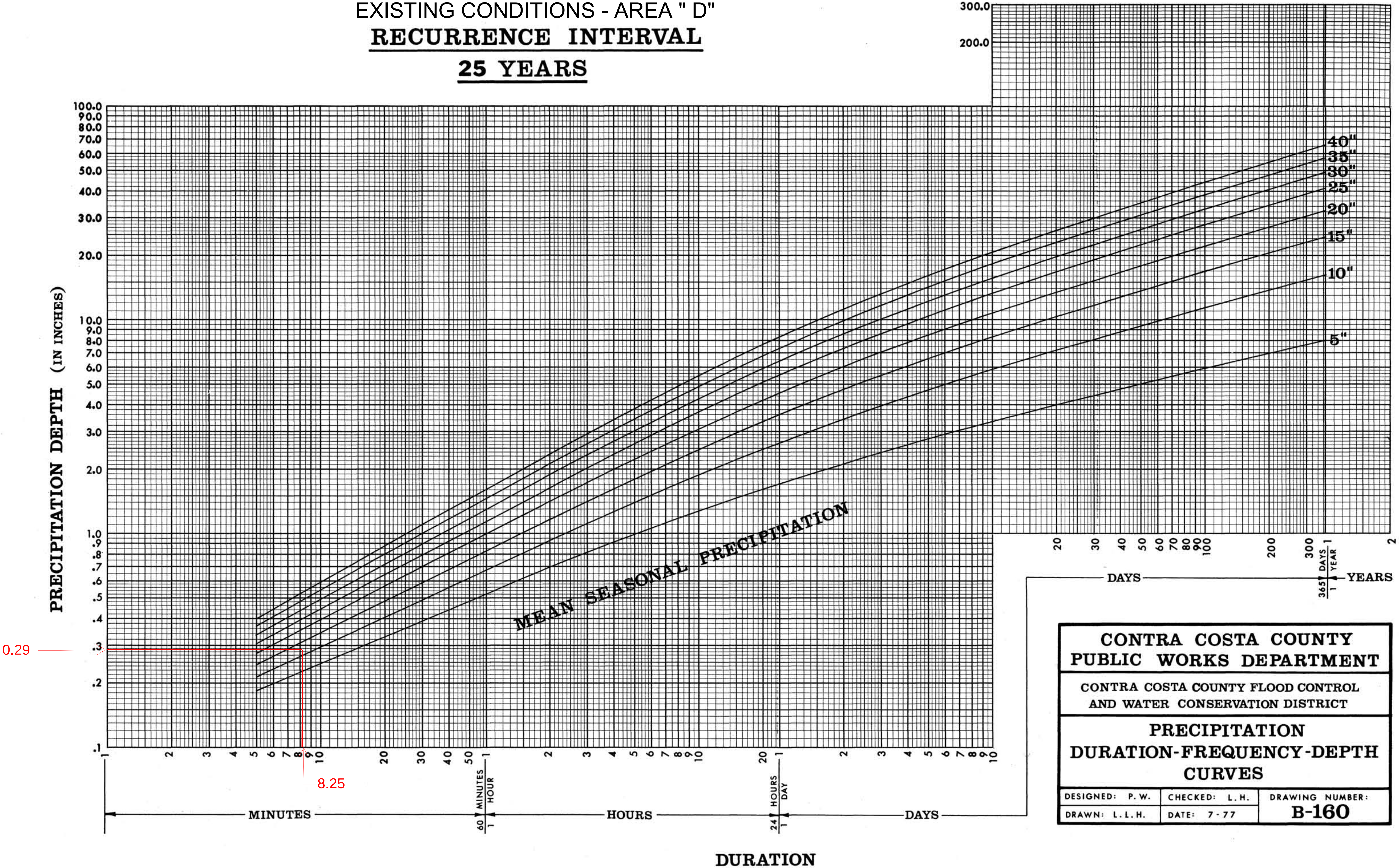


CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT		
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES		
DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-159

EXISTING CONDITIONS - AREA " D"

RECURRENCE INTERVAL

25 YEARS



CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

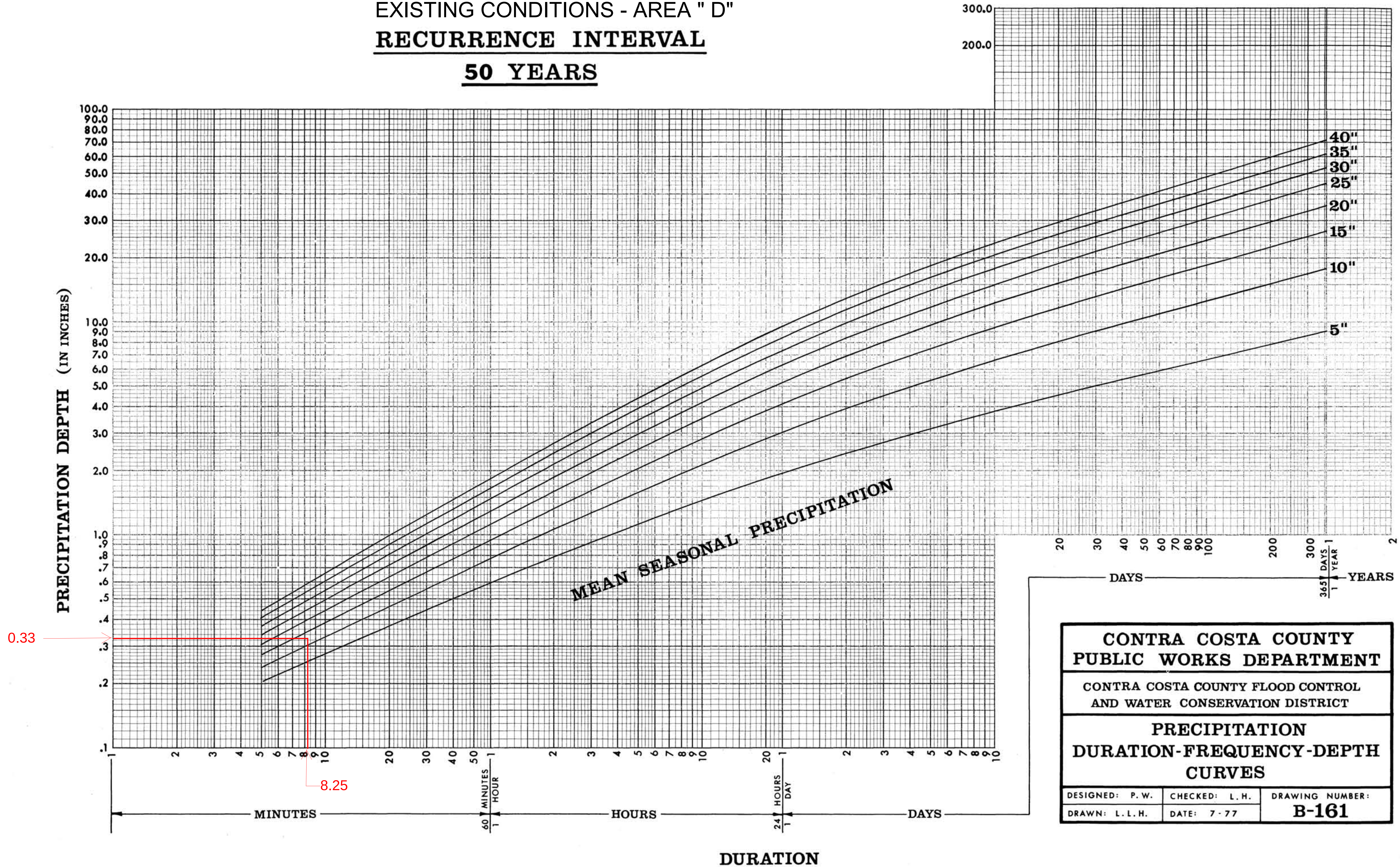
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

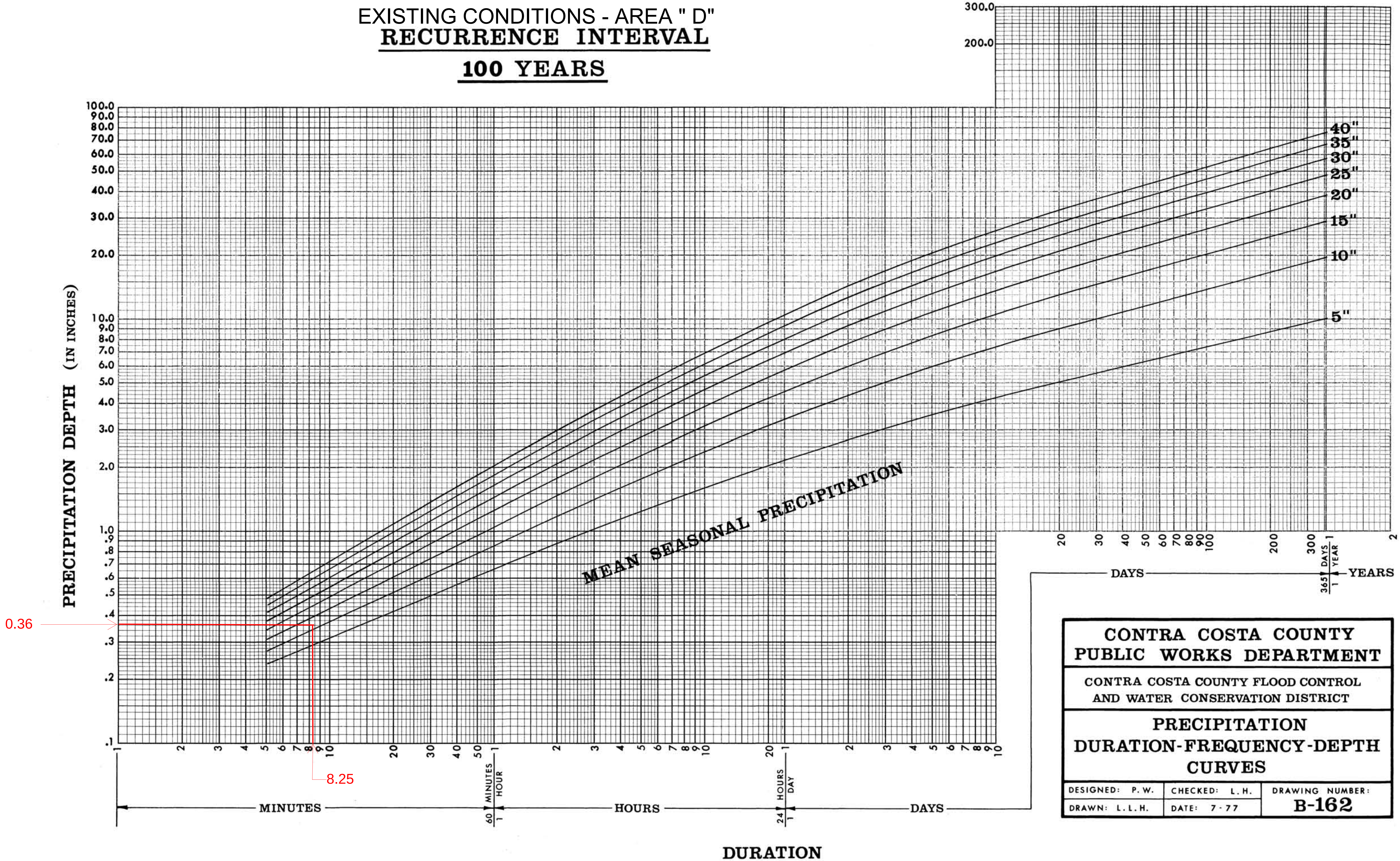
DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7 - 77	B-160

EXISTING CONDITIONS - AREA " D"

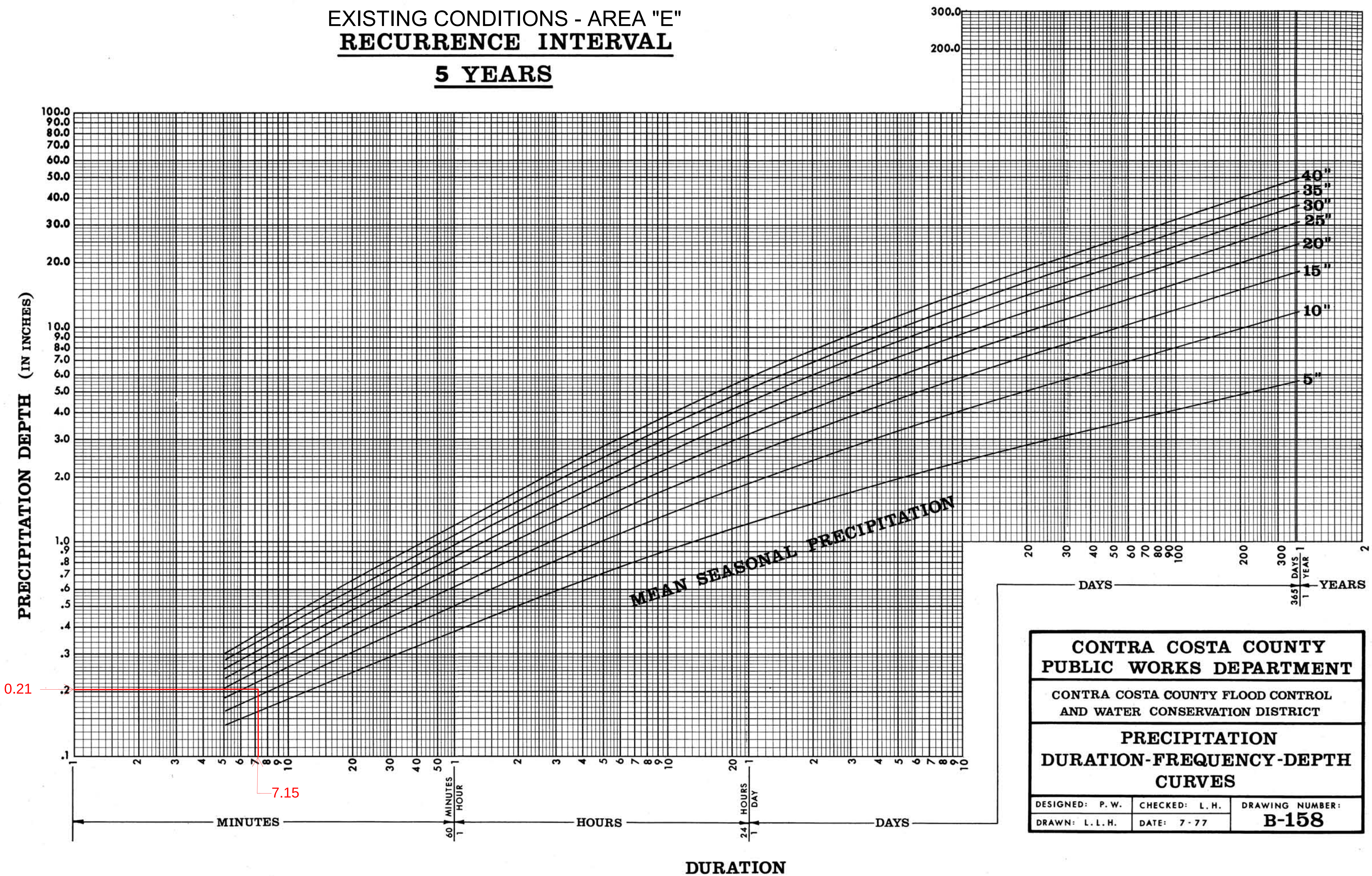
RECURRENCE INTERVAL

50 YEARS



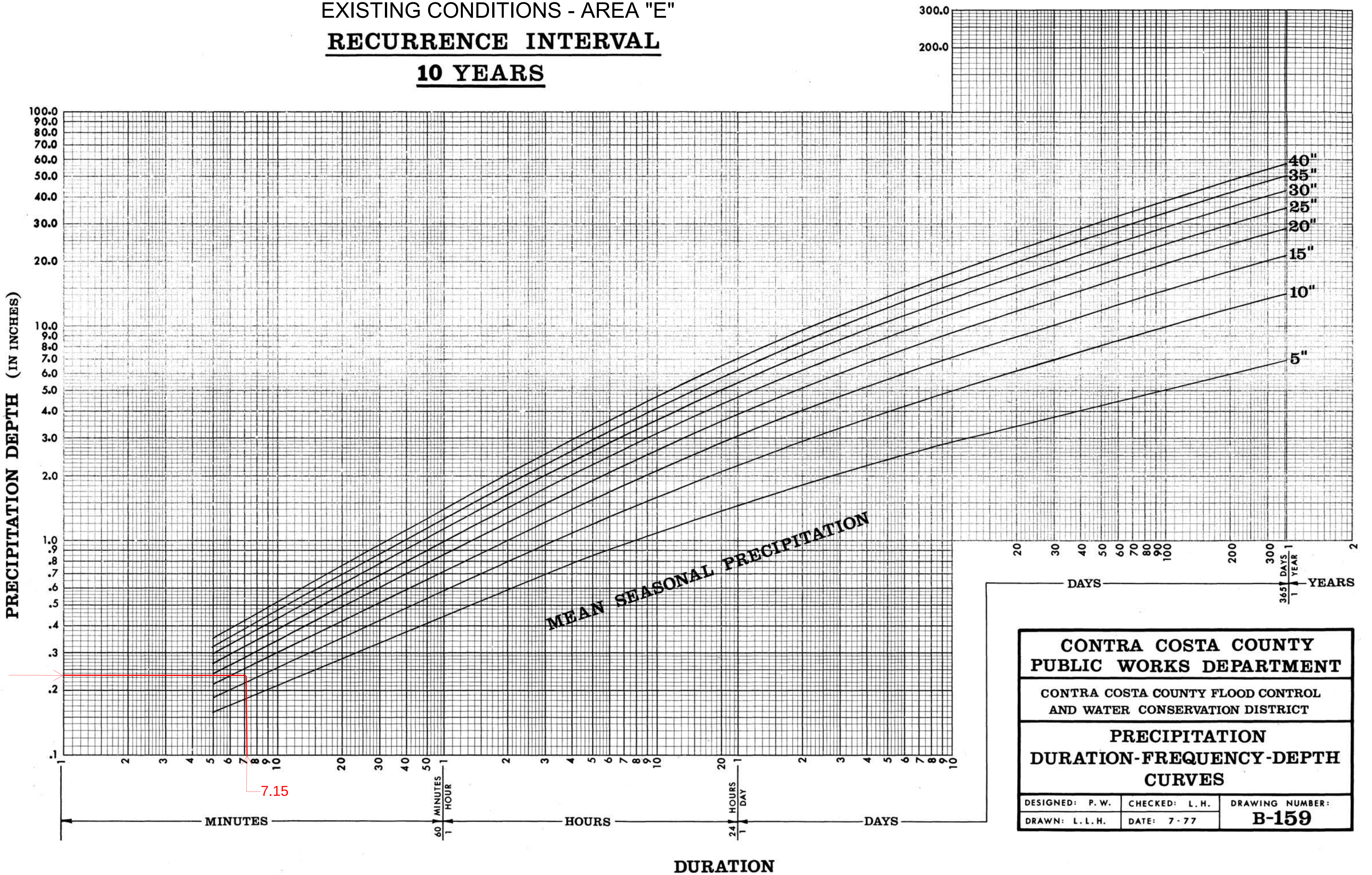


EXISTING CONDITIONS - AREA " D"
RECURRENCE INTERVAL
100 YEARS
PRECIPITATION DEPTH (IN INCHES)
MEAN SEASONAL PRECIPITATION
40"
35"
30"
25"
20"
15"
10"
5"
0.36
8.25
MINUTES
60 MINUTES
1 HOUR
HOURS
24 HOURS
1 DAY
DAYS
365 DAYS
1 YEAR
YEARS
DURATION
CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT
CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
PRECIPITATION
DURATION-FREQUENCY-DEPTH
CURVES
DESIGNED: P. W.
CHECKED: L. H.
DRAWING NUMBER:
DRAWN: L. L. H.
DATE: 7-77
B-162


EXISTING CONDITIONS - AREA "E"
RECURRENCE INTERVAL
5 YEARS
PRECIPITATION DEPTH (IN INCHES)
MEAN SEASONAL PRECIPITATION
40"
35"
30"
25"
20"
15"
10"
5"
0.21
7.15
MINUTES
60 MINUTES
1 HOUR
HOURS
24 HOURS
1 DAY
DAYS
365 DAYS
1 YEAR
YEARS
DURATION
CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT
CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
PRECIPITATION
DURATION-FREQUENCY-DEPTH
CURVES
DESIGNED: P. W.
CHECKED: L. H.
DRAWING NUMBER:
DRAWN: L. L. H.
DATE: 7-77
B-158

EXISTING CONDITIONS - AREA "E"

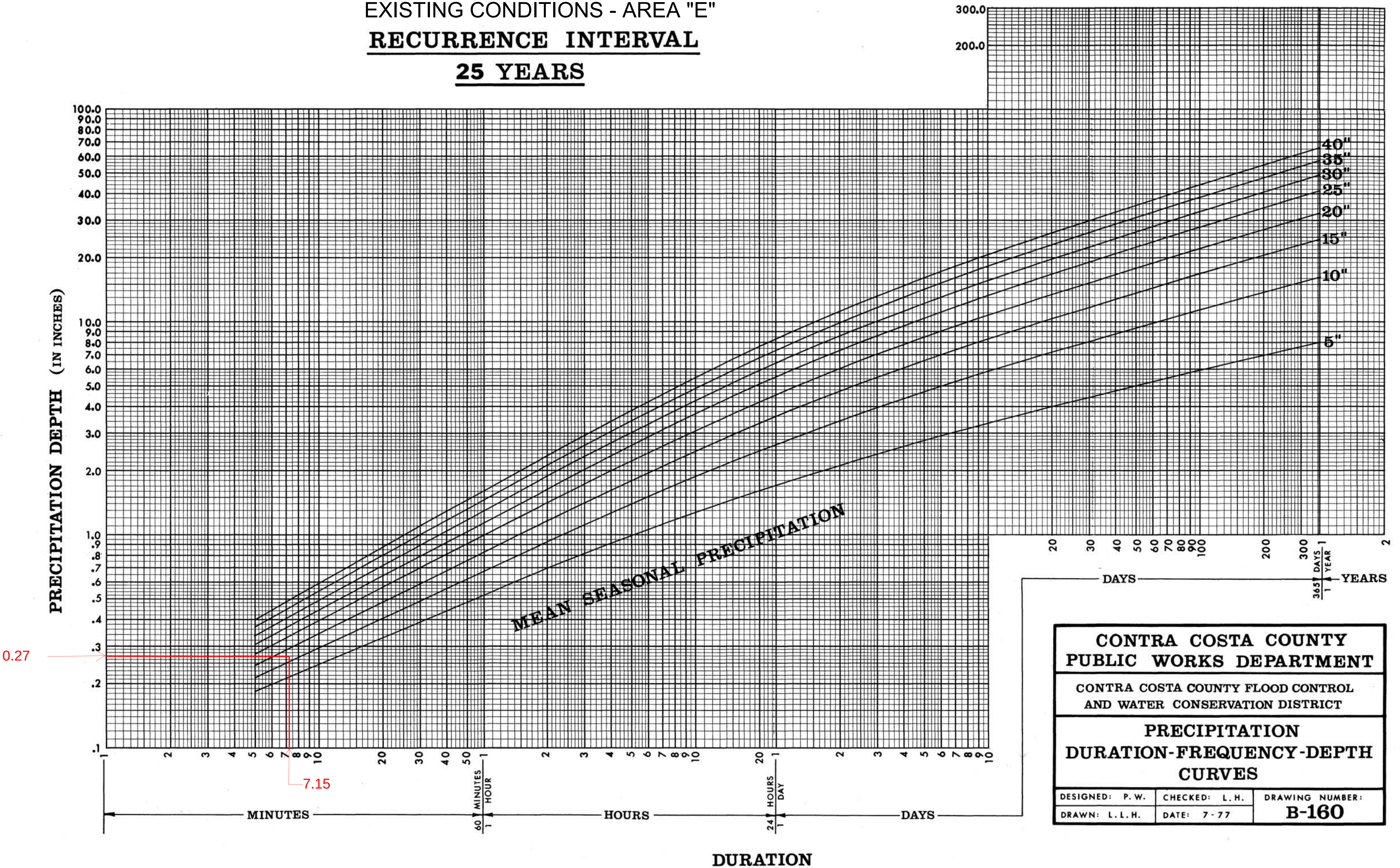
RECURRENCE INTERVAL
10 YEARS



CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT		
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES		
DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-159

EXISTING CONDITIONS - AREA "E"

RECURRENCE INTERVAL
25 YEARS

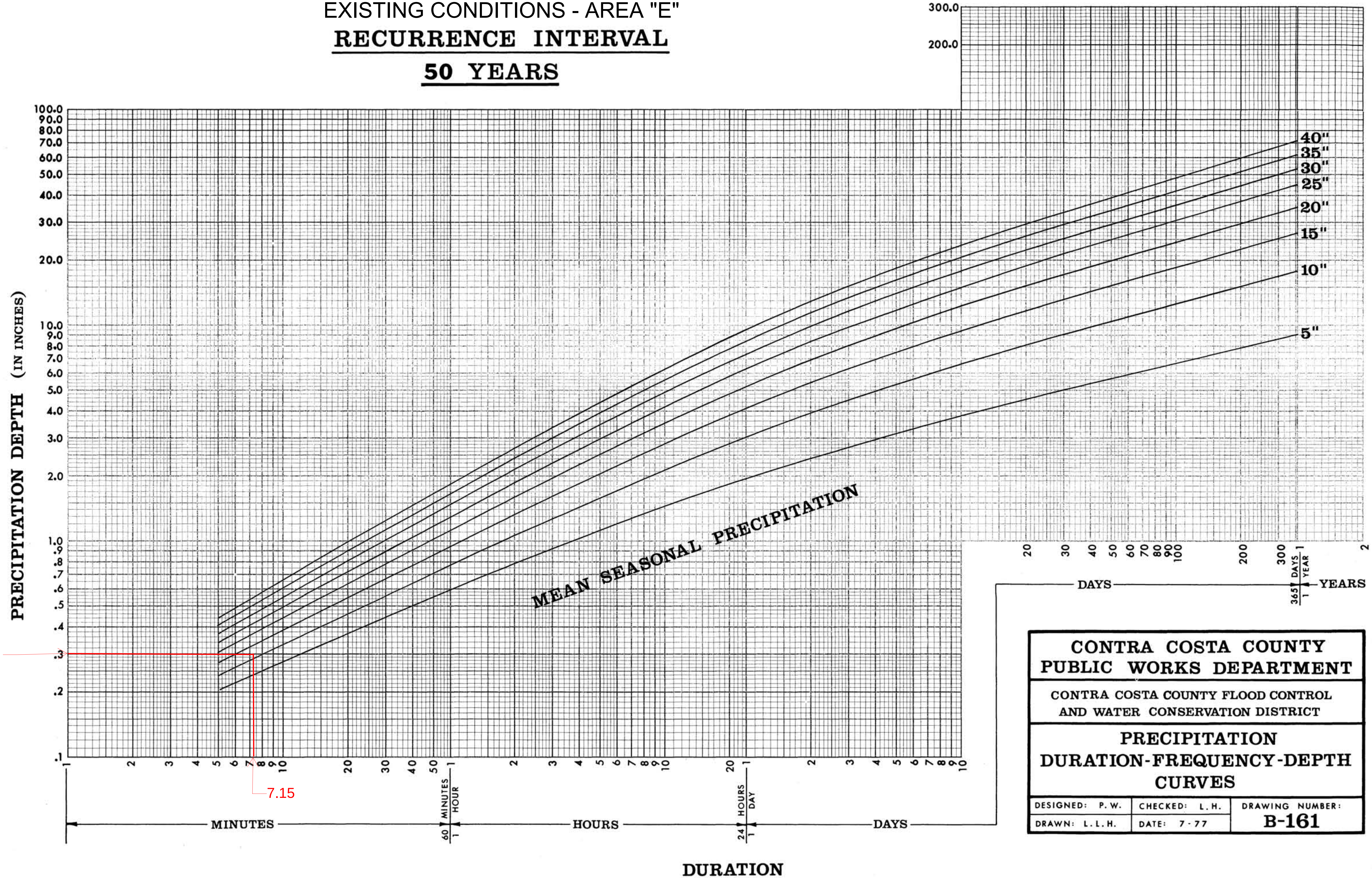


CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT		
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES		
DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER: B-160
DRAWN: L. L. H.	DATE: 7-77	

EXISTING CONDITIONS - AREA "E"

RECURRENCE INTERVAL

50 YEARS



CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

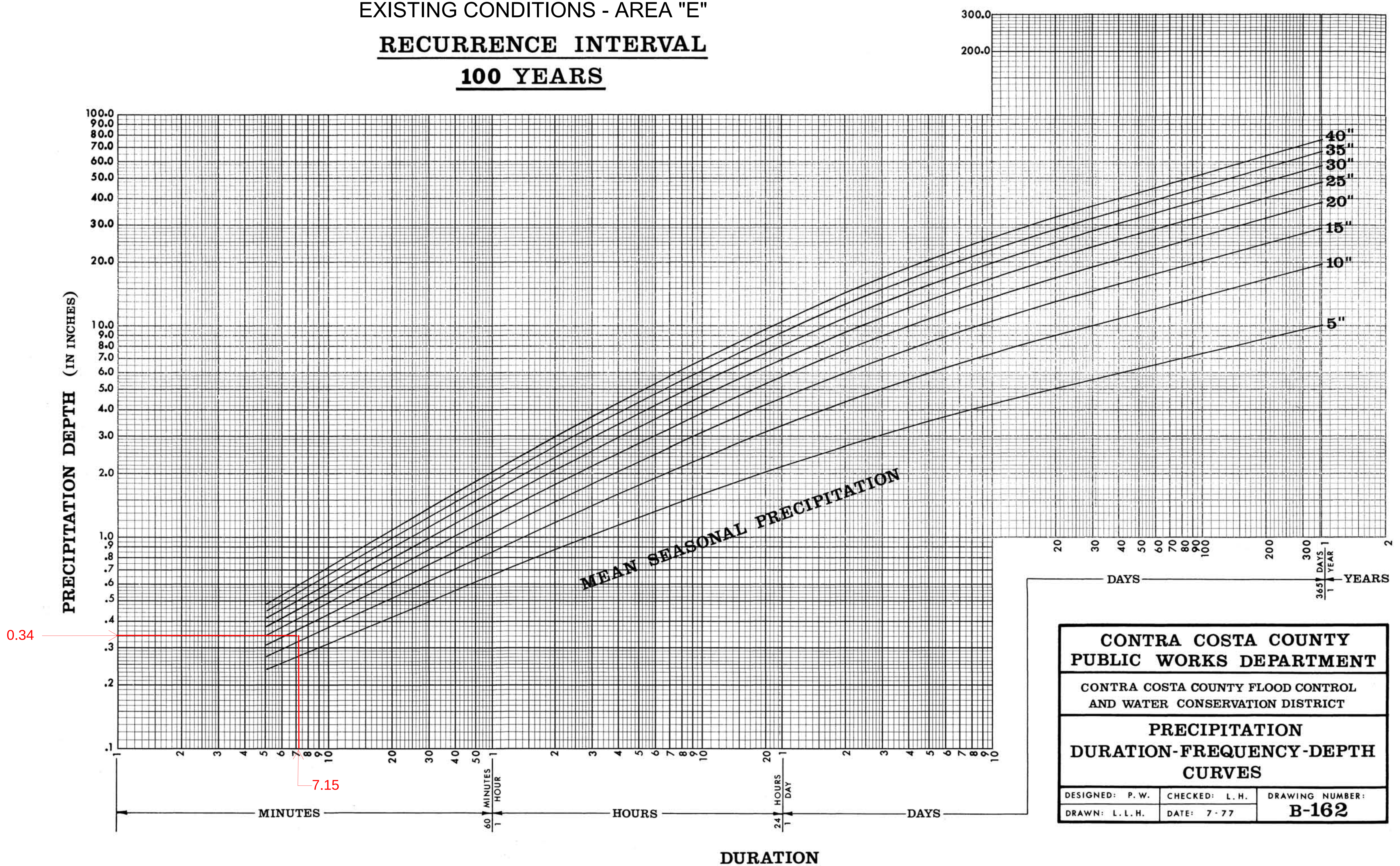
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-161

EXISTING CONDITIONS - AREA "E"

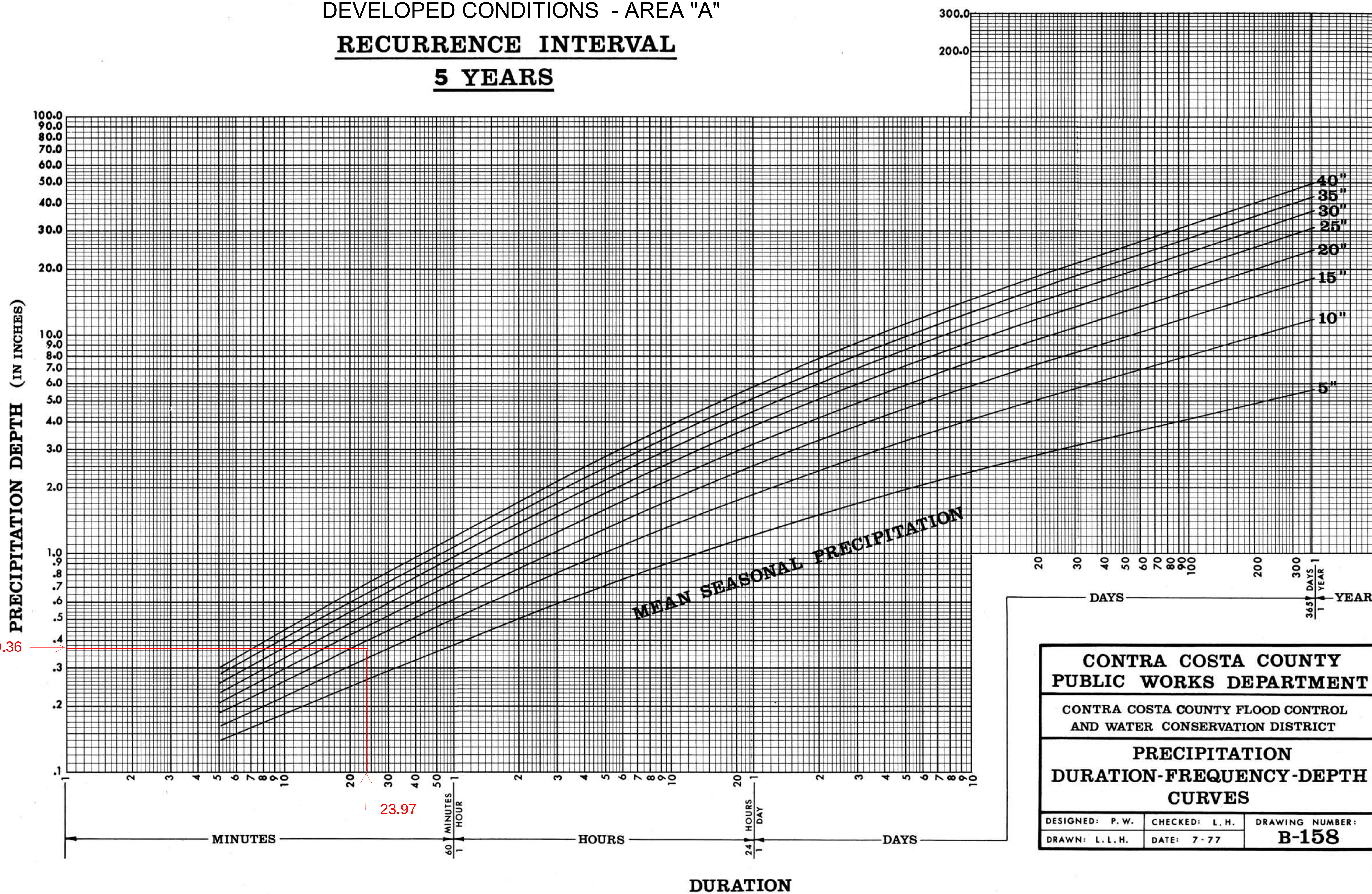
RECURRENCE INTERVAL
100 YEARS



CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT		
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES		
DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-162

DEVELOPED CONDITIONS - AREA "A"

RECURRENCE INTERVAL
5 YEARS



CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

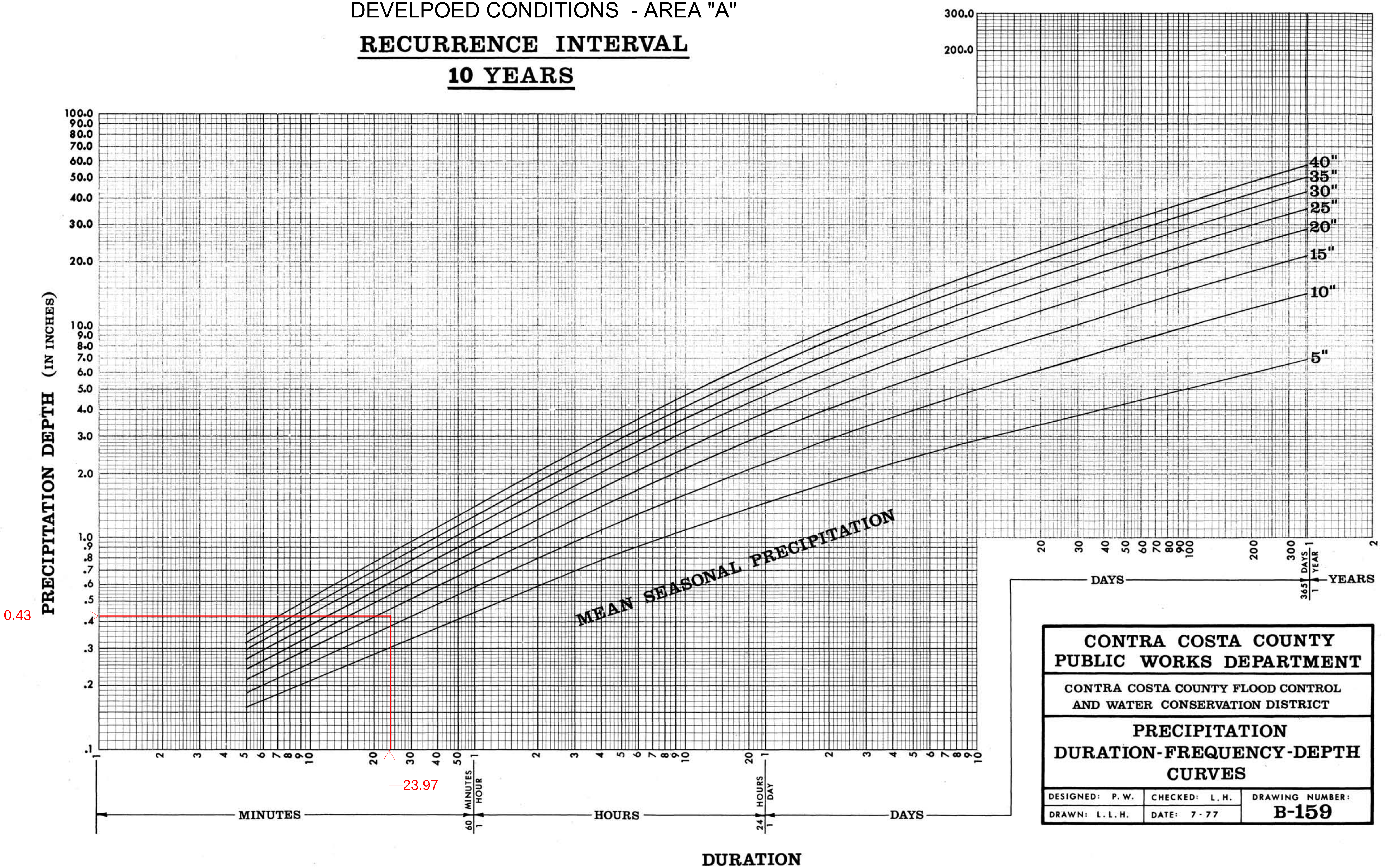
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-158

DEVELPOED CONDITIONS - AREA "A"

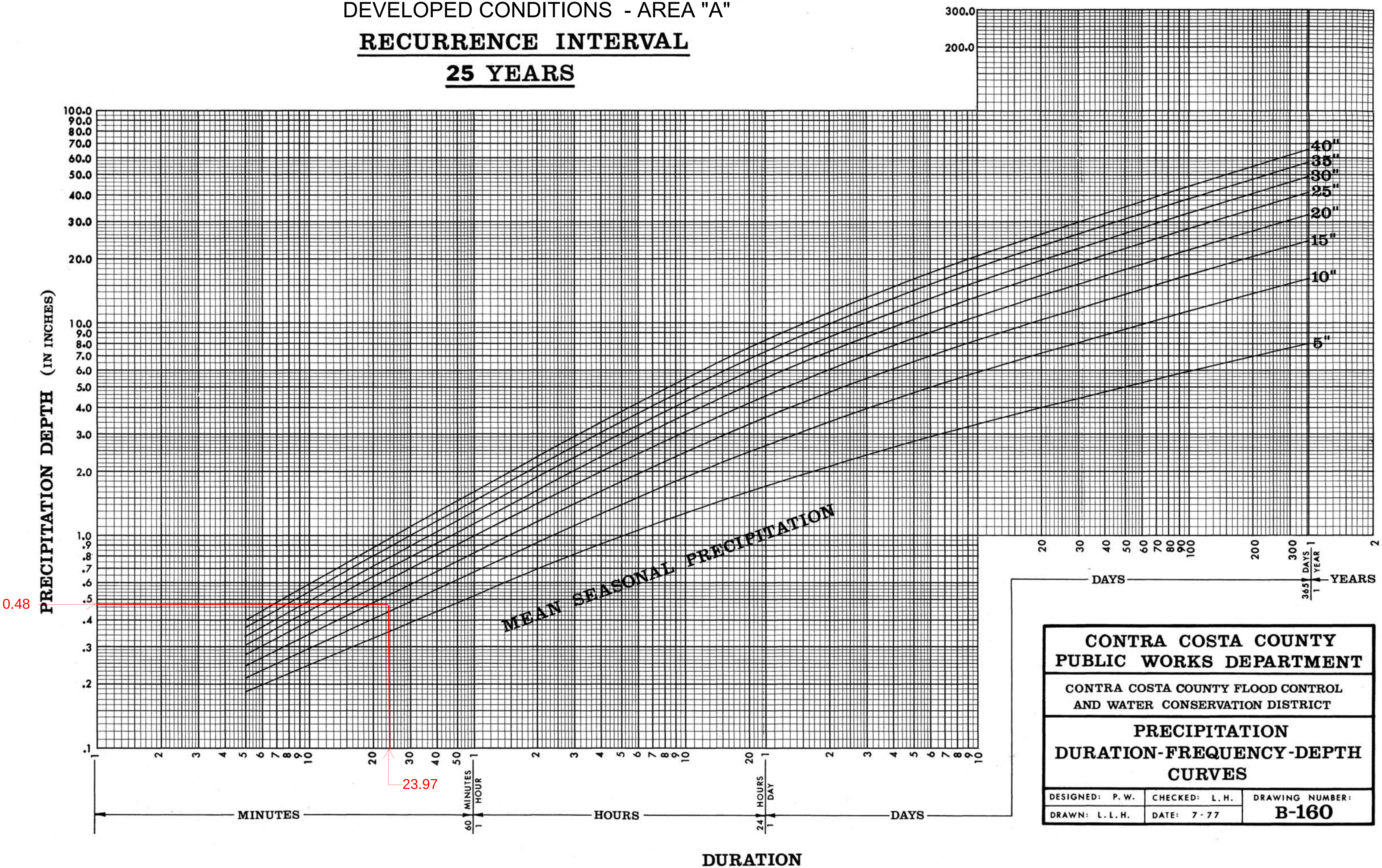
RECURRENCE INTERVAL

10 YEARS



DEVELOPED CONDITIONS - AREA "A"

RECURRENCE INTERVAL
25 YEARS

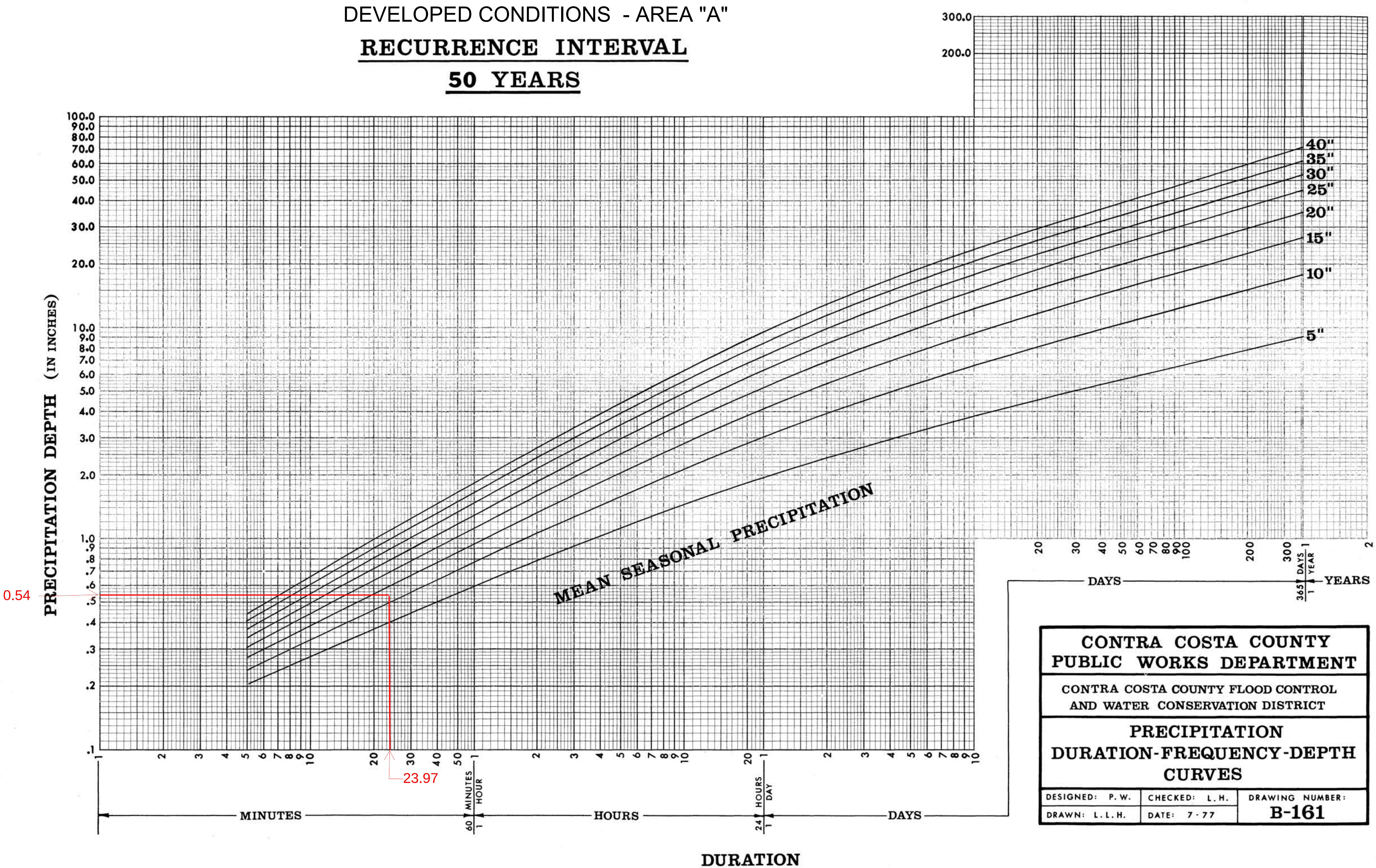


CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

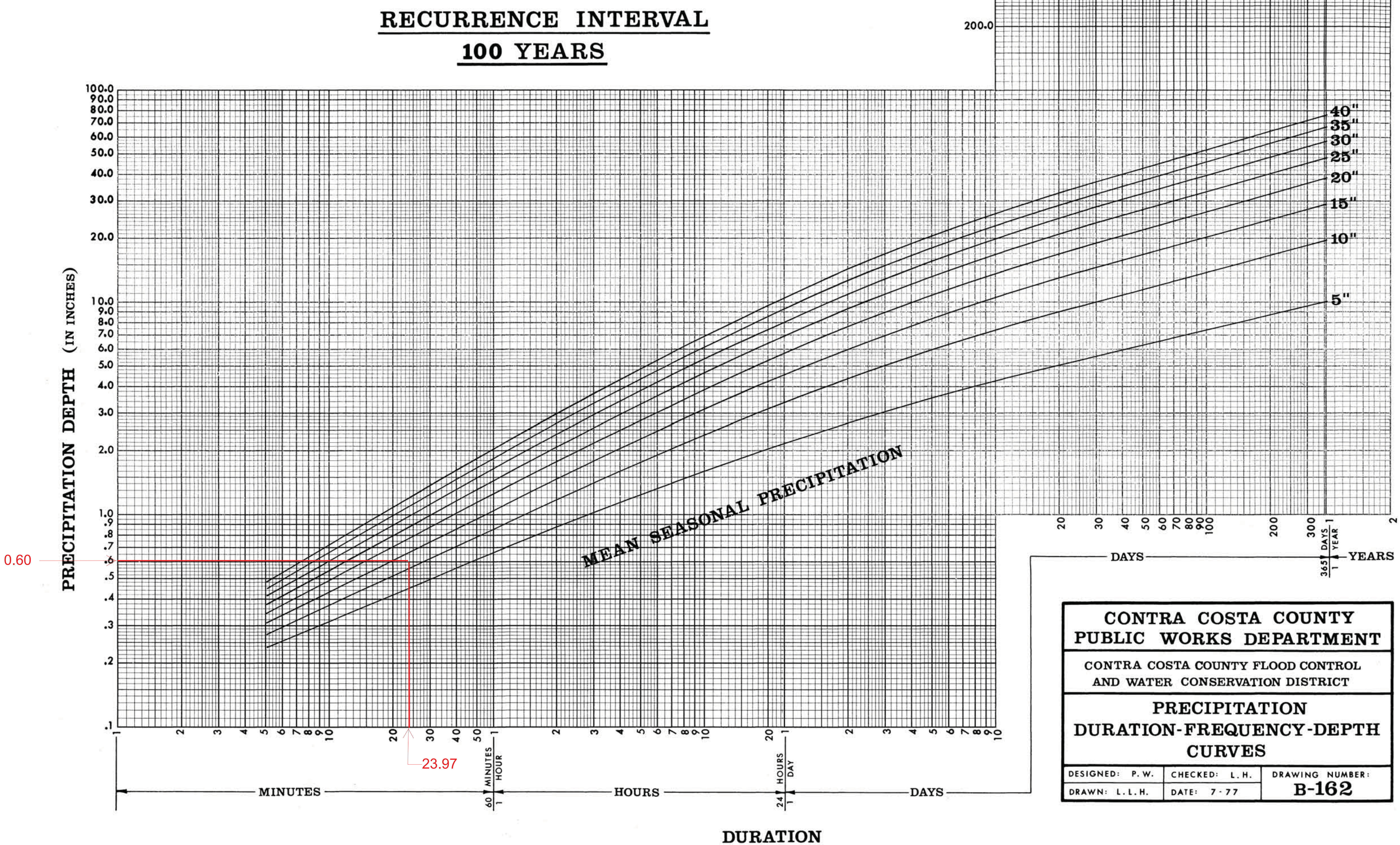
CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

PRECIPITATION
DURATION-FREQUENCY-DEPTH
CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-160


DEVELOPED CONDITIONS - AREA "A"
RECURRENCE INTERVAL
50 YEARS
PRECIPITATION DEPTH (IN INCHES)
DURATION
MINUTES
HOURS
DAYS
YEARS
60 MINUTES 1 HOUR
24 HOURS 1 DAY
365 DAYS 1 YEAR
MEAN SEASONAL PRECIPITATION
40"
35"
30"
25"
20"
15"
10"
5"
0.54
23.97
CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT
CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
PRECIPITATION
DURATION-FREQUENCY-DEPTH
CURVES
DESIGNED: P. W.
CHECKED: L. H.
DRAWN: L. L. H.
DATE: 7-77
DRAWING NUMBER:
B-161

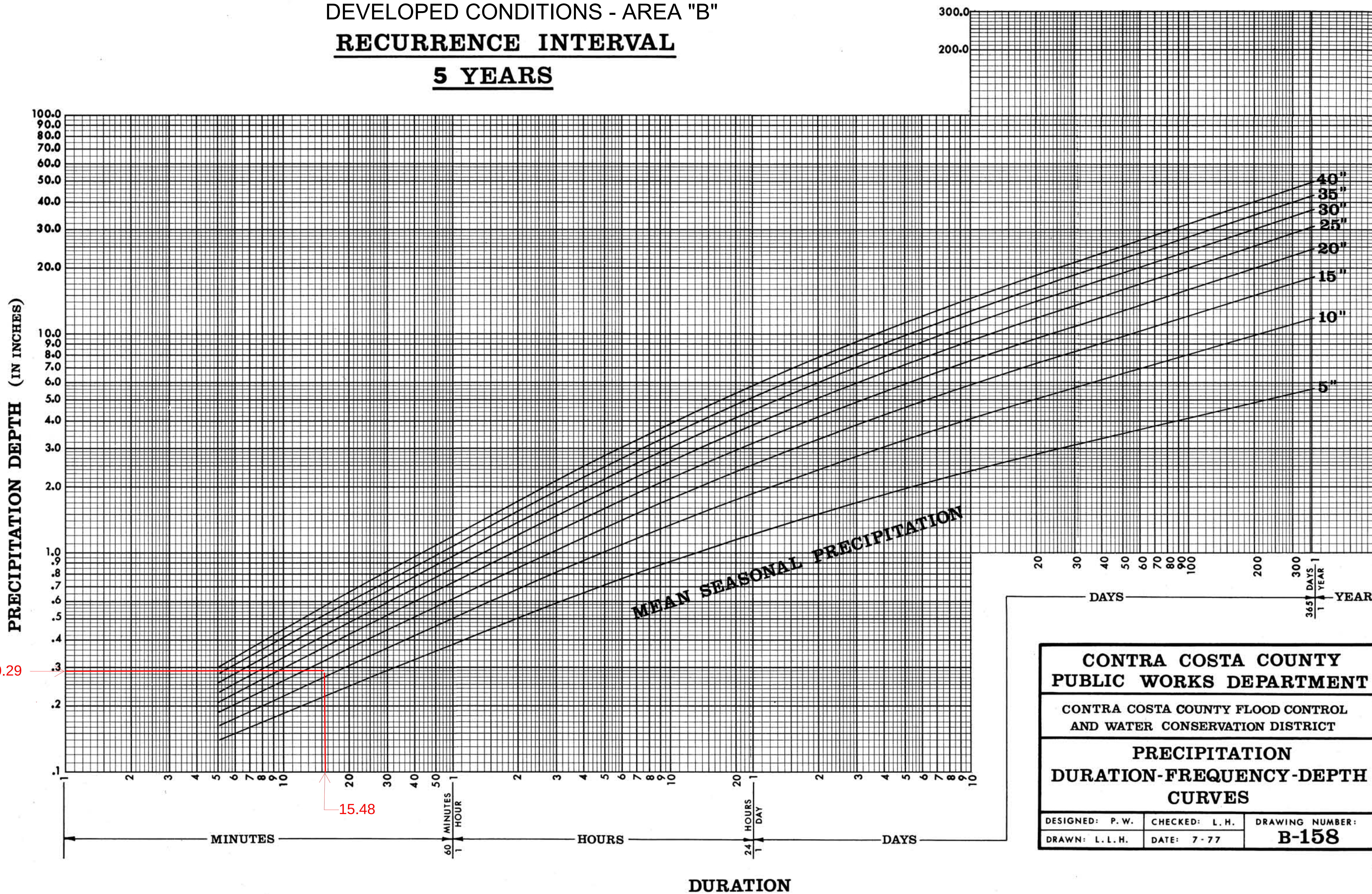
DEVELOPED CONDITIONS - AREA "A"



CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT		
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES		
DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-162

DEVELOPED CONDITIONS - AREA "B"

RECURRENCE INTERVAL
5 YEARS



CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

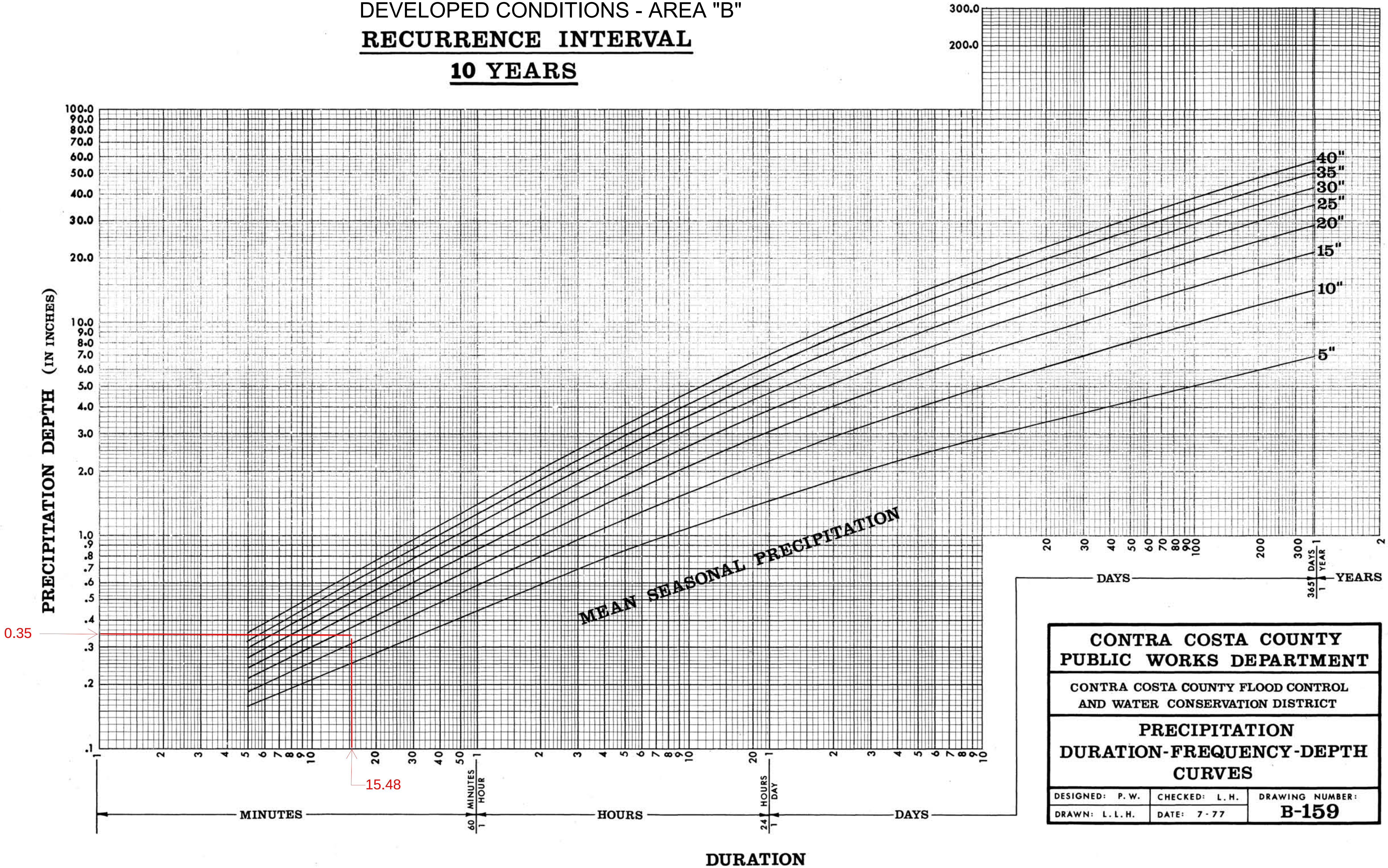
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-158

DEVELOPED CONDITIONS - AREA "B"

RECURRENCE INTERVAL

10 YEARS



CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

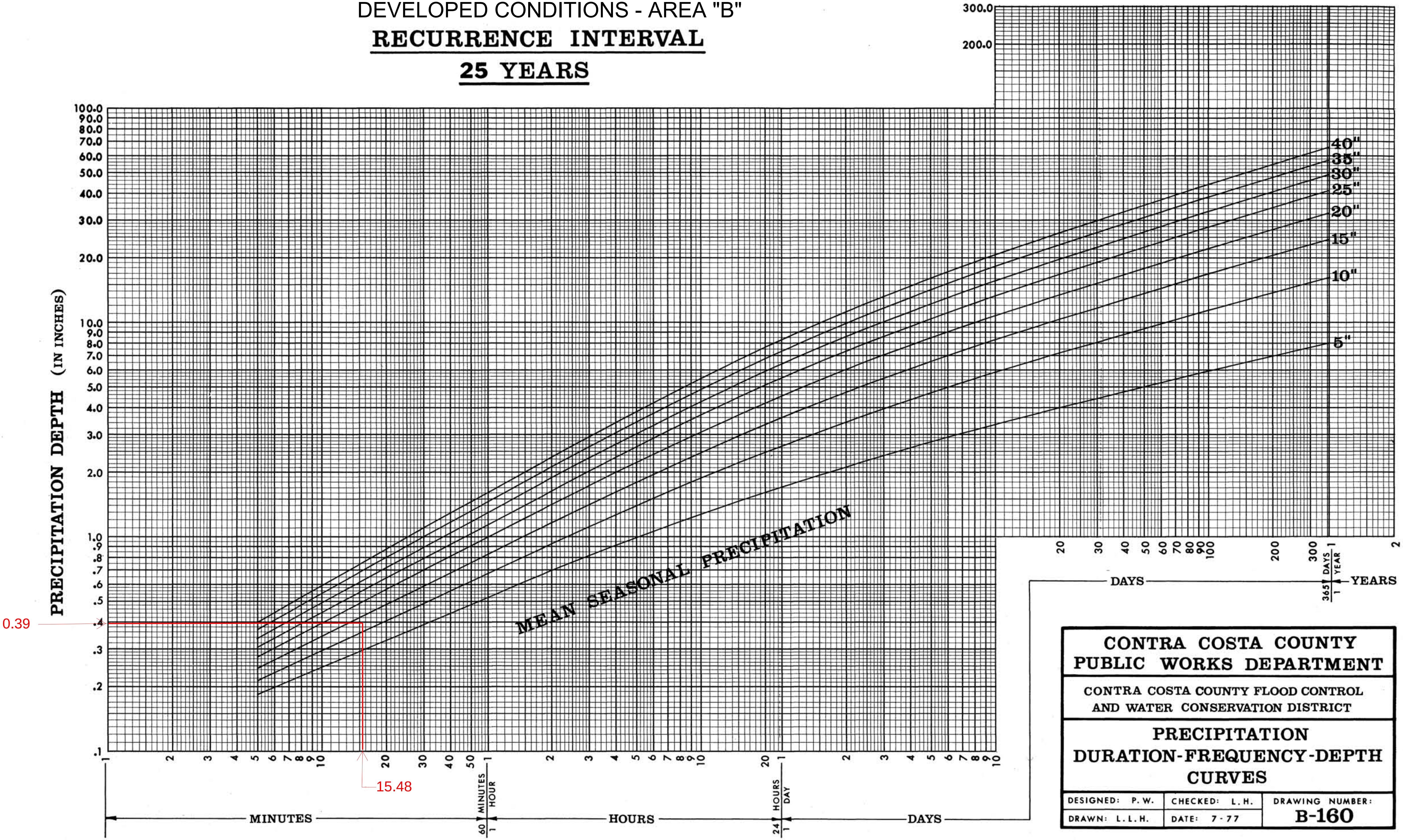
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-159

DEVELOPED CONDITIONS - AREA "B"

RECURRENCE INTERVAL

25 YEARS



CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT

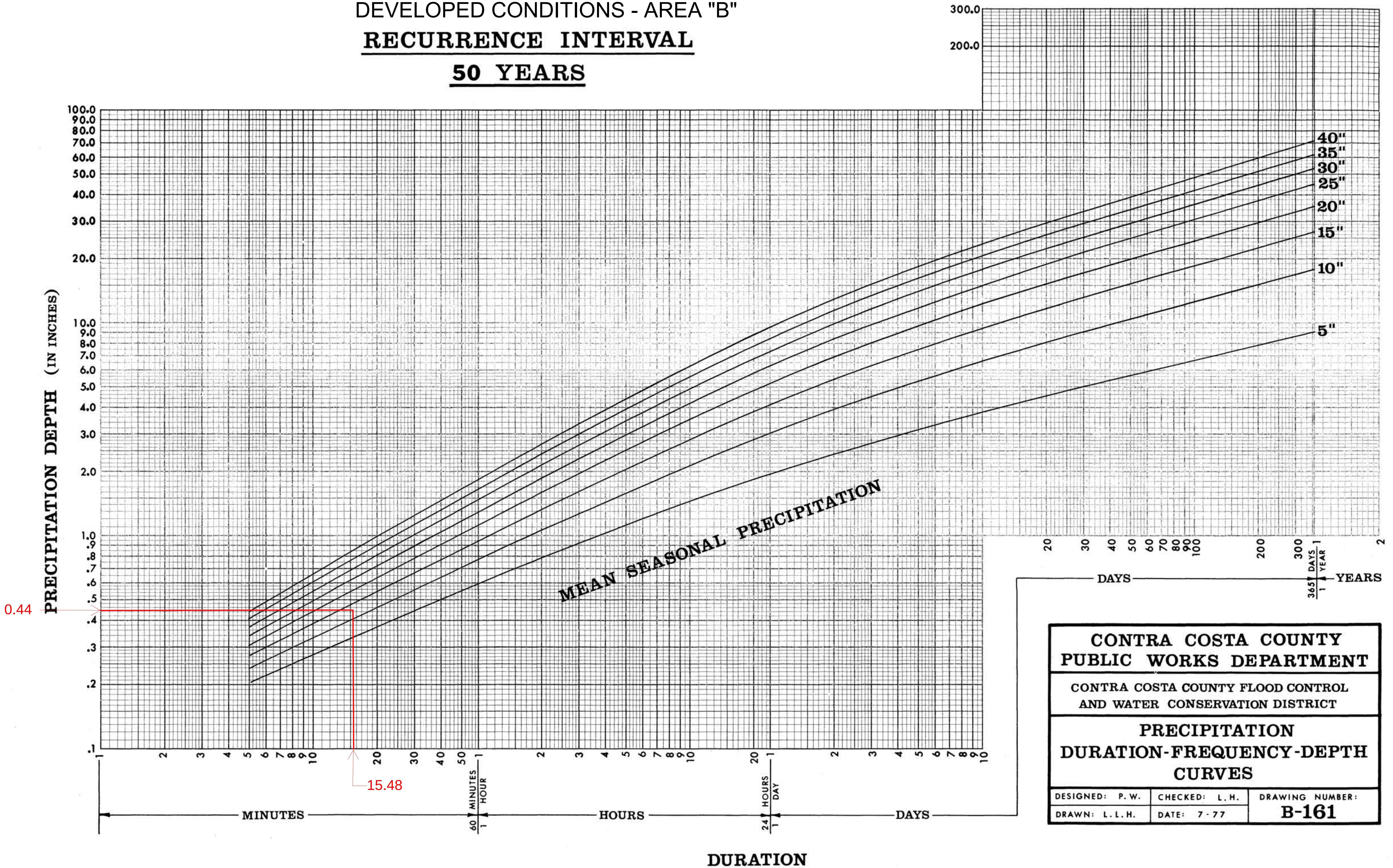
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-160

DEVELOPED CONDITIONS - AREA "B"

RECURRENCE INTERVAL
50 YEARS



CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

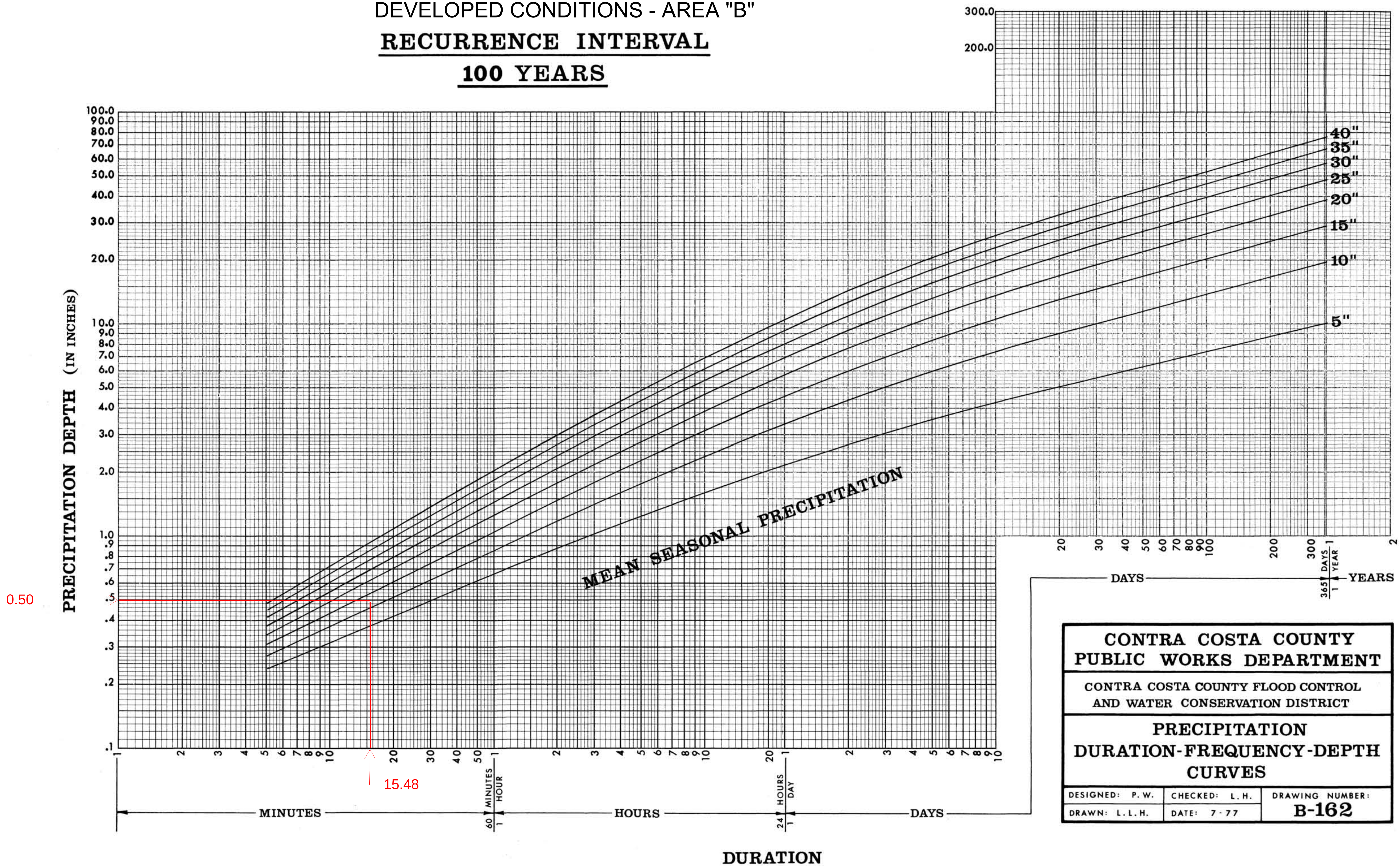
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-161

DEVELOPED CONDITIONS - AREA "B"

RECURRENCE INTERVAL

100 YEARS



CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

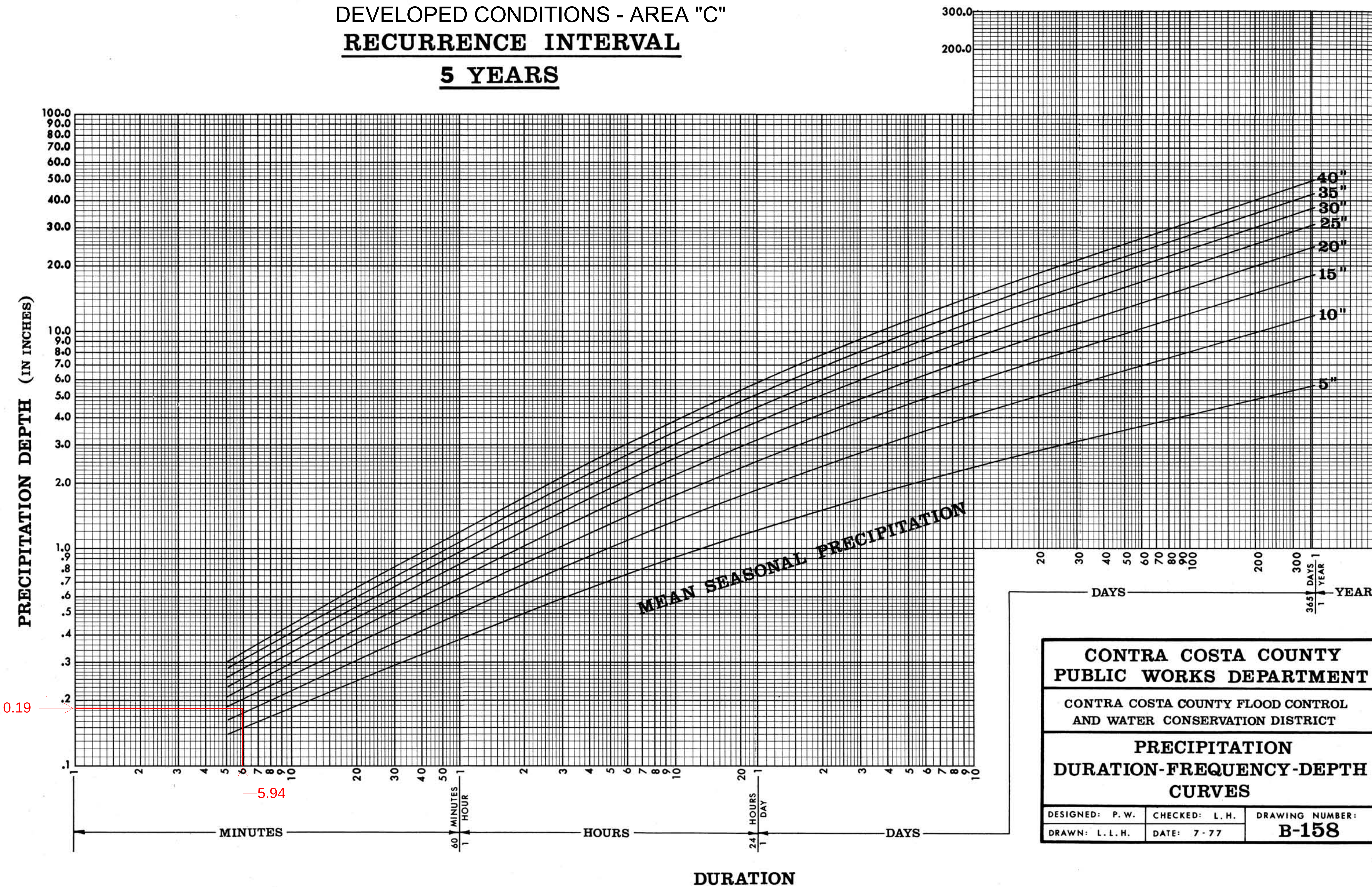
PRECIPITATION
DURATION-FREQUENCY-DEPTH
CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-162

DEVELOPED CONDITIONS - AREA "C"

RECURRENCE INTERVAL

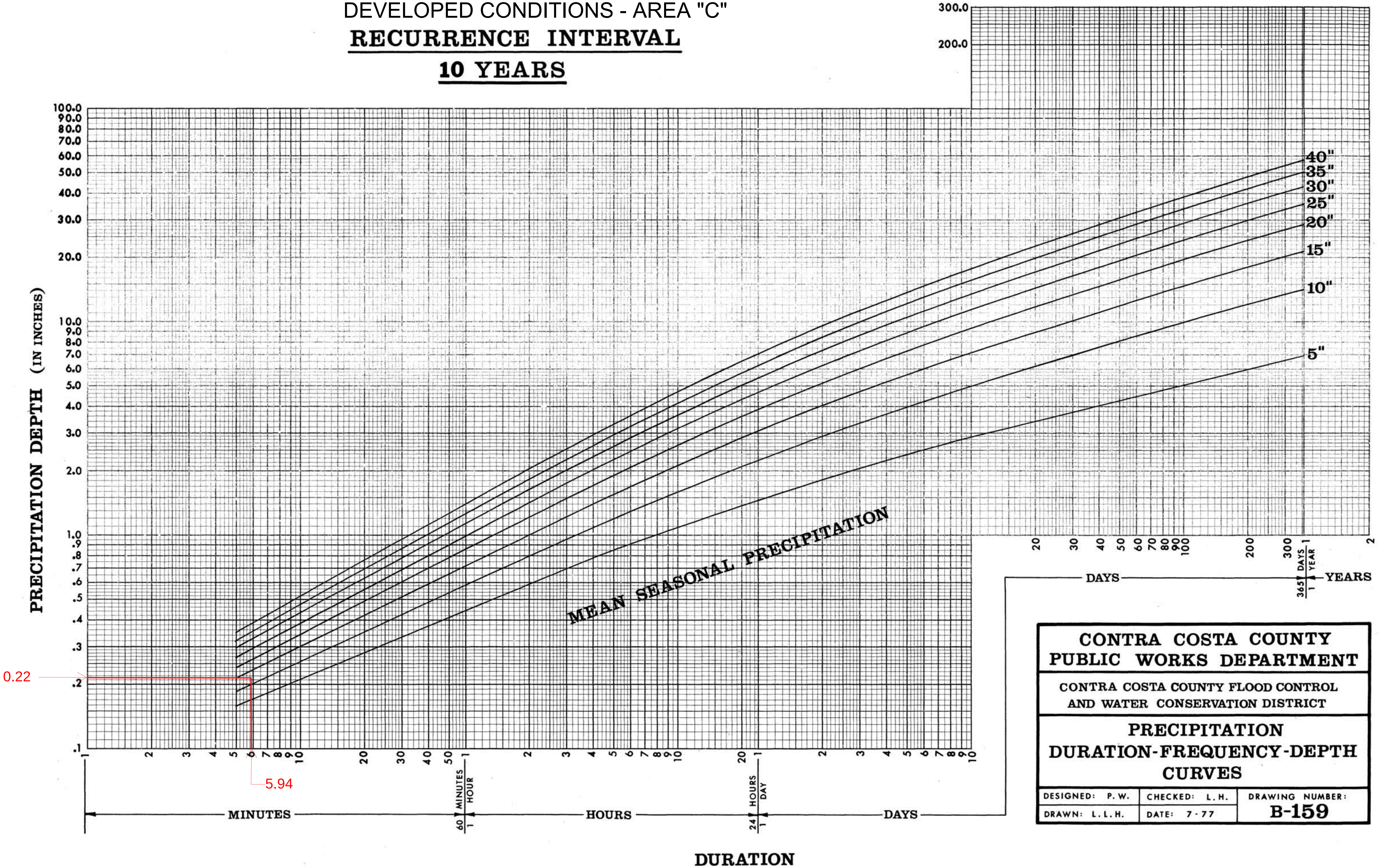
5 YEARS



DEVELOPED CONDITIONS - AREA "C"

RECURRENCE INTERVAL

10 YEARS



CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

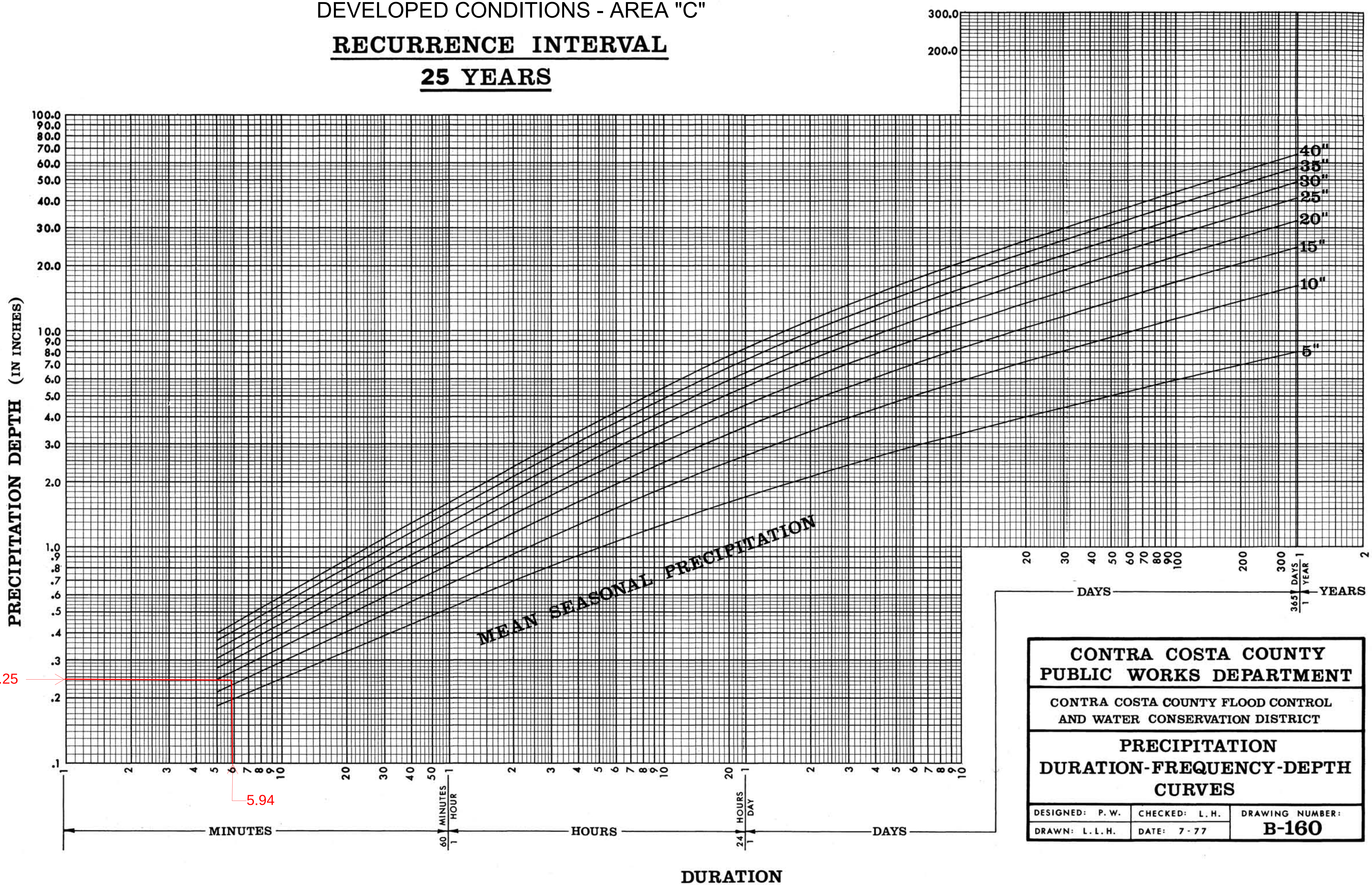
CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

PRECIPITATION
DURATION-FREQUENCY-DEPTH
CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7 - 77	B-159

DEVELOPED CONDITIONS - AREA "C"

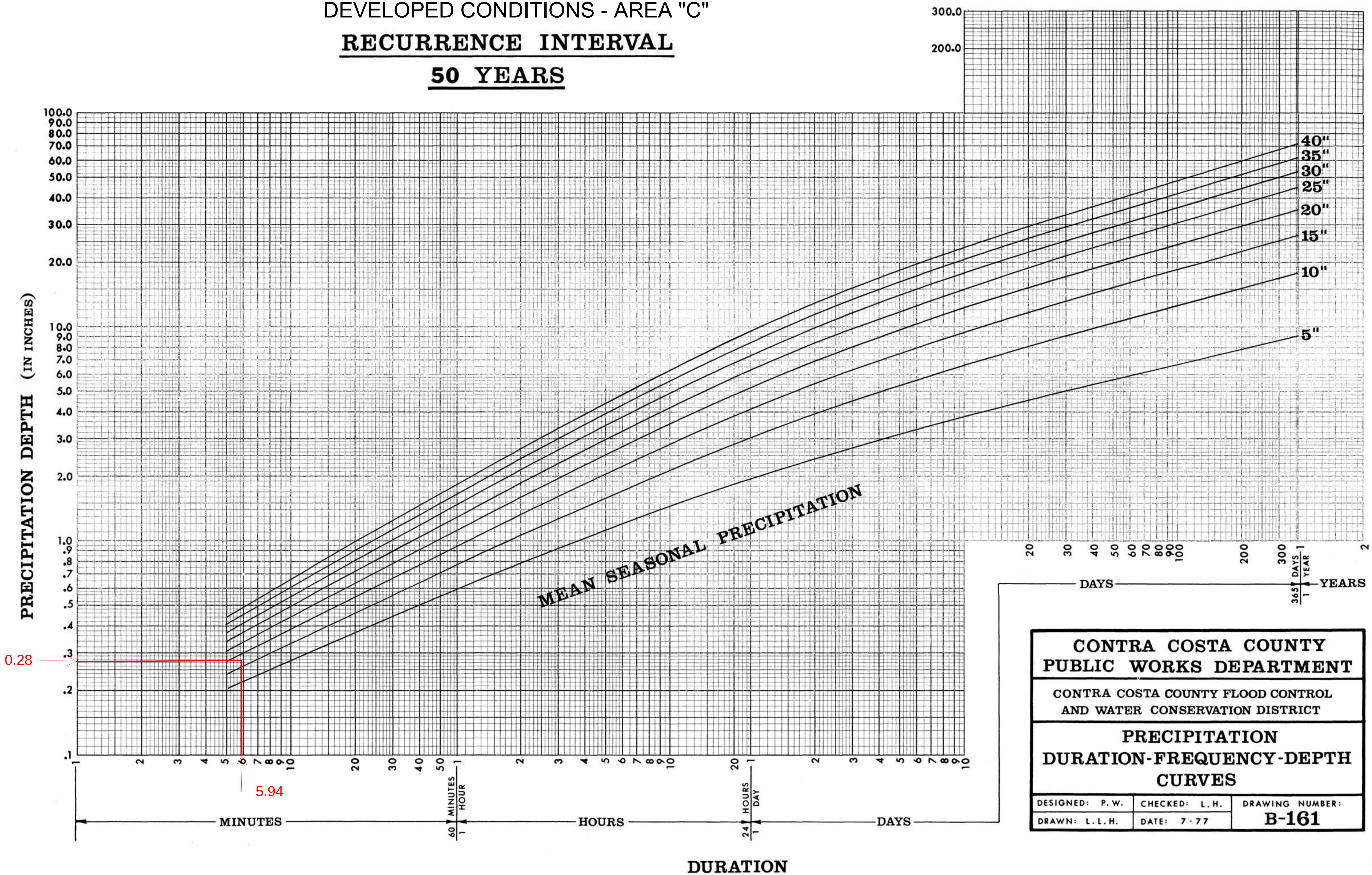
RECURRENCE INTERVAL
25 YEARS

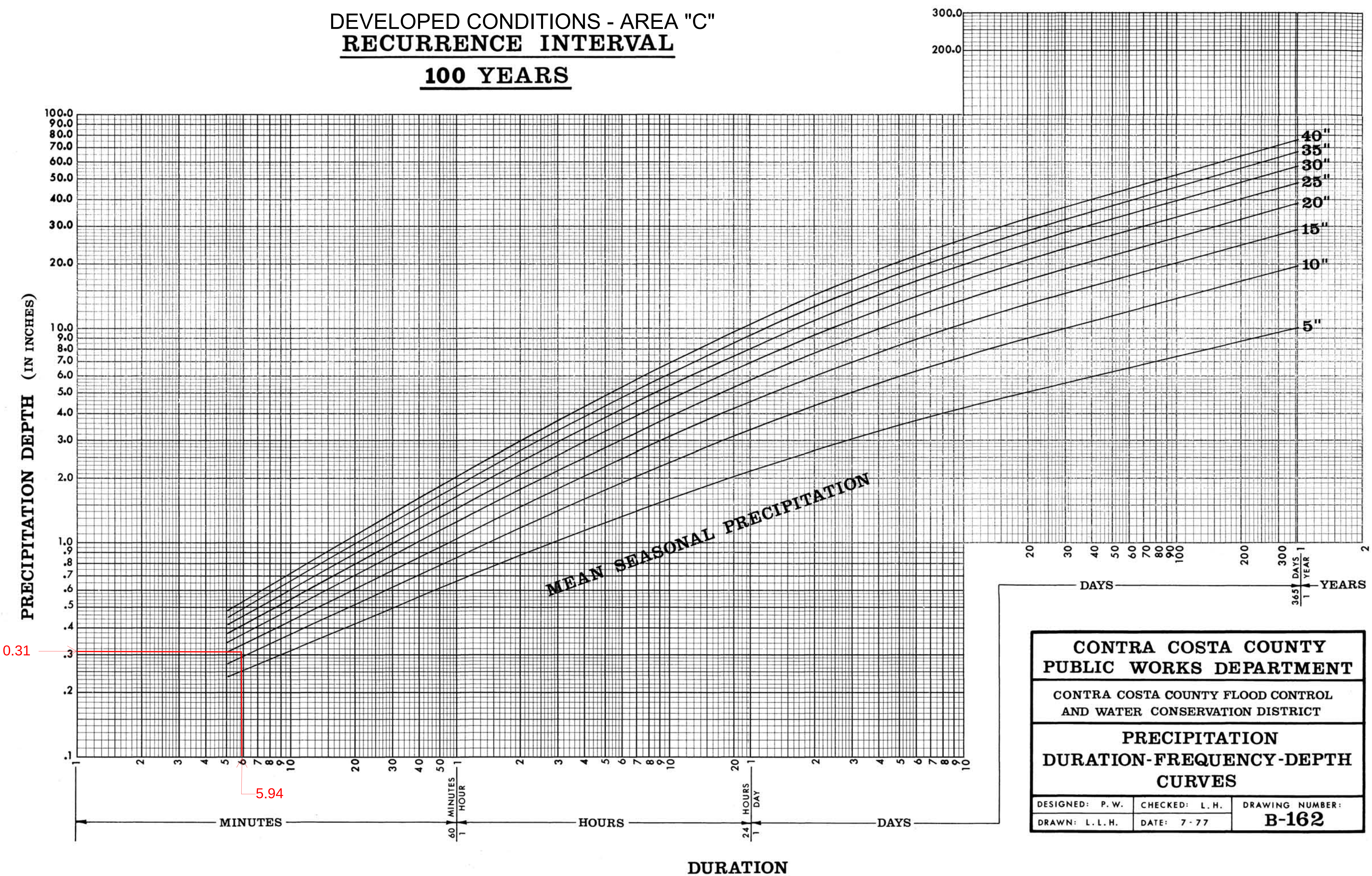


DEVELOPED CONDITIONS - AREA "C"

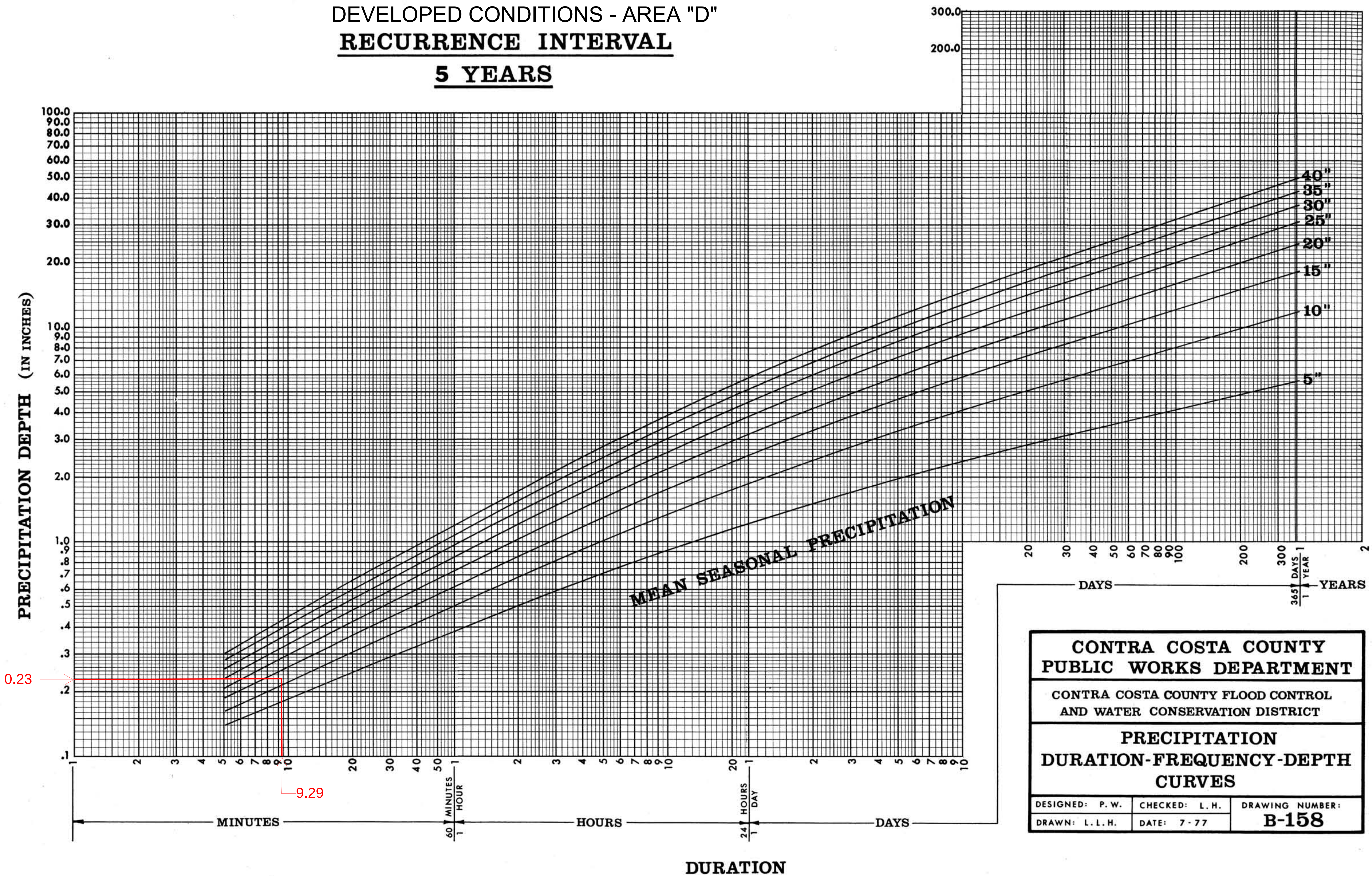
RECURRENCE INTERVAL

50 YEARS





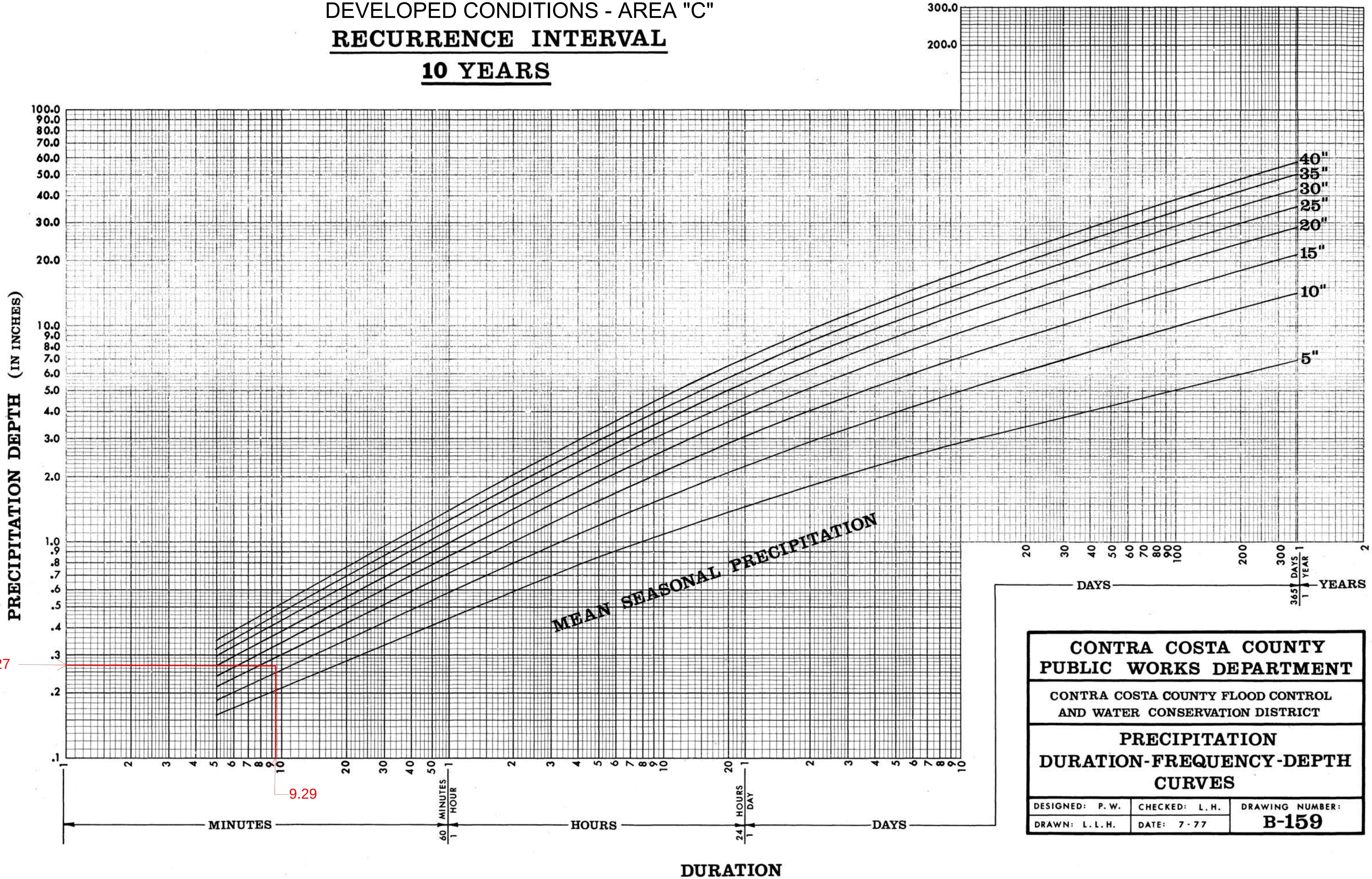
DEVELOPED CONDITIONS - AREA "C"
RECURRENCE INTERVAL
100 YEARS
PRECIPITATION DEPTH (IN INCHES)
MEAN SEASONAL PRECIPITATION
40"
35"
30"
25"
20"
15"
10"
5"
0.31
5.94
MINUTES
60 MINUTES
1 HOUR
HOURS
24 HOURS
1 DAY
DAYS
365 DAYS
1 YEAR
YEARS
DURATION
CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT
CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
PRECIPITATION
DURATION-FREQUENCY-DEPTH
CURVES
DESIGNED: P. W.
CHECKED: L. H.
DRAWING NUMBER:
DRAWN: L. L. H.
DATE: 7-77
B-162


DEVELOPED CONDITIONS - AREA "D"
RECURRENCE INTERVAL
5 YEARS
PRECIPITATION DEPTH (IN INCHES)
MEAN SEASONAL PRECIPITATION
40"
35"
30"
25"
20"
15"
10"
5"
0.23
9.29
MINUTES
HOURS
DAYS
YEARS
60 MINUTES
1 HOUR
24 HOURS
1 DAY
365 DAYS
1 YEAR
DURATION
CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT
CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
PRECIPITATION
DURATION-FREQUENCY-DEPTH
CURVES
DESIGNED: P. W.
CHECKED: L. H.
DRAWING NUMBER:
B-158
DRAWN: L. L. H.
DATE: 7-77

DEVELOPED CONDITIONS - AREA "C"

RECURRENCE INTERVAL

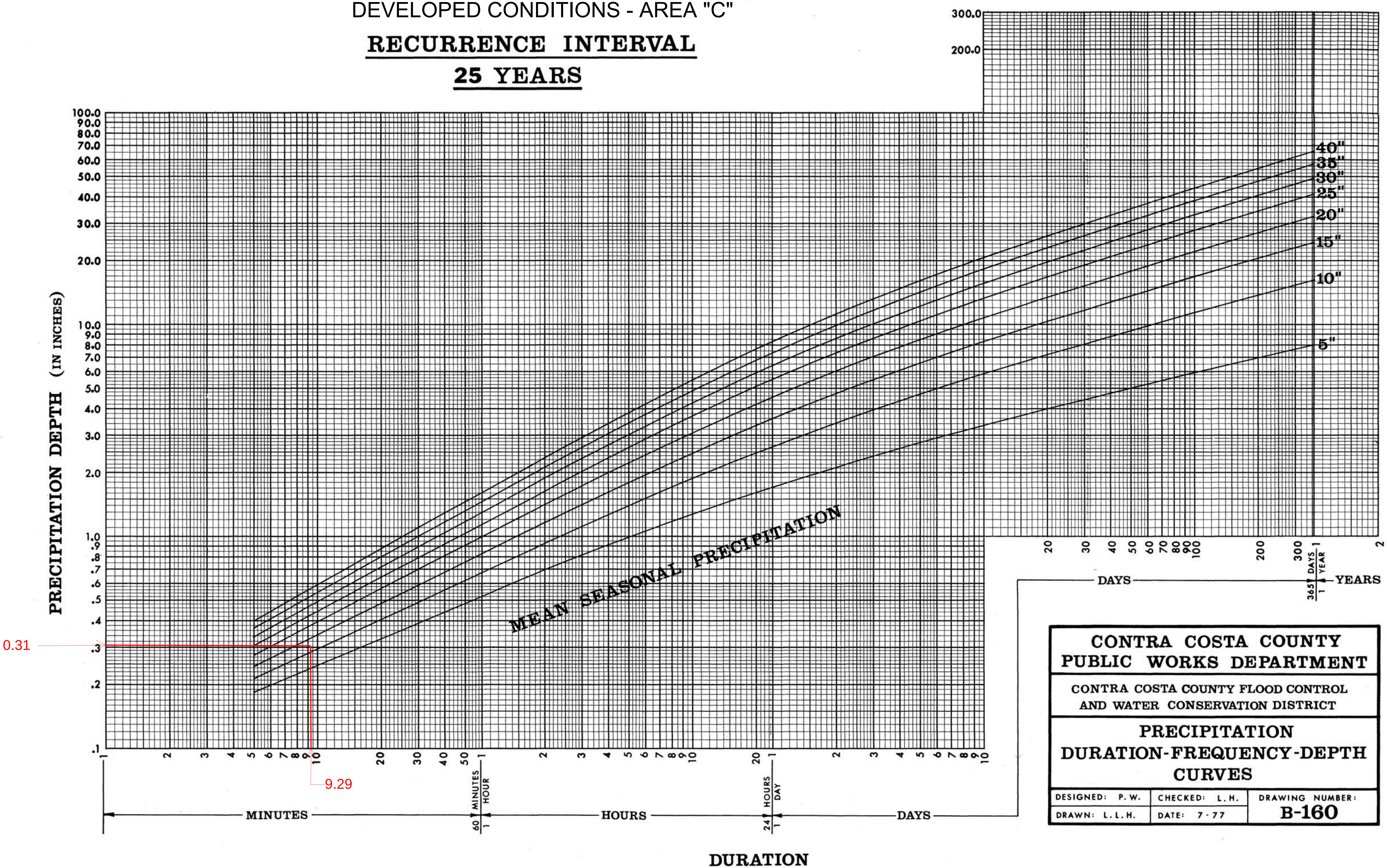
10 YEARS



DEVELOPED CONDITIONS - AREA "C"

RECURRENCE INTERVAL

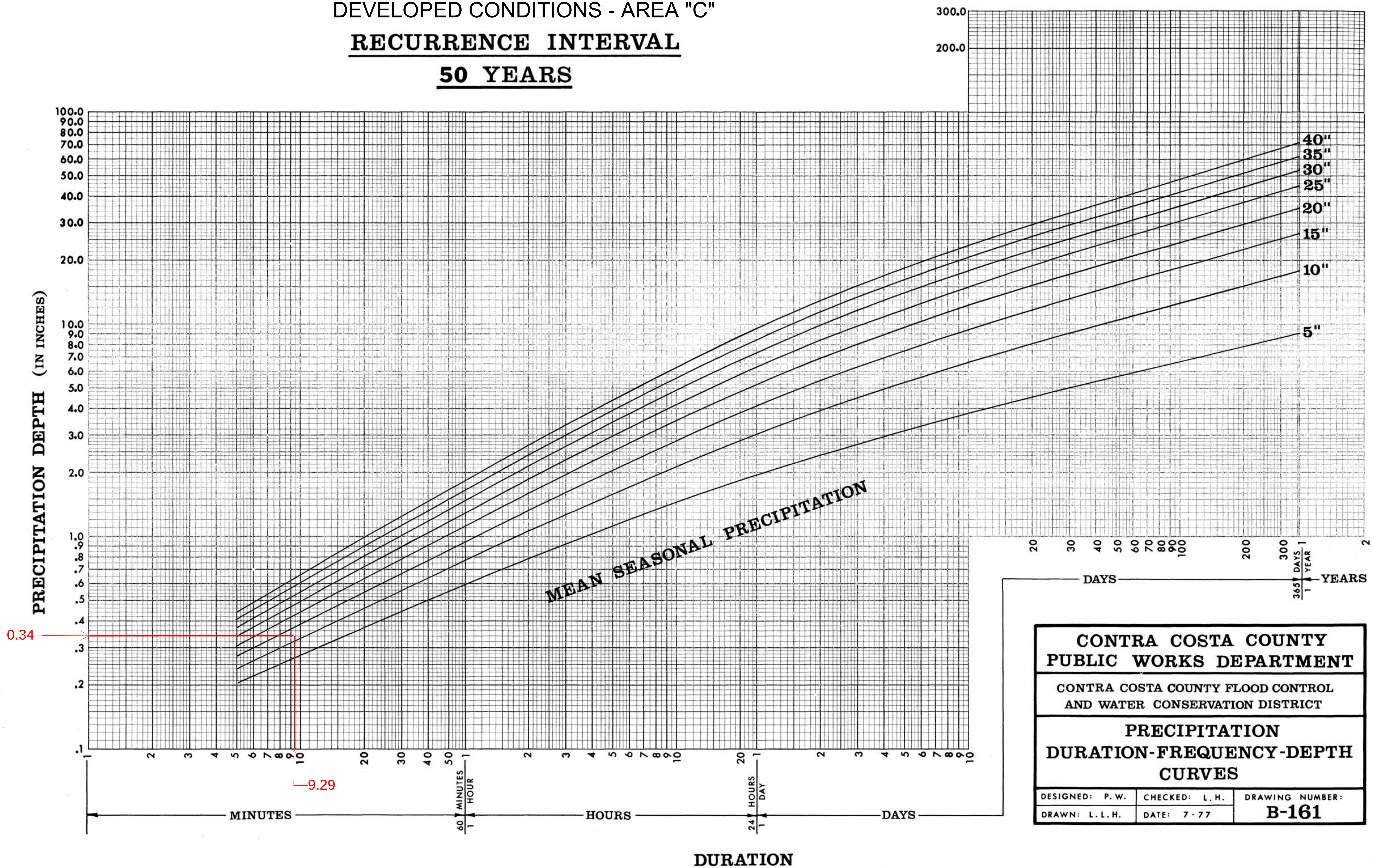
25 YEARS



DEVELOPED CONDITIONS - AREA "C"

RECURRENCE INTERVAL

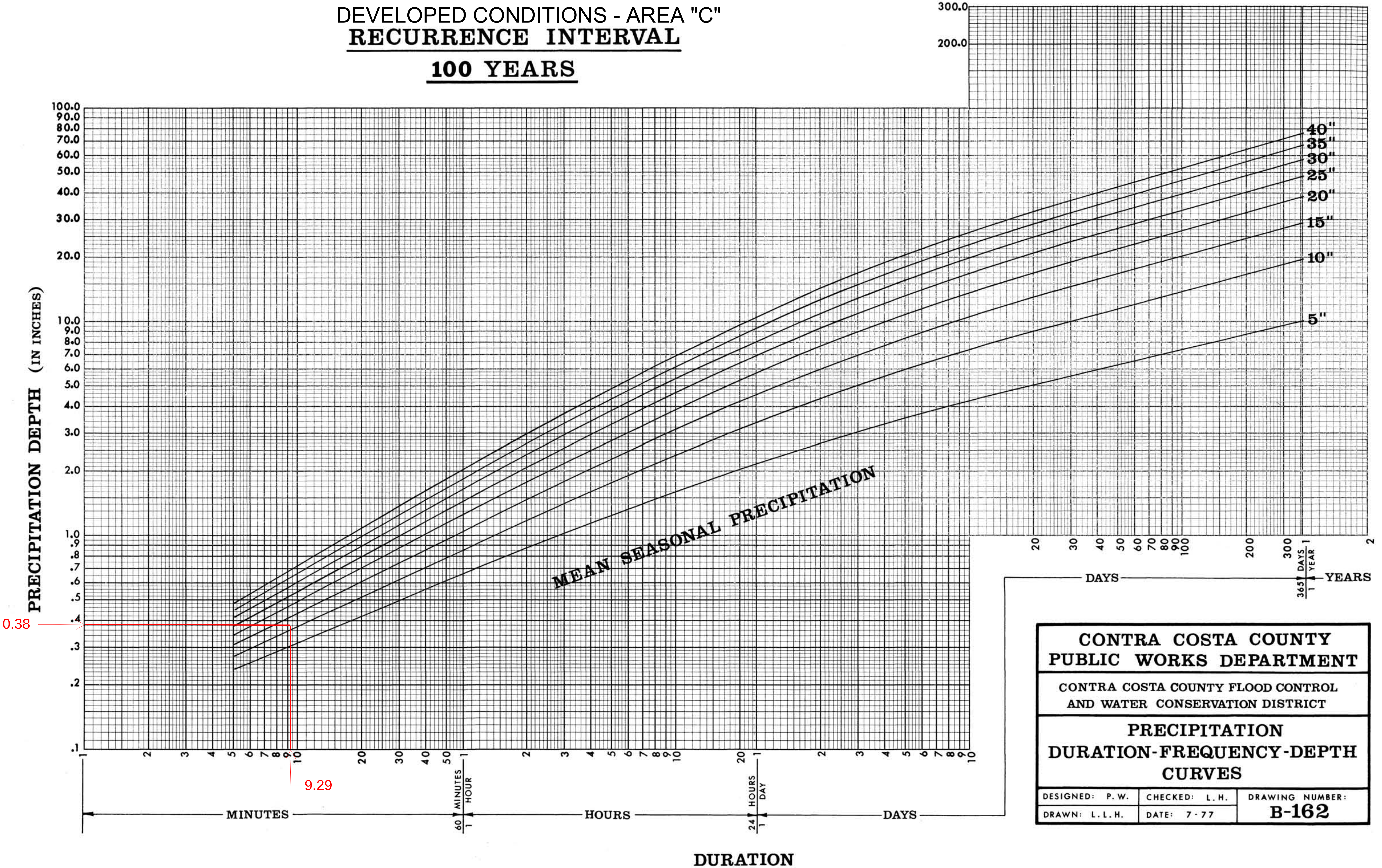
50 YEARS



DEVELOPED CONDITIONS - AREA "C"

RECURRENCE INTERVAL

100 YEARS



CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT		
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES		
DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-162

EXHIBIT “E”

Existing Hydrologic Conditions
Study Map

EXHIBIT "E"
EXISTING CONDITION EXHIBIT
MARSH LANDING SOLAR SITE
CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA

MAP LEGEND

AREA "A"
1.00 AC
20% IMP
1 AC LOTS

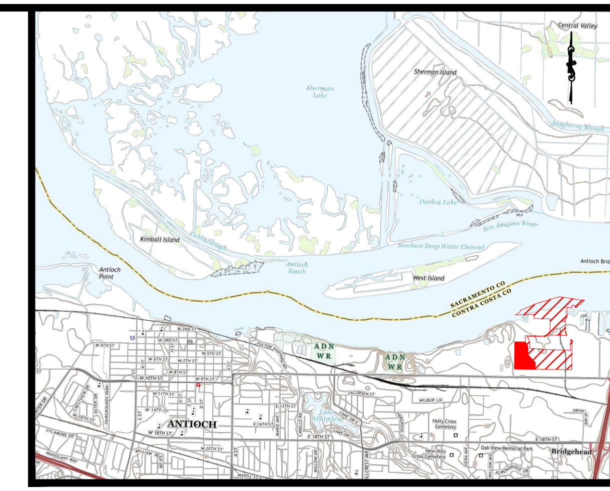
DRAINAGE AREA, SIZE, % IMPERVIOUS, & CLOSEST APPROXIMATED CLASSIFICATION

A 1 ELEV = 100.00
Q_{100-1} = 1.0CFS

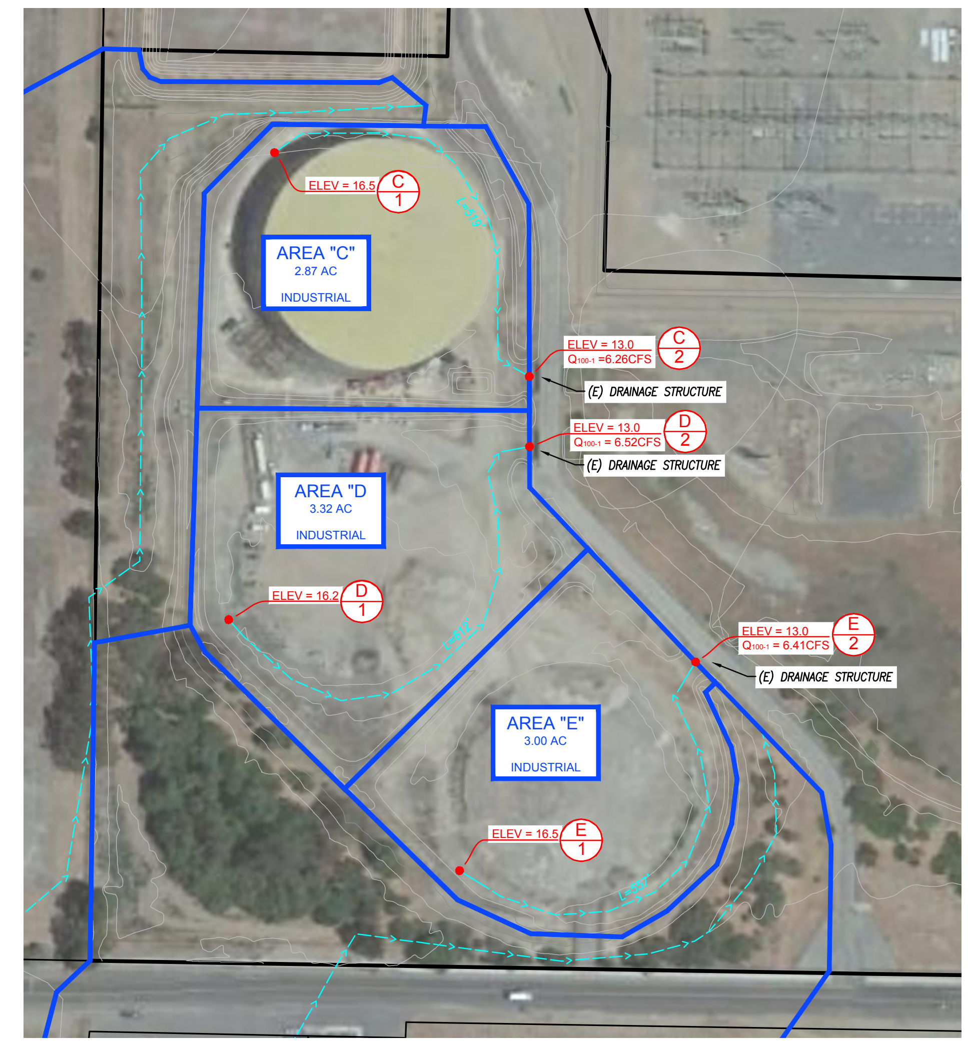
RATIONAL METHOD NODE LOCATION, ELEVATION, & TOTAL PEAK $Q_{YEAR/HOUR}$

DRAINAGE AREA LIMITS

FLOW PATHS



VICINITY MAP



ON-SITE DETAIL

VERTICAL DATUM:

TOPOGRAPHIC DATA SHOWN HEREON IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

100 0 100 200 300
SCALE: 1"=100'

EXISTING CONDITION EXHIBIT
MARSH LANDING SOLAR SITE
CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA

PREPARED BY: BONADIMAN
JOSEPH E. BONADIMAN & ASSOCIATES, INC.
ENGINEERING • G.I.S. • SURVEYING • PLANNING
TEL. (909) 885-3806

PREPARED FOR: nrg. Renew

BY	MARK	REVISION DESCRIPTION	DATE

PREPARED FOR:	NRG RENEW, LLC
JOB NO:	154219
PREPARED BY:	JTS
CHECKED BY:	JTS

NOTE: *JOSEPH E. BONADIMAN & ASSOCIATES, INC. DOES NOT WARRANT THE ACCURACY OF THE G.I.S. DATA PRESENTED IN THIS EXHIBIT. THIS EXHIBIT MAY CONTAIN INFORMATION COPYRIGHTED TO THE COUNTY OF KERN, CA.*

EXISTING CONDITION EXHIBIT
MARSH LANDING SOLAR SITE
IN THE CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 02-22-17

E

SHEET 1 OF 1

EXHIBIT “F”

Developed Hydrologic Conditions
Study Map

EXHIBIT "F"
DEVELOPED CONDITION EXHIBIT
MARSH LANDING SOLAR SITE
CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA

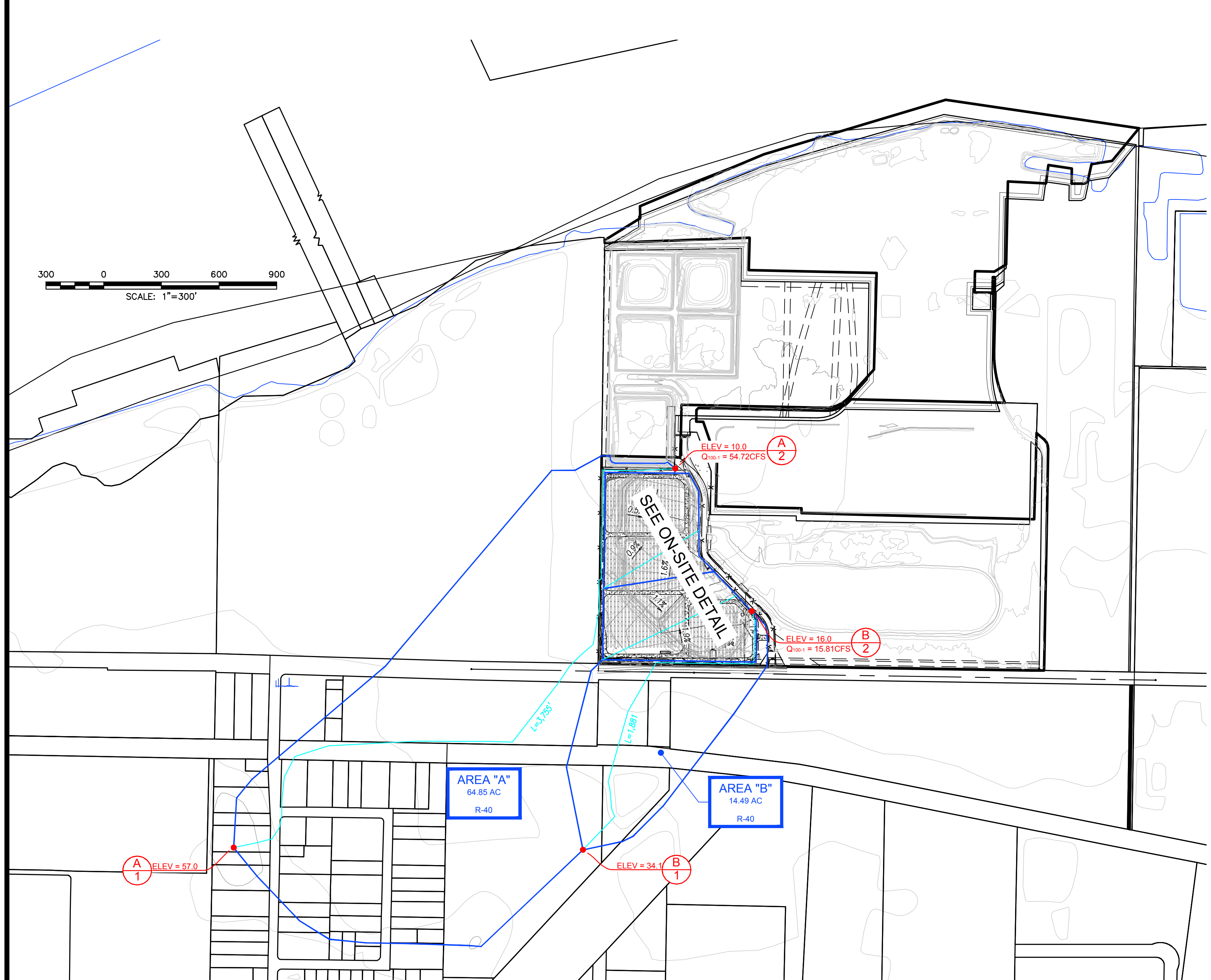
MAP LEGEND

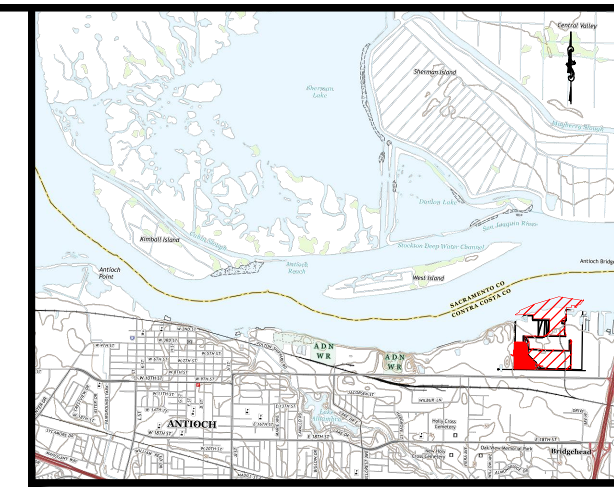
AREA "A" 1.00 AC 20% IMP 1 AC LOTS — DRAINAGE AREA, SIZE, % IMPERVIOUS, & CLOSEST APPROXIMATED CLASSIFICATION

A 1 ELEV = 100.00 Q_{100-1} = 1.0CFS — RATIONAL METHOD NODE LOCATION, ELEVATION, & TOTAL PEAK $Q_{YEAR\text{-}HOUR}$

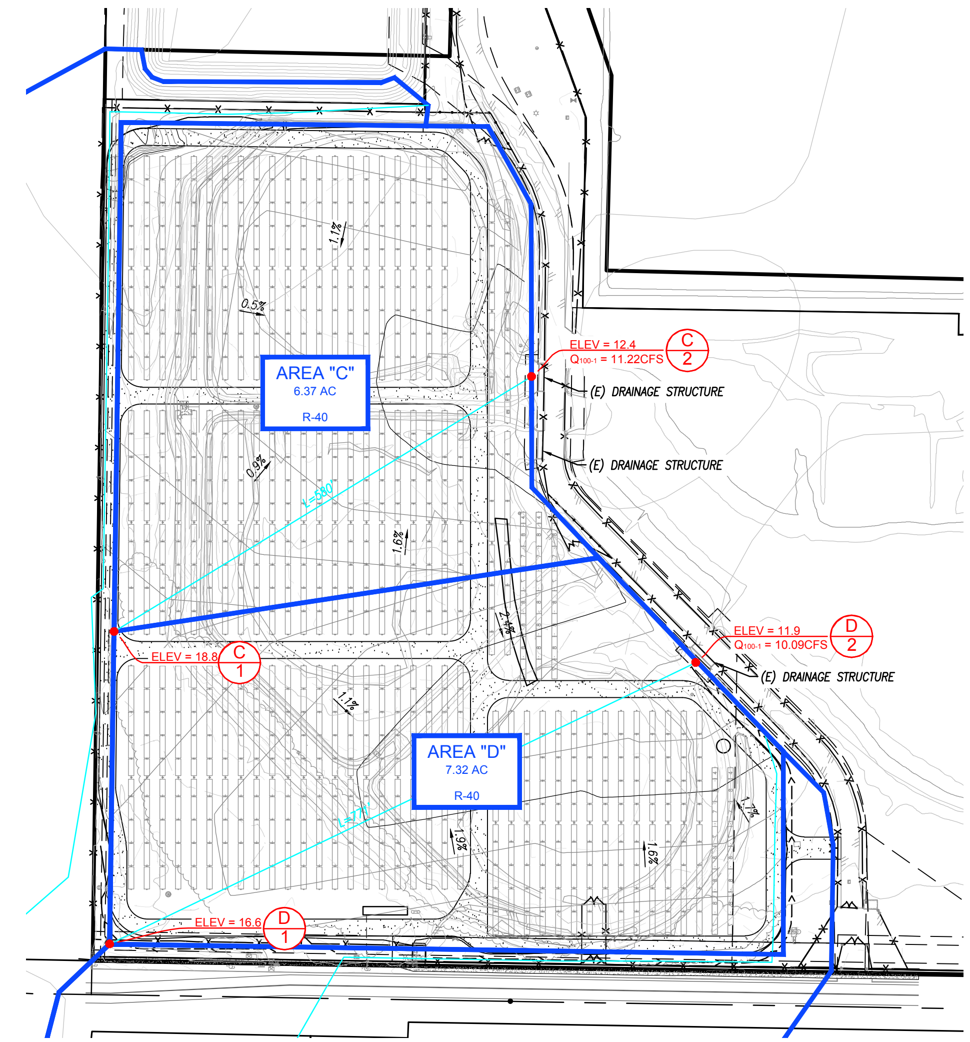
DRAINAGE AREA LIMITS

FLOW PATHS





VICINITY MAP



ON-SITE DETAIL

VERTICAL DATUM:

TOPOGRAPHIC DATA SHOWN HEREON IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

100 0 100 200 300
SCALE: 1"=100'

DEVELOPED CONDITION EXHIBIT
MARSH LANDING SOLAR SITE
CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA

PREPARED BY: BONADIMAN — JOSEPH E. BONADIMAN & ASSOCIATES, INC. ENGINEERING • G.I.S. • SURVEYING • PLANNING — TEL. (909) 885-3806

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DEVELOPED CONDITION EXHIBIT
MARSH LANDING SOLAR SITE
IN THE CITY OF ANTIOCH, CONTRA COSTA COUNTY, CA

DISREGARD PRINTS BEARING EARLIER REVISION DATES 02-22-17

F

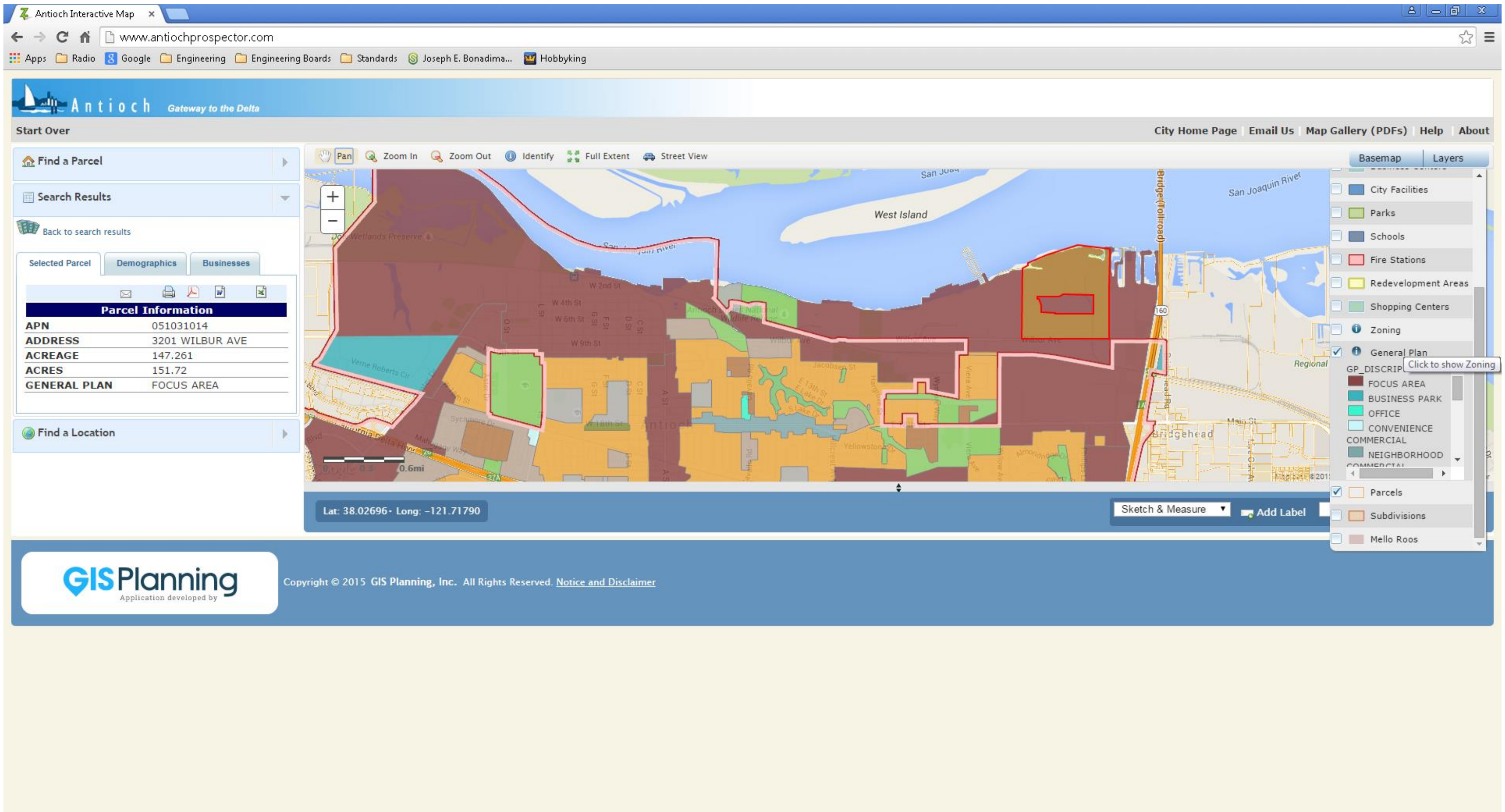
SHEET 1 OF 1

ATTACHMENT 1

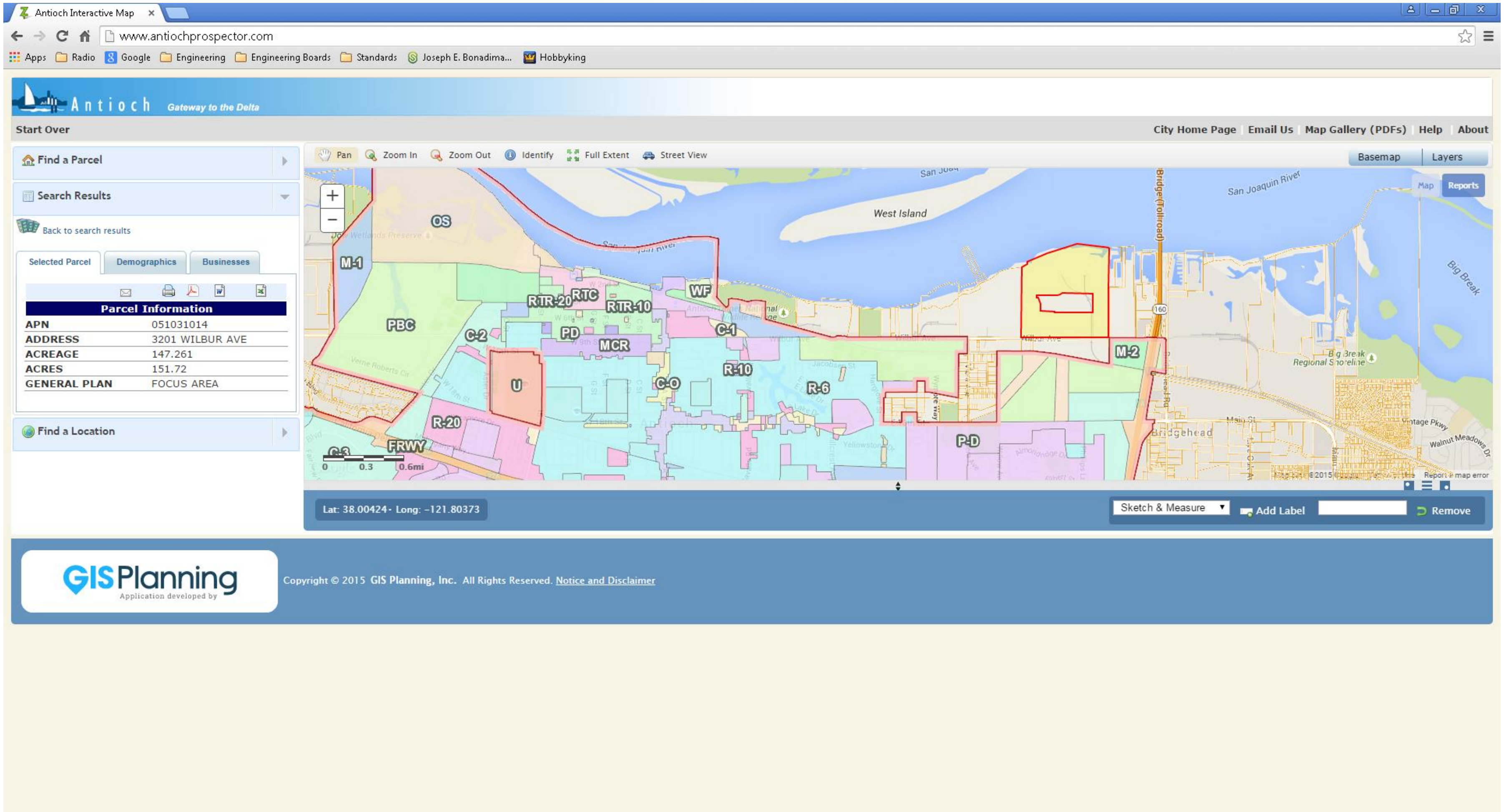
City of Antioch

"Zoning" Map

Marsh Landing Solar Site
City of Antioch ~ Gereral Plan



Marsh Landing Solar Site
City of Antioch ~ Zoning Map



ATTACHMENT 2

Project Best Management Practices
(BMPs)

Site Design & Landscape Planning SD-10

Design Objectives

☑ Maximize Infiltration
☑ Provide Retention
☑ Slow Runoff
☑ Minimize Impervious Land Coverage
Prohibit Dumping of Improper Materials
Contain Pollutants
Collect and Convey

Description
Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach
Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications
Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations
Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

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Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.

- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.

- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.

- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

- Promote natural vegetation by using parking lot islands and other landscaped areas.

- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.

- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “ redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Trash Storage Areas SD-32

Design Objectives

Maximize Infiltration

Provide Retention

Slow Runoff

Minimize Impervious Land Coverage

Prohibit Dumping of Improper Materials

☑ Contain Pollutants

Collect and Convey

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.

- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

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