CH2M HILL
2485 Natomas Park Drive
Suite 600
Sacramento, Ca 95833
Tel 916-920-0300
Fax 916-920-8463

CH2M HILL

February 11, 2008
357891

DOCKET
07-AFC-5
DATE FEB 1 1 2008
RECD. FEB 1 1 2008

Mr. Jack Caswell
California Energy Commission
Systems Assessment and Facilities Siting Division
1516 9th Street, MS 15
Sacramento, CA 95814-5504

RE: Data Response, Set 1B
Ivanpah Solar Electric Generating System (07-AFC-5)

Dear Mr. Caswell:

On behalf of Solar Partners I, LLC, Solar Partners II, LLC, Solar Partners IV, LLC, and Solar Partners VIII, LLC, please find attached one original and 12 hard copies of Data Response, Set 1B, which provide supplemental responses to Staff's data requests dated December 12, 2007.

Included in this submittal are the following oversize documents. The number of copies provided is shown in parenthesis. Please let us know if you need more hard copies. Electronic copies of these documents will be provided to the parties upon request.

- Attachment DR19-1, Delineation of Waters of the United States for the Ivanpah Solar Energy Project (13 copies)
- Attachment DR57-1, Preliminary Draft Drainage, Erosion, and Sediment Control Plan (7 copies)
- Attachment DR93-1B, Final Interconnection System Impact Study for DPT 1 (i.e., Ivanpah 2) (5 copies)

Please call me if you have any questions.

Sincerely,

CH2M HILL

John L. Carrier, J.D.
Program Manager

Enclosure
c: POS List
Project File

Ivanpah Solar Electric Generating System (ISEGS)

(07-AFC-5)

Data Response, Set 1B

(Response to Data Requests for: Project Description, Air Quality, Biological Resources, Cultural Resources, Land Use, Soil & Water, Traffic & Transportation, Transmission System Engineering and Visual Resources)

Submitted to the

California Energy Commission

Submitted by

Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC

February 11, 2008

With Assistance from

CH2MHILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833

Contents

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Introduction

Attached are supplemental responses (Set 1B) by Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC (Applicant) to the California Energy Commission (CEC) Staff's data requests for the Ivanpah Solar Electric Generating System (Ivanpah SEGS) Project (07-AFC-5). The CEC Staff served these data requests on December 12, 2007, as part of the discovery process for Ivanpah SEGS. As with Data Response, Set 1A, the responses are grouped by individual discipline or topic area. Within each discipline area, the responses are presented in the same order as CEC Staff presented them and are keyed to the Data Request numbers (1 through 116). New graphics or tables are numbered in reference to the Data Request number. For example, the first table used in response to Data Request 15 would be numbered Table DR15-1. The first figure used in response to Data Request 15 would be Figure DR15-1, and so on. AFC figures or tables that have been revised have "R1" following the original number, indicating revision 1.

Additional tables, figures, or documents submitted in response to a data request (supporting data, stand-alone documents such as plans, folding graphics, etc.) are found at the end of a discipline-specific section and may not be sequentially page-numbered consistently with the remainder of the document, though they may have their own internal page numbering system.

The Applicant looks forward to working cooperatively with the CEC and Bureau of Land Management (BLM) staff as the Ivanpah SEGS Project proceeds through the siting process. We trust that these responses address the Staff's questions and remain available to have any additional dialogue the Staff may require.

Project Description (5-6)

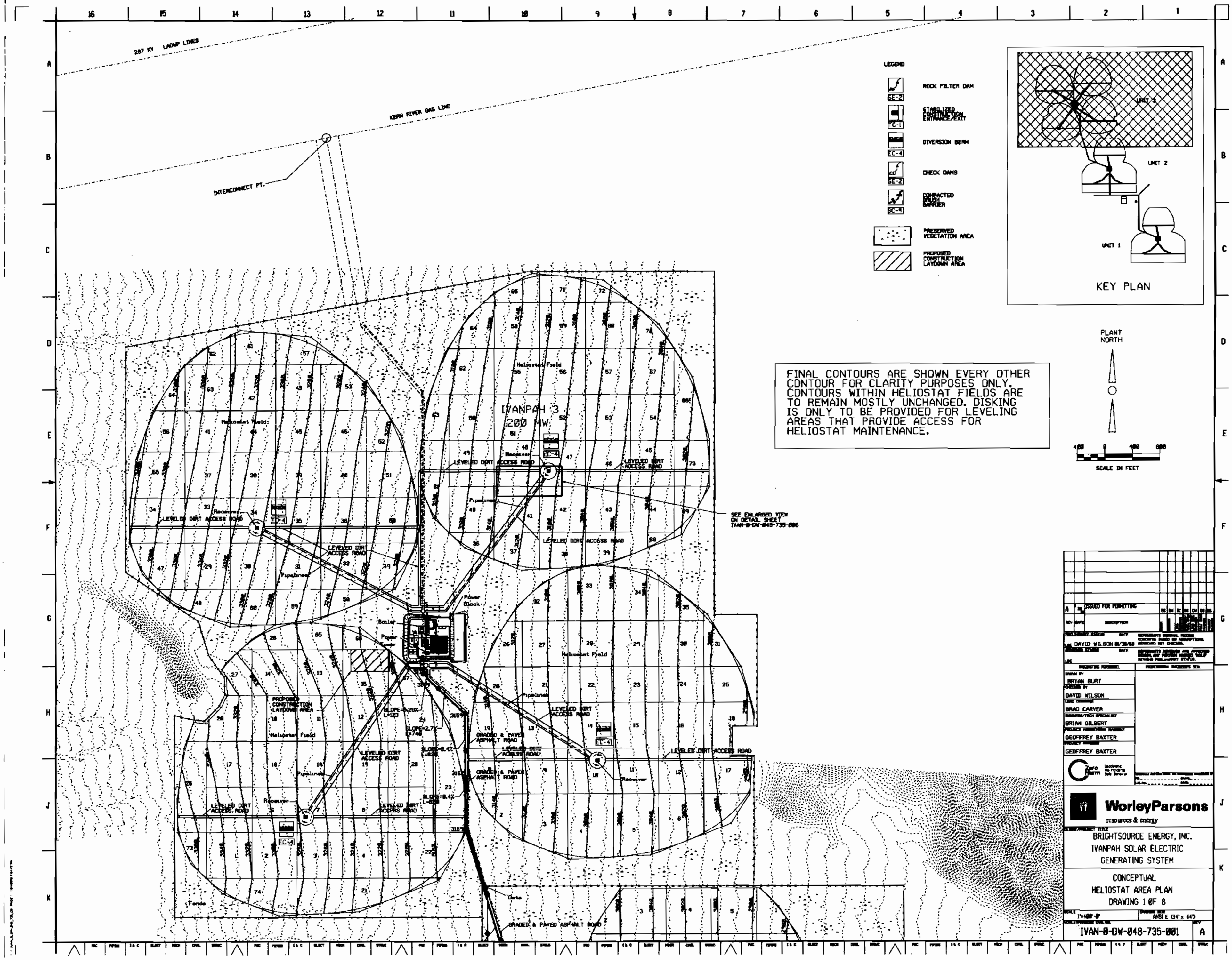
Background

Plan of Development, 2.15.3 Distributed Power Tower and Heliostat Erection cites that excavation spoils would be stored in an approved area of the site. Heliostat Construction cites a pre-casting shed would be adjacent to the batch plant, outside the plant entrance.

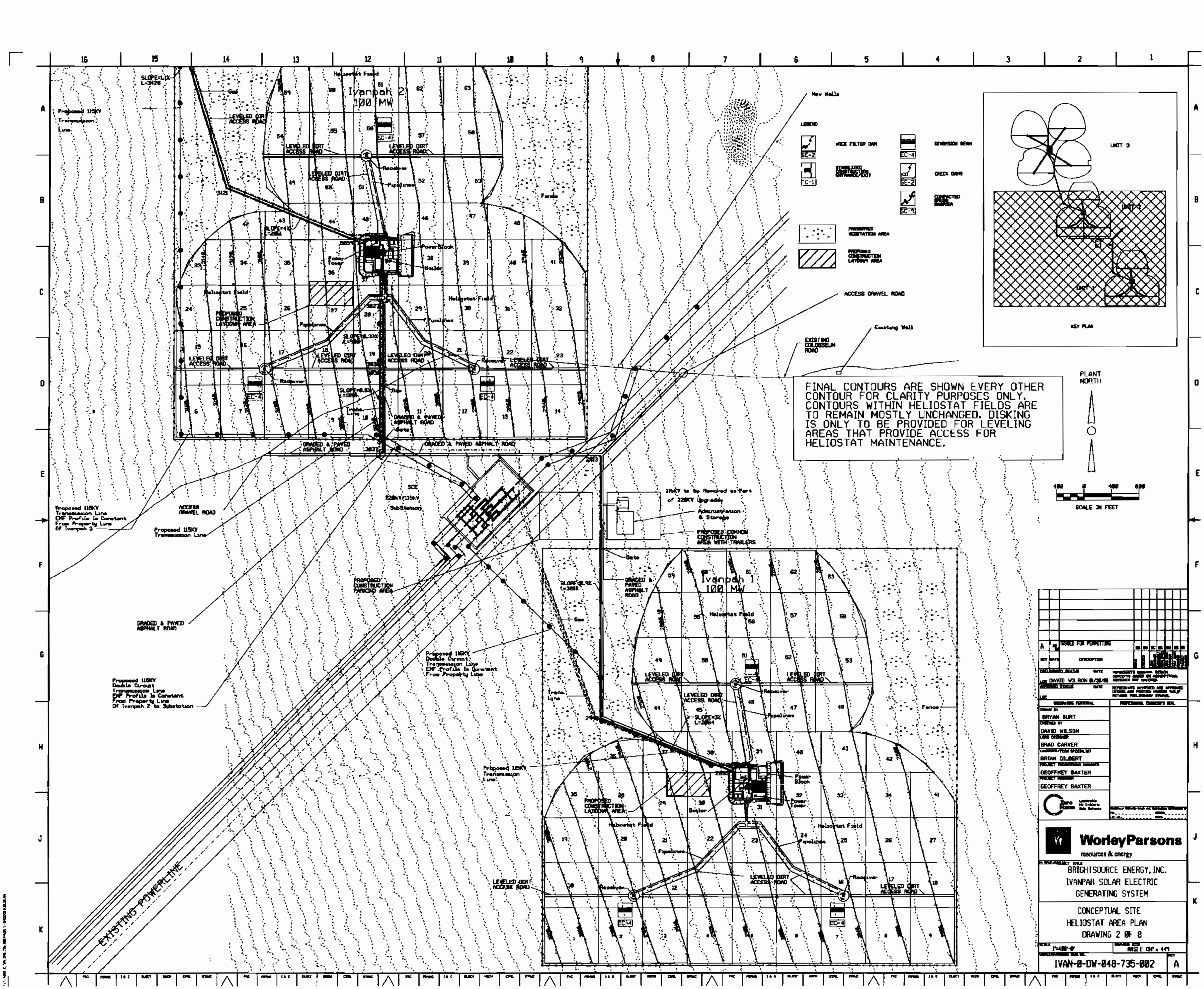
Data Request

6. Describe and plot spoils storage location, confirming the location would be located within the proposed project footprint or an added acreage.

Response: The spoil storage areas have been designated as shown on drawings Ivan-0-DW112-735-003, Ivan-0-DW-048-735-004 and Ivan-0-DW-048-735-005 (the eight conceptual drawings are provided at the send of this section). Spoil storage areas are to be sited adjacent to each power block located within the proposed project footprint. A brush barrier consisting of native vegetation is to be installed down slope of each spoils storage location to promote sediment deposition.



287 KV LADWP LINES
KERN RIVER GAS LINE
INTERCONNECT PT.
LEGEND
ROCK FILTER DAM
STABILIZED CONSTRUCTION ENTRANCE/EXIT
DIVERSION BERM
CHECK DAMS
COMPACTED BRUSH BARRIER
PRESERVED VEGETATION AREA
PROPOSED CONSTRUCTION LAYDOWN AREA
UNIT 1
UNIT 2
UNIT 3
KEY PLAN
PLANT NORTH
SCALE IN FEET
FINAL CONTOURS ARE SHOWN EVERY OTHER CONTOUR FOR CLARITY PURPOSES ONLY. CONTOURS WITHIN HELIOSTAT FIELDS ARE TO REMAIN MOSTLY UNCHANGED. DISKING IS ONLY TO BE PROVIDED FOR LEVELING AREAS THAT PROVIDE ACCESS FOR HELIOSTAT MAINTENANCE.
IVANPAH 3
200 MW
SEE ENLARGED VIEW ON DETAIL SHEET IVAN-0-DW-048-735-006
Heliostat Field
LEVELED DIRT ACCESS ROAD
Receiver
Pipelines
Power Block
Boiler
PROPOSED CONSTRUCTION LAYDOWN AREA
GRADED & PAVED ASPHALT ROAD
Gate
Fence
ISSUED FOR PERMITTING
DAVID WILSON
BRYAN BURT
BRAD CARVER
BRIAN GILBERT
GEOFFREY BAXTER
WorleyParsons
resources & energy
BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM
CONCEPTUAL
HELIOSTAT AREA PLAN
DRAWING 1 OF 8
ANSI E (34" x 44")
IVAN-0-DW-048-735-001
A


Ivanpah 2
100 MW
Ivanpah 1
100 MW
Heliostat Field
LEVELED DIRT ACCESS ROAD
Receiver
Pipelines
Power Block
Power Tower
Boiler
PROPOSED CONSTRUCTION LAYDOWN AREA
GRADED & PAVED ASPHALT ROAD
ACCESS GRAVEL ROAD
SCE 220KV/115KV Substation
PROPOSED CONSTRUCTION PARKING AREA
115KV to be Removed as Part of 220KV Upgrade
Administration & Storage
PROPOSED COMMON CONSTRUCTION AREA WITH TRAILERS
Gate
Gas
Fence
Trans. Line
Proposed 115KV Transmission Line
Proposed 115KV Double Circuit Transmission Line EMF Profile is Constant From Property Line
Proposed 115KV Double Circuit Transmission Line EMF Profile is Constant From Property Line Of Ivanpah 2 to Substation
Proposed 115KV Transmission Line EMF Profile is Constant From Property Line Of Ivanpah 3
EXISTING POWERLINE
New Wells
Existing Well
EXISTING COLOSSEUM ROAD
LEGEND
ROCK FILTER DAM
STABILIZED CONSTRUCTION ENTRANCE/EXIT
DIVERSION BERM
CHECK DAMS
PRESERVED VEGETATION AREA
PROPOSED CONSTRUCTION LAYDOWN AREA
UNIT 3
UNIT 2
UNIT 1
KEY PLAN
FINAL CONTOURS ARE SHOWN EVERY OTHER CONTOUR FOR CLARITY PURPOSES ONLY. CONTOURS WITHIN HELIOSTAT FIELDS ARE TO REMAIN MOSTLY UNCHANGED. DISKING IS ONLY TO BE PROVIDED FOR LEVELING AREAS THAT PROVIDE ACCESS FOR HELIOSTAT MAINTENANCE.
PLANT NORTH
SCALE IN FEET
A ISSUED FOR PERMITTING
DAVID WILSON
BRYAN BURT
DAVID WILSON
BRAD CARVER
BRIAN GILBERT
GEOFFREY BAXTER
GEOFFREY BAXTER
WorleyParsons
resources & energy
BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM
CONCEPTUAL SITE
HELIOSTAT AREA PLAN
DRAWING 2 OF 8
1"=400'-0"
ANSI E (34" x 44")
IVAN-0-DW-048-735-002
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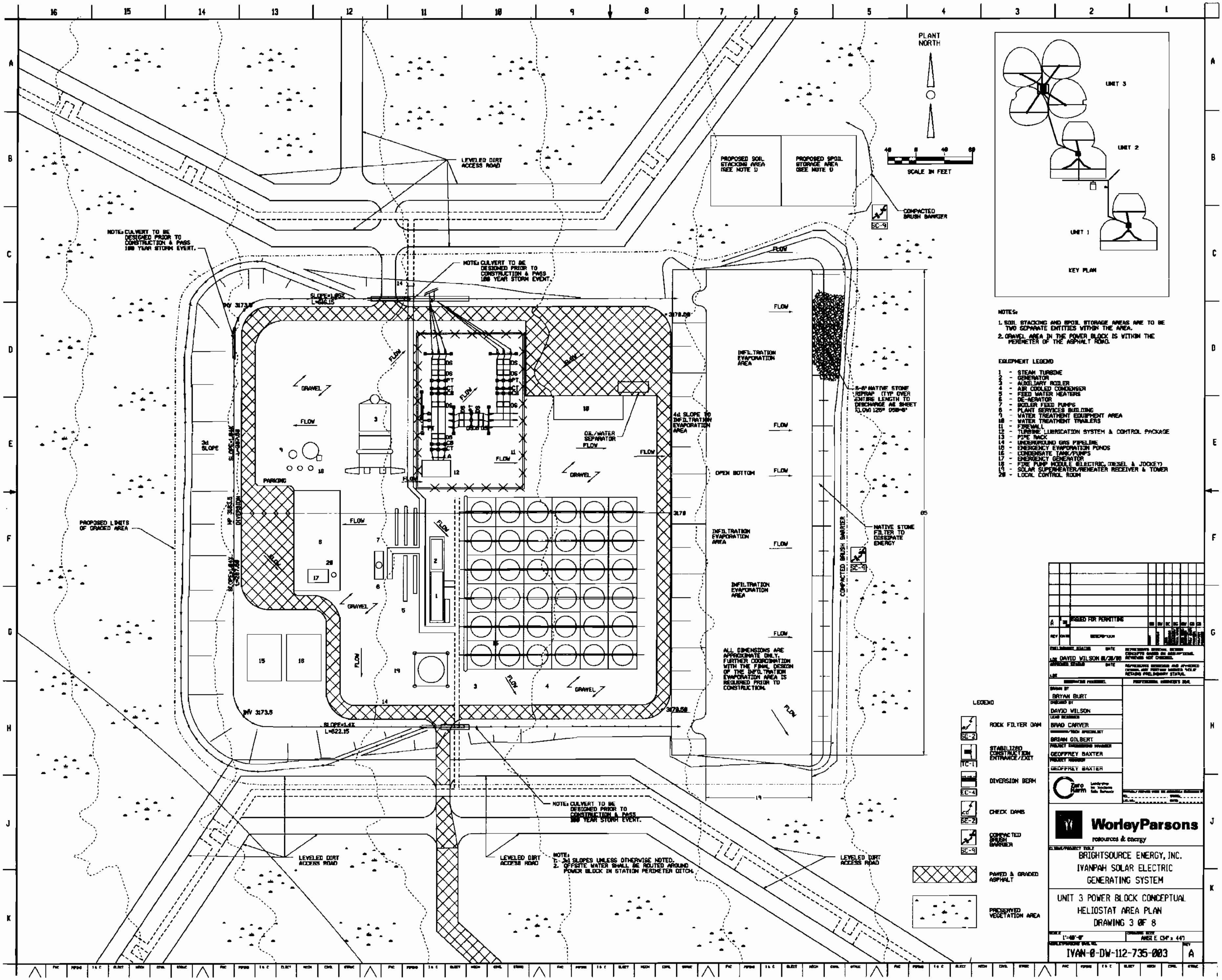
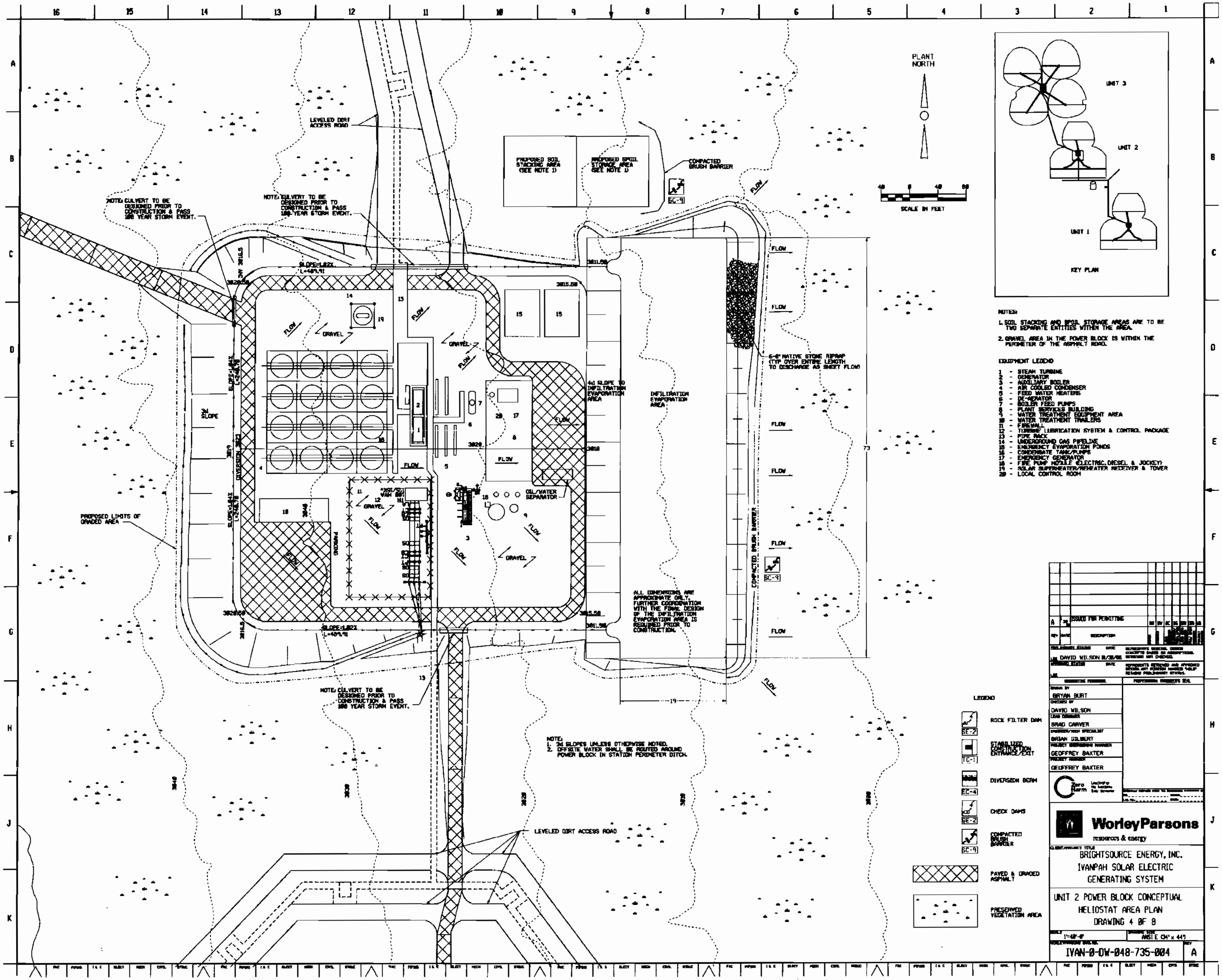
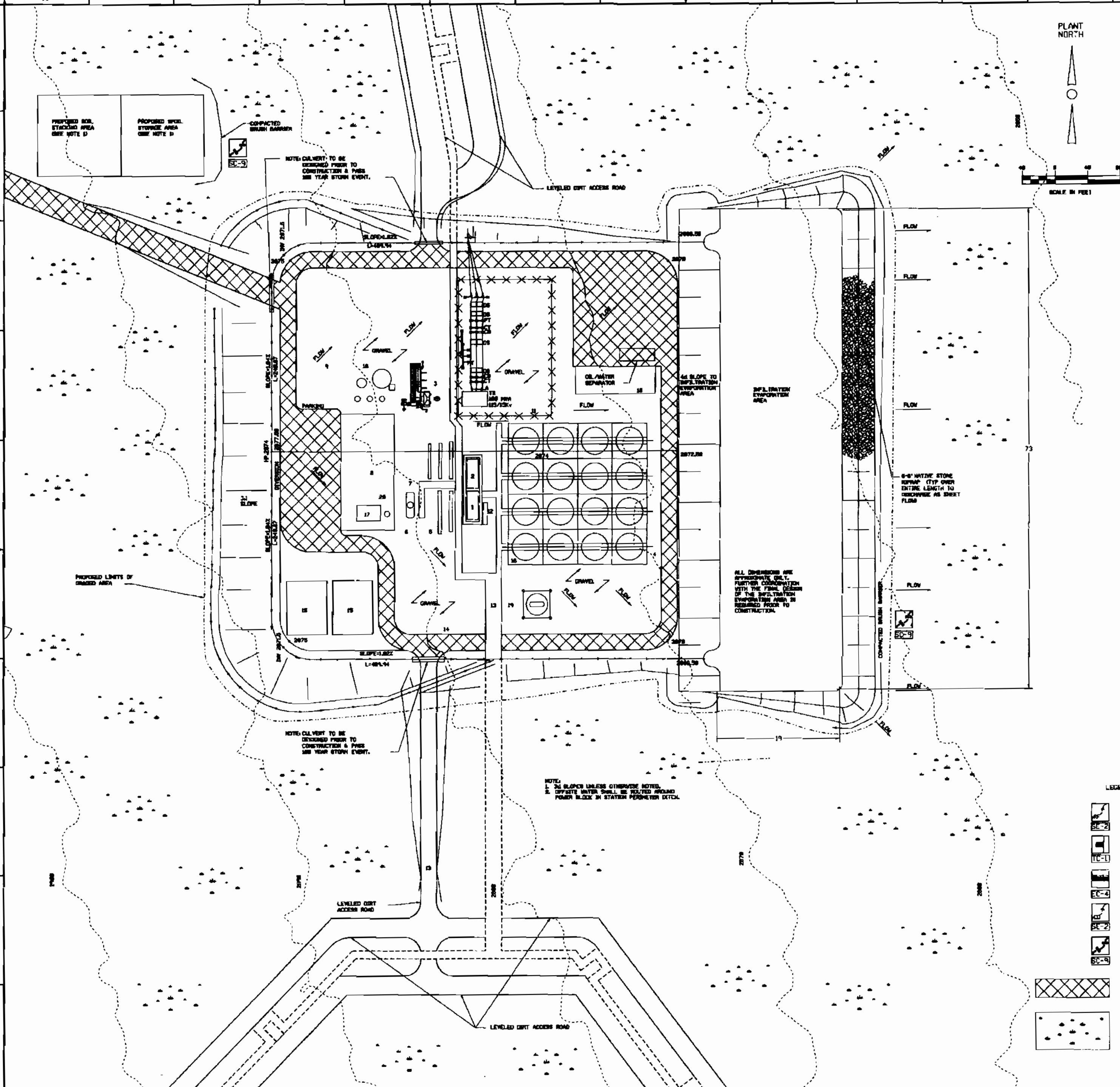
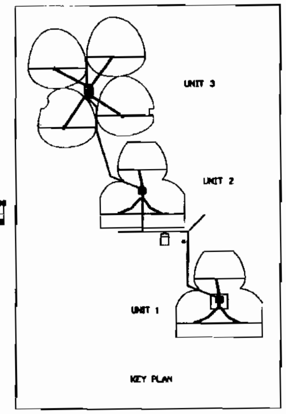

PLANT NORTH
SCALE IN FEET
COMPACTED BRUSH BARRIER
PROPOSED SOIL STACKING AREA (SEE NOTE 1)
PROPOSED SPOIL STORAGE AREA (SEE NOTE 1)
LEVELED DIRT ACCESS ROAD
NOTE: CULVERT TO BE DESIGNED PRIOR TO CONSTRUCTION & PASS 100 YEAR STORM EVENT.
PROPOSED LIMITS OF GRADED AREA
INFILTRATION EVAPORATION AREA
OPEN BOTTOM
ALL DIMENSIONS ARE APPROXIMATE ONLY. FURTHER COORDINATION WITH THE FINAL DESIGN OF THE INFILTRATION EVAPORATION AREA IS REQUIRED PRIOR TO CONSTRUCTION.
NATIVE STONE FILTER TO DISSIPATE ENERGY
OIL/WATER SEPARATOR
GRAVEL
FLOW
PARKING
UNIT 3
UNIT 2
UNIT 1
KEY PLAN
NOTES:
1. SOIL STACKING AND SPOIL STORAGE AREAS ARE TO BE TWO SEPARATE ENTITIES WITHIN THE AREA.
2. GRAVEL AREA IN THE POWER BLOCK IS WITHIN THE PERIMETER OF THE ASPHALT ROAD.
EQUIPMENT LEGEND
1 - STEAM TURBINE
2 - GENERATOR
3 - AUXILIARY BOILER
4 - AIR COOLED CONDENSER
5 - FEED WATER HEATERS
6 - DE-AERATOR
7 - BOILER FEED PUMPS
8 - PLANT SERVICES BUILDING
9 - WATER TREATMENT EQUIPMENT AREA
10 - WATER TREATMENT TRAILERS
11 - FIREWALL
12 - TURBINE LUBRICATION SYSTEM & CONTROL PACKAGE
13 - PIPE RACK
14 - UNDERGROUND GAS PIPELINE
15 - EMERGENCY EVAPORATION PONDS
16 - CONDENSATE TANK/PUMPS
17 - EMERGENCY GENERATOR
18 - FIRE PUMP MODULE (ELECTRIC, DIESEL & JOCKEY)
19 - SOLAR SUPERHEATER/REHEATER RECEIVER & TOWER
20 - LOCAL CONTROL ROOM
NOTE:
1. 3:1 SLOPES UNLESS OTHERWISE NOTED.
2. OFFSITE WATER SHALL BE ROUTED AROUND POWER BLOCK IN STATION PERIMETER DITCH.
LEGEND
ROCK FILTER DAM
STABILIZED CONSTRUCTION ENTRANCE/EXIT
DIVERSION BERM
CHECK DAMS
COMPACTED BRUSH BARRIER
PAVED & GRADED ASPHALT
PRESERVED VEGETATION AREA
A ISSUED FOR PERMITTING
DAVID WILSON
BRYAN BURT
BRAD CARVER
BRIAN GILBERT
GEOFFREY BAXTER
WorleyParsons
resources & energy
BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC
GENERATING SYSTEM
UNIT 3 POWER BLOCK CONCEPTUAL
HELIOSTAT AREA PLAN
DRAWING 3 OF 8
ANSI E (34" x 44")
IVAN-0-DW-112-735-003
A


PLANT NORTH
SCALE IN FEET
UNIT 3
UNIT 2
UNIT 1
KEY PLAN
NOTES:
1. SOIL STACKING AND SPOIL STORAGE AREAS ARE TO BE TWO SEPARATE ENTITIES WITHIN THE AREA.
2. GRAVEL AREA IN THE POWER BLOCK IS WITHIN THE PERIMETER OF THE ASPHALT ROAD.
EQUIPMENT LEGEND
1 - STEAM TURBINE
2 - GENERATOR
3 - AUXILIARY BOILER
4 - AIR COOLED CONDENSER
5 - FEED WATER HEATERS
6 - DE-AERATOR
7 - BOILER FEED PUMPS
8 - PLANT SERVICES BUILDING
9 - WATER TREATMENT EQUIPMENT AREA
10 - WATER TREATMENT TRAILERS
11 - FIREWALL
12 - TURBINE LUBRICATION SYSTEM & CONTROL PACKAGE
13 - PIPE RACK
14 - UNDERGROUND GAS PIPELINE
15 - EMERGENCY EVAPORATION PONDS
16 - CONDENSATE TANK/PUMPS
17 - EMERGENCY GENERATOR
18 - FIRE PUMP MODULE (ELECTRIC, DIESEL & JOCKEY)
19 - SOLAR SUPERHEATER/REHEATER RECEIVER & TOWER
20 - LOCAL CONTROL ROOM
LEVELED DIRT ACCESS ROAD
PROPOSED SOIL STACKING AREA (SEE NOTE 1)
PROPOSED SPOIL STORAGE AREA (SEE NOTE 1)
COMPACTED BRUSH BARRIER
NOTE: CULVERT TO BE DESIGNED PRIOR TO CONSTRUCTION & PASS 100 YEAR STORM EVENT.
NOTE: CULVERT TO BE DESIGNED PRIOR TO CONSTRUCTION & PASS 100-YEAR STORM EVENT.
6-8" NATIVE STONE RIPRAP (TYP OVER ENTIRE LENGTH TO DISCHARGE AS SHEET FLOW)
4:1 SLOPE TO INFILTRATION EVAPORATION AREA
INFILTRATION EVAPORATION AREA
ALL DIMENSIONS ARE APPROXIMATE ONLY. FURTHER COORDINATION WITH THE FINAL DESIGN OF THE INFILTRATION EVAPORATION AREA IS REQUIRED PRIOR TO CONSTRUCTION.
OIL/WATER SEPARATOR
PARKING
GRAVEL
FLOW
DIVERSION 3823
SLOPE=1.82%
L=489.91
SLOPE=1.84%
L=246.78
3:1 SLOPE
PROPOSED LIMITS OF GRADED AREA
NOTE:
1. 3:1 SLOPES UNLESS OTHERWISE NOTED.
2. OFFSITE WATER SHALL BE ROUTED AROUND POWER BLOCK IN STATION PERIMETER DITCH.
LEGEND
ROCK FILTER DAM
STABILIZED CONSTRUCTION ENTRANCE/EXIT
DIVERSION BERM
CHECK DAMS
COMPACTED BRUSH BARRIER
PAVED & GRADED ASPHALT
PRESERVED VEGETATION AREA
A ISSUED FOR PERMITTING
DAVID WILSON
BRYAN BURT
DAVID WILSON
BRAD CARVER
BRIAN GILBERT
GEOFFREY BAXTER
GEOFFREY BAXTER
WorleyParsons
resources & energy
BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC
GENERATING SYSTEM
UNIT 2 POWER BLOCK CONCEPTUAL
HELIOSTAT AREA PLAN
DRAWING 4 OF 8
ANSI E (34" x 44")
IVAN-0-DW-040-735-004
A





NOTES:

1. SOIL STACKING AND SPOIL STORAGE AREAS ARE TO BE TWO SEPARATE ENTITIES WITHIN THE AREA.
2. GRAVEL AREA IN THE POWER BLOCK IS WITHIN THE PERIMETER OF THE ASPHALT ROAD.

EQUIPMENT LEGEND

1 - STEAM TURBINE
2 - GENERATOR
3 - AUXILIARY BOILER
4 - AIR COOLED CONDENSER
5 - FEED WATER HEATERS
6 - DE-AERATOR
7 - BOILER FEED PUMPS
8 - PLANT SERVICES BUILDING
9 - WATER TREATMENT EQUIPMENT AREA
10 - WATER TREATMENT TRAILERS
11 - FIREWALL
12 - TURBINE LUBRICATION SYSTEM & CONTROL PACKAGE
13 - PIPE RACK
14 - UNDERGROUND GAS PIPELINE
15 - EMERGENCY EVAPORATION PONDS
16 - CONDENSATE TANK/PUMPS
17 - EMERGENCY GENERATOR
18 - FIRE PUMP MODULE (ELECTRIC, DIESEL & JOCKEY)
19 - SOLAR SUPERHEATER/REHEATER RECEIVER & TOWER
20 - LOCAL CONTROL ROOM

LEGEND

- SE-2 ROCK FILTER DAM
- TC-1 STABILIZED CONSTRUCTION ENTRANCE/EXIT
- EC-4 DIVERSION BERM
- SE-2 CHECK DAMS
- SE-9 COMPACTED BRUSH BARRIER
- PAVED & GRADED ASPHALT
- PRESERVED VEGETATION AREA

REV	DATE	DESCRIPTION
A		ISSUED FOR PERMITTING

DAVID WILSON 8/30/09

DRAWN BY: BRYAN BURT
CHECKED BY: DAVID WILSON
BRAD CARVER
BRIAN GILBERT
GEOFFREY BAXTER
GEOFFREY BAXTER

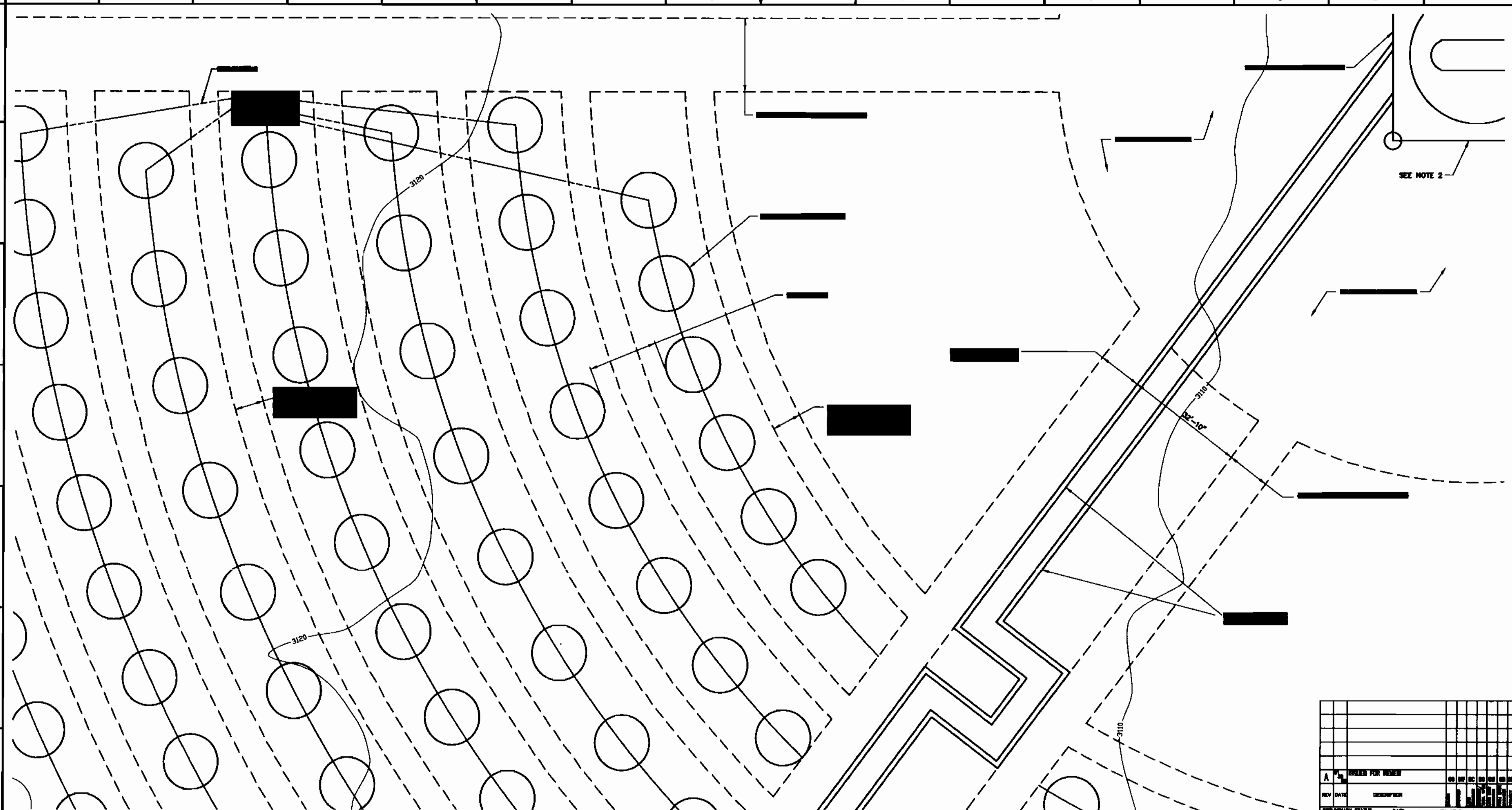
WorleyParsons
resources & energy

BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

UNIT 1 POWER BLOCK CONCEPTUAL
HELIOSTAT AREA PLAN
DRAWING 5 OF 8

SCALE 1"=40'-0" ANSI E (34" x 44")

IVAN-0-DW-048-735-005 REV A



TYPICAL BLOW-UP VIEW

LEGEND

PROPOSED HELIOSTAT MIRROR (CIRCLES SHOWN FOR CLARITY PURPOSES ONLY)

EXISTING MAJOR CONTOURS ——XXXX——

NOTES:

1. UTILITIES SERVING HELIOSTAT MIRRORS TO BE LOCATED BELOW GROUND ONLY AT ROAD CROSSINGS.
2. GRADING ONLY WITHIN FOOTPRINT OF PROPOSED RECEIVING TOWER.

PLANT NORTH

A — ISSUED FOR REVIEW

PRELIMINARY STATUS: DAVID WILSON 01/30/08

DRAWN BY: GREG GRANT
CHECKED BY: DAVID WILSON
LEAD ENGINEER: BRAD CARVER
BRIAN GILBERT
DAVID WILSON
GEOFFREY BAXTER

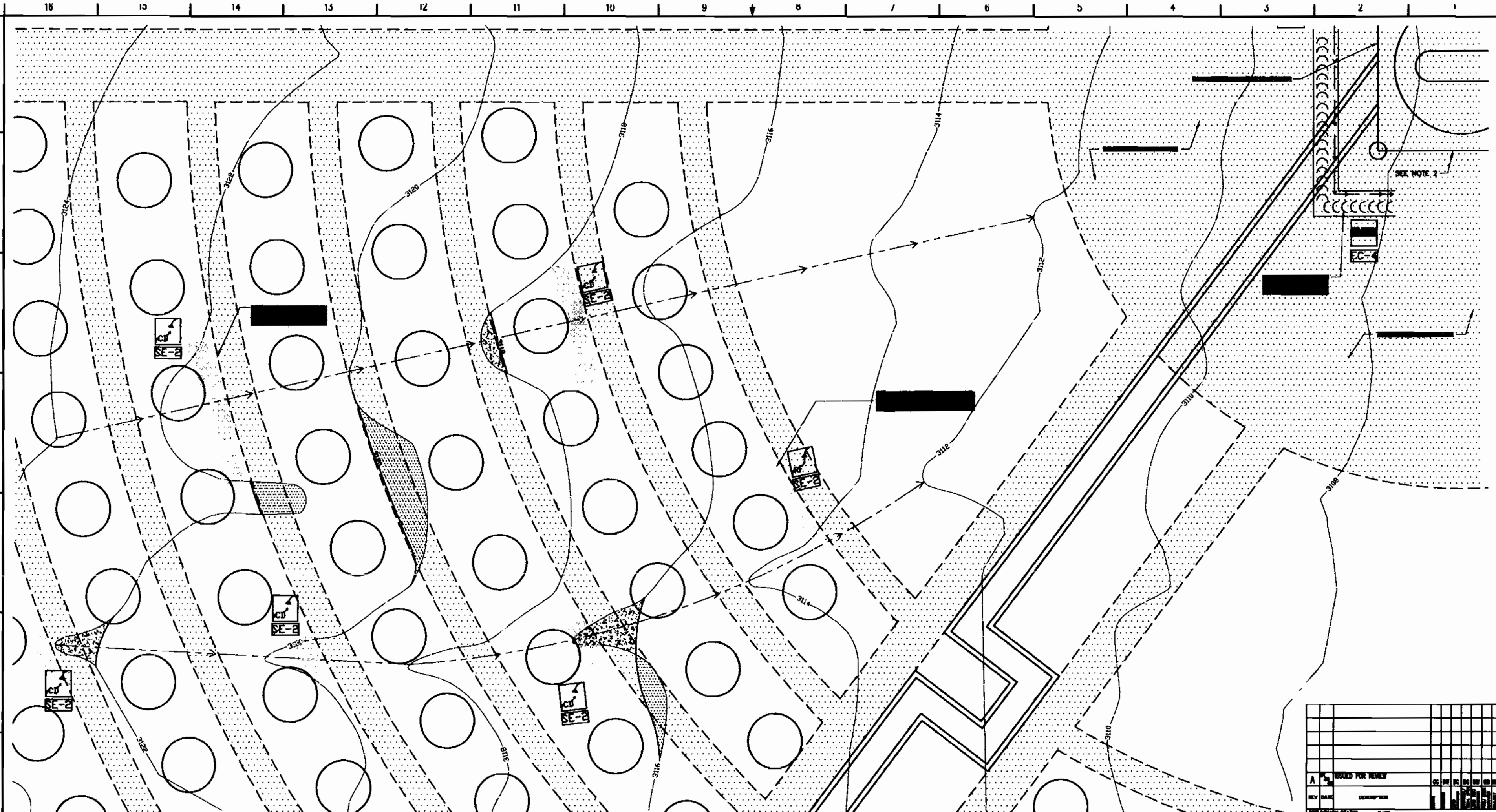
WorleyParsons
resources & energy

BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

TYPICAL HELIOSTAT FIELD
CONCEPTUAL ROAD ACCESS LAYOUT PLAN
DRAWING 6 OF 8

SCALE: 1" = 10'-0"
ANSI E (34" x 44")

IVAN-0-DW-048-735-006 A



TYPICAL BLOW-UP VIEW

LEGEND

AREAS WITH SURFACE VEGETATION REMOVED & ROOT SYSTEM TO REMAIN IN PLACE	
PROPOSED DIRT ACCESS FOR HELIOSTAT MAINTENANCE (CUT TO LEVEL & REMOVE ROOTS AS REQUIRED DUE TO IRREGULAR TOPOGRAPHY)	
PROPOSED DIRT ACCESS FOR HELIOSTAT MAINTENANCE (FILL TO LEVEL DUE TO IRREGULAR TOPOGRAPHY & ROOT SYSTEM TO REMAIN)	
PROPOSED HELIOSTAT MIRROR (CIRCLES SHOWN FOR CLARITY PURPOSES ONLY)	
EXISTING MAJOR CONTOURS	—XXXX—
PROPOSED MAJOR CONTOURS	—XXXX—
FLOW LINES	- - - ->

LEGEND

RF SE-2 ROCK FILTER DAM

CD SE-2 CHECK DAMS

EC-4 DIVERSION BERM

NOTES:

1. UTILITIES SERVING HELIOSTAT MIRRORS TO BE LOCATED BELOW GROUND ONLY AT ROAD CROSSINGS.
2. GRADING ONLY WITHIN FOOTPRINT OF PROPOSED RECEIVING TOWER.

PLANT NORTH

REV	DATE	DESCRIPTION
A		ISSUED FOR REVIEW

PRELIMINARY STATUS: DAVID WILSON 01/30/08 — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVISIONS NOT CHECKED.

APPROVED STATUS — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL — PROFESSIONAL ENGINEER'S SEAL

DRAWN BY: GREG GRANT
CHECKED BY: DAVID WILSON
LEAD ENGINEER: BRAD CARVER
ENGINEER/TECH SPECIALIST: BRIAN GILBERT
PROJECT ENGINEERING MANAGER: DAVID WILSON
PROJECT MANAGER: GEOFFREY BAXTER

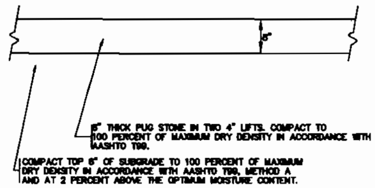
Zero Harm

WorleyParsons resources & energy

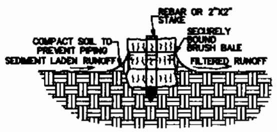
CLIENT/PROJECT TITLE
BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

TYPICAL HELIOSTAT FIELD
CONCEPTUAL GRADING, DRAINAGE, & EROSION CONTROL PLAN
DRAWING 7 OF 8

SCALE: 1" = 10'-0"
DRAWING SIZE: ANSI E (34" x 44")
WORLEYPARSONS DWG. NO.: IVAN-0-DW-048-735-007
REV: A

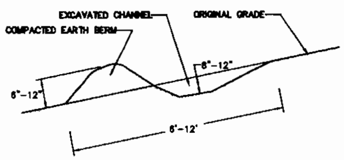


GRAVEL SECTION
NTS



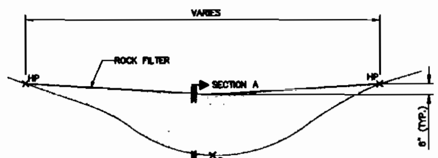
1. FOR STAKES, USE 2x4 INCH WOOD WITH MIN. LENGTH OF 3 FEET.
2. SPACE STAKES EVENLY AROUND THE INLET AT LEAST TWO STAKES OR REBAR PER BALE, & DRIVE SECURELY INTO THE GROUND, APPROXIMATELY 18 INCHES DEEP.
3. BRUSH SHALL BE PLACED LENGTHWISE IN A SINGLE ROW SURROUNDING THE INLET, WITH THE ENDS OF ADJACENT BRUSH PRESSED TOGETHER.
4. BRUSH SHALL BE EITHER WIRE-BOUND OR STRING-TIED WITH THE BINDINGS ORIENTED AROUND THE SIDES RATHER THAN OVER AND UNDER THE BRUSH.
5. LOOSE STRAW SHALL BE WEDGED BETWEEN BRUSH TO PREVENT WATER FROM ENTERING BETWEEN BRUSH.
6. THE FILTER BARRIER SHALL BE ENTRENCHED AND BACKFILLED. A TRENCH SHALL BE EXCAVATED AROUND THE INLET THE WIDTH OF A BALE TO A MINIMUM DEPTH OF 4 INCHES. AFTER THE BRUSH ARE STAKED, THE EXCAVATED WOIL SHALL BE BACKFILLED AND COMPACTED AGAINST THE FILTER BARRIER.

SC-9 COMPACTED BRUSH BARRIER
NTS



NOTE:
THE DIVERSION SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED AND FREE OF IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.

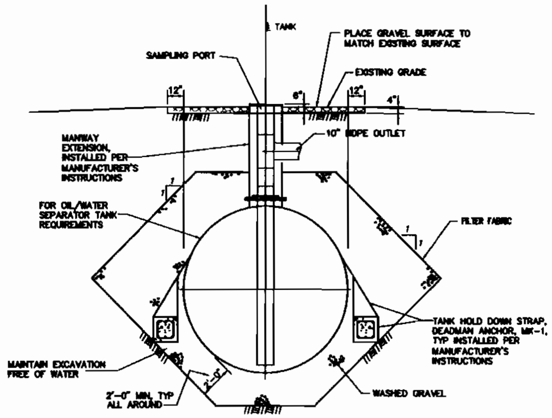
EC-4 DIVERSION BERM
N.T.S.



NOTES:
1. SEDIMENT TRAP TO BE CLEANED OUT WHEN VOLUME BECOMES HALF FULL.
2. ROCK FILTER TO BE INSPECTED & REPAIRED AS NEEDED.
3. STONE SIZES RANGE FROM 2 TO 15 INCHES. (CLEAN OF FINES)
4. THESE STRUCTURES ARE USED FOR DRAINAGE AREAS UP TO 5 ACRES.
5. ROCK FILTER DAM SHOULD BE KEYED INTO SWALE OR CHANNEL BOTTOM AT A MINIMUM OF 6 INCHES.
6. CONTRACTOR TO USE NATIVE STONE AS AVAILABLE.

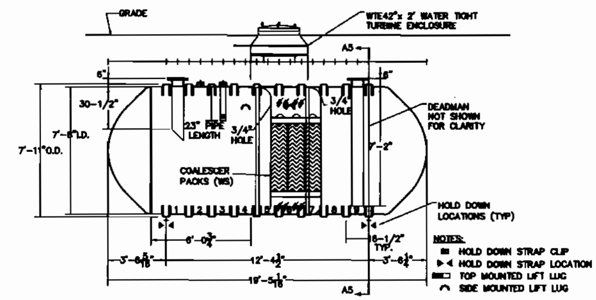
SECTION A

SE-2 ROCK FILTER DAM
NTS

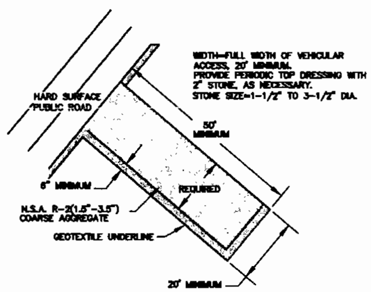


RIB STIFFENERS OMITTED FOR CLARITY

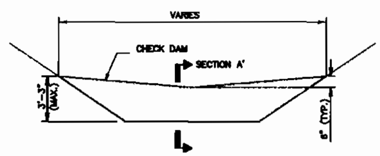
SECTION A5-A5
(SEE PLAN FOR LOCATION, SEE DETAIL F5)
NTS



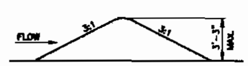
DETAIL F5
TYPICAL OIL/WATER SEPARATOR DETAIL
DIMENSIONS WILL VARY WITH SIZE OF OIL/WATER SEPARATOR
NTS



TC-1 STABILIZED CONSTRUCTION ENTRANCE/EXIT
NTS



NOTES:
1. SEDIMENT TRAP TO BE CLEANED OUT WHEN VOLUME BECOMES HALF FULL.
2. ROCK FILTER TO BE INSPECTED & REPAIRED AS NEEDED.
3. MINIMUM STONE SIZE AT 1.0 INCHES. (CLEAN OF FINES)
4. THESE STRUCTURES ARE USED FOR SMALL DRAINAGE AREAS UP TO 1 ACRE.
5. CONTRACTOR TO USE NATIVE STONE FOR CONSTRUCTION AS AVAILABLE.



SECTION A'

SE-2 CHECK DAMS
NTS

REV	DATE	DESCRIPTION
A		ISSUED FOR REVIEW

PRELIMINARY STATUS: DAVID WILSON 01/30/08

DRAWN BY: DANNY STEPHENS
CHECKED BY: DAVID WILSON
LEAD DESIGNER: BRAD CARVER
BRIAN GILBERT
PROJECT ENGINEERING MANAGER: DAVID WILSON
PROJECT MANAGER: GEOFFREY BAXTER

WorleyParsons
resources & energy

BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

TYPICAL HELIOSTAT FIELD DETAILS
DRAWING 8 OF 8

NOT TO SCALE — ANSI E (34" x 44")
IVAN-0-DW-112-735-008 — REV A

Air Quality (9)

Background

Facility Emission Impacts May Be Underestimated

Calculations of criteria air contaminants, provided in the AFC and its appendices, for the facility appeared to be underestimated. Page 5.1-27 of the AFC states that the construction of each phase of the facility would last approximately 24 months, and that overlapping of construction of the three phases would occur. However, the air quality impact analysis, contained in the AFC, includes two distinct, separate phases of construction and operation as if they are not overlapping. Because of this, staff believes that the facility operational emission impacts may be underestimated.

Data Request

9. Please provide a revised air quality impact analysis to identify the facility's impacts for two special cases:

a. when Ivanpah 1 is in operation (including emissions identified in Data Requests 1 and 2) and Ivanpah 2 is under construction; and

b. Ivanpah 1 and 2 are operational (including emissions identified in Data Requests 1 and 2) and Ivanpah 3 is under construction.

Response: The modeling is underway and should be ready to file by the end of February.

Biological Resources (13, 14, 19, 20, 23, 24, 26, 29, 30)

Background

There are significant populations of Sahara mustard, schismus, and cheatgrass in the project region. One of the BLM's primary responsibilities is to curtail the spread of invasive species for a number of reasons. For example, invasive species increase fire risk, reduce natural habitat for native plants and wildlife, and compete with native plants for water and other resources. On AFC page 5.2-60, section 5.2.11.2 Mitigation Measure 2 - Noxious Weeds states that a Noxious Weed Control Plan will be prepared and submitted to BLM prior to construction. However, BLM needs to review a draft Weed Management Plan sooner to facilitate completion of the final plan according to the template BLM provided to the applicant. Similarly, information on the soil source(s) for foundations and structural support is needed because soils brought in from another location will have to be tested for invasive species seeds and other contents.

Data Request

13. Please prepare and submit a Weed Management Plan to the Energy Commission and BLM that includes herbicides to be used in control methods.

Response: As stated in Applicant's December 28, 2007 letter, additional time has been requested to respond to this data request. A meeting with the BLM (and other interested agencies) is being scheduled to discuss specifics of the Weed Management Plan and develop a timeline for the submittal of a conceptual draft and a final Weed Management Plan. A copy of the draft Weed Management Plan will be provided as soon as it is available.

14. Describe specific methods for weed management under heliostat structures (e.g., pre-emergent herbicide or other methods).

Response: The Weed Control Management Plan prepared in response to Data Request 13 will include information on weed control under the heliostat structures.

Background

AFC Table 5.2-15 provides an overview of permits required for biological resources and indicates that the process for each requires approximately six to nine months. The AFC also refers to informal consultation with staff members at agencies regarding the project and potential biological issues of concern. However, staff could not find any documentation on the dates, personnel, and content of communications with the California Department of Fish and Game (CDFG), U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), or U.S. Fish and Wildlife Service (USFWS) regarding sensitive biological resources, such as the federally threatened desert tortoise, jurisdictional waters, and permitting requirements. In addition, a USFWS-approved Biological Assessment (BA) with agreed upon mitigation needs to be provided so the Preliminary and Final Staff Assessments can be completed.

Data Request

19. For jurisdictional waters, please provide expected impact acreages as well as mitigation ratios and acreages for the Clean Water Act section 401 and 404 permits and CDFG Streambed Alteration Agreement, as appropriate.

Response: A wetland delineation report is being submitted to the USACE concurrently with this filing. Copies of the wetland delineation report have been bound separately and are provided as Attachment DR19-1. A field verification meeting with the USACE is being requested as part of the wetland delineation submittal. The anticipated mitigation ratios and acreages will be discussed with the USACE. Once the results of the wetland delineation are determined complete by the USACE, discussions regarding mitigation and permitting with CDFG and RWQCB will be scheduled and coordinated with CEC and BLM.

20. Provide copies of the draft and final USFWS-approved BA, including required habitat compensation ratios and acreages, to Energy Commission and BLM staff.

Response: Once the BA is submitted to USFWS by BLM, copies of the draft BA will be provided to CEC staff. Once the BA has been approved by the USFWS, copies of the Final BA and Biological Opinion will be provided to CEC staff.

Background

According to AFC section 5.2.9.2.4, approximately 34 percent of the estimated known acreage of creosote bush-white bursage-barrel cactus vegetation in California could be impacted by the project. This vegetation type is noted as worthy of consideration in the list of terrestrial natural communities developed for CDFG's California Natural Diversity Database, and BLM has expressed concerns regarding its loss and the availability of habitat compensation lands. The impact discussion noted a lack of information regarding its abundance and did not conclude whether impacts would be considered significant or require additional mitigation.

Data Request

23. Please provide additional discussion on direct, indirect, and cumulative impacts to creosote bush-white bursage-barrel cactus vegetation.

a. Address the significance of these impacts as determined through discussions with BLM, CDFG, and USFWS biology staff.

b. Discuss the mitigation suggested by the above agencies to mitigate impacts.

Response: Applicant is currently scheduling a meeting with Dr. Todd Keeler-Wolf (of CNDDB) to more fully understand the creosote bush-white bursage-barrel cactus community type and will provide an update on this issue upon completion of that meeting.

Background

The AFC lacks a detailed project description for the following elements as they relate to biological resources: site runoff, pre-construction ground disturbance, and post-construction operations and maintenance activities. More information is needed for staff to determine whether these elements could result in additional impacts to biological resources. In addition, BLM needs this information for its consultation with USFWS on the effects of the proposed action on desert tortoise. BLM expressed concern regarding the formal consultation process with USFWS because other agencies may recommend project footprint changes, and it may be necessary to re-initiate the consultation process and biological evaluation.

Data Request

24.a. Please provide a detailed description and analyze the associated biological resource impacts related to site runoff from rainfall and mirror washing.

Response: As described in the soil and water data responses, the stormwater system will be designed so that site runoff will not increase from the existing conditions. Construction of the 3,400-acre Ivanpah SEGS site will require complete removal of vegetation within the solar plant (except for the landscape areas around the power blocks) and discouragement of natural vegetation recruitment during operation. Consequently, the biological analysis presented in the AFC assumed that all vegetation would be removed during plant construction and operation. Similarly, it is not expected that water from mirror washing will produce any vegetation.

24.b. Down slope of the project, address the biological resource impacts and ground disturbance anticipated outside the 3,400-acre project site.

Response: These potential impacts will be discussed with the USACE and RWQCB during jurisdictional waters discussions and the field verification. See Data Response 19.

26. Provide a graphic and description of areas of the site that will be graded and areas where root systems will be left in place, and indicate other areas of ground disturbance.

Response: See drawings Ivan-0-DW-048-735-001 through Ivan-0-DW-048-735-007 (following Data Response 6). Grading is to be performed only within each of the power block areas, power block connecting road, and re-aligned Colosseum Road. Within the heliostat arrays the surface vegetation is to be removed and the root system is to remain. The proposed dirt access roads within the heliostat arrays will be leveled if required (minor cuts and fills) and only to the extent that minimal access is provided for heliostat installation and maintenance. Drawings Ivan-0-DW-048-735-006 and Ivan-0-DW-048-735-007 (following Data Response 6) have been created to provide additional clarity regarding typical areas of disturbance within the heliostat array fields.

Background

As noted in the AFC, ravens are known to prey upon juvenile desert tortoise and other wildlife species. However, ravens are a migratory species and federally protected under the Migratory Bird Treaty Act. Perch-deterrent device installation is mentioned in the AFC on page 5.2-67, but the facilities upon which they would be installed are not specified. In addition, CDFG commented in a March 23, 2007 letter on Victorville 2, another desert solar project, regarding the need for a sufficiently detailed raven control plan.

Data Request

29. Please provide a detailed raven control plan that discusses, but is not limited to the following elements:

a. coordination process with CDFG and USFWS

b. area to be covered by the plan

c. use of perch-deterrent devices and locations of installation

d. circumstances when nest removal would be necessary

e. remedial actions that would be employed if evidence of raven predation of juvenile desert tortoise is detected and the circumstances that would trigger the implementation of remedial actions

f. facility/project owner staff expected to implement the raven control plan and their qualifications

Response: The Applicant is setting up a meeting with USFWS and CDFG to develop an approved raven control plan that will be based on plans that have proved successful on other projects.

Background

AFC section 5.2.11.1, Mitigation Measure 1 – Site Rehabilitation Plan, addresses closure of the project following the cessation of facility operations and discusses elements of a project closure plan. Permanent closure is an issue of concern regarding biological resources due to the proposed facility location on a relatively large and undisturbed habitat area as well as the potential threats to biological resources posed by abandoned equipment and hazardous materials.

Data Request

30. Please describe the likely components of a closure plan (e.g., decommissioning methods, timing of any proposed habitat restoration, restoration performance criteria), and discuss each relative to biological resources and specifically to desert tortoise and its habitat.

Response: Construction of the 3,400-acre Ivanpah SEGS site will require complete removal of vegetation within the solar plant and discouragement of natural vegetation recruitment during operation. Successful restoration of mature creosote bush scrub similar to, or better than, baseline conditions will require many years and perhaps more than one restoration technique.

Desert soil structures are complex and difficult to restore following disturbance and compaction, and subsequent erosion from wind and water. Perennial growth is slow in the Mojave Desert and occurs primarily in years of above average rainfall, which are few and far between.

The desert tortoise endures the harsh climate and conditions of the Mojave Desert with a unique physiology as well as avoidance through behavior. A mature shrub community provides the tortoise with shade cover and cover from predators. This is especially important for hatchling and juvenile tortoises. Tortoise burrows are also typically located near, or at the base of, shrubs.

Annual forage will become established in the area of the restored solar fields long before perennial vegetation. Tortoise will likely avoid travel into the expansive restoration area for foraging, movement, or dispersal prior to the development of sufficient cover. Entry into areas without sufficient shrub coverage will increase the threats of exposure and predation for hatchling, juvenile, and adult tortoises.

The Applicant suggests that each project owner file a closure/decommissioning plan with San Bernardino County, BLM and the CPM for review and approval at least 12 months (or other mutually agreed to time) prior to commencing the closure activities. The closure plan shall include a discussion of the following:

1. The proposed closure/decommissioning activities for the project and all appurtenant facilities constructed as part of the project;
2. All applicable LORS, all local/regional plans, and a discussion of the conformance of the proposed decommissioning activities to the applicable LORS and local/regional plans;
3. Activities necessary to restore the site if the decommissioning plan requires removal of all equipment and appurtenant facilities; and
4. Closure/decommissioning alternatives, other than complete restoration of the site.

Cultural Resources (40)

Background

The three phases of the proposed project, Ivanpah 1–3, are to be built on a bajada, a broad apron of sediment that fronts a mountain range, immediately to the west of the Ivanpah Lake playa, a shallow ephemeral lake bed. Since the construction of the project appears to include the contouring of the surface of the site for each project phase, the excavation of trenches for the installation of a natural gas pipeline, and the construction of new site access roads, the consideration of the potential presence of buried archaeological deposits becomes relevant. If the depositional environment across the project site is one of net aggradation or ongoing thickening of surface sediments, archaeological deposits related to the use of former bajada surfaces may lie beneath the present surface of the project site. Staff needs additional information to evaluate the potential for encountering buried archaeological deposits during the construction, operation, and maintenance of the project.

Data Request

40. Please provide a discussion of the historical geomorphology of the project site to better evidence a consideration of the potential there for buried archaeological deposits. The discussion should describe the development of the bajada on which the project area is proposed with a focus on the character of the bajada's depositional regime since the Late Pleistocene era. The basis for the discussion should be data on the geomorphology, sedimentology, pedology, and stratigraphy of the project area or the near vicinity. The source of these data may be a combination, as necessary, of extant literature or primary field research.

Response: The project area extends over the eastern bajada of Clark Mountain, which is composed of a number of coalescing alluvial fans that issue from different canyons on the east side of the mountain. The bajada extends east to the edge of Ivanpah playa, descending over 5.5 to 6 miles from about 4,000 feet amsl (above mean sea level) at the toe of the mountain, to about 2,610 feet on the edge of the playa. As is typical of these surfaces the alluvium ranges from coarse, bouldery material near the fan head (also termed the apex or proximal portion of the fan), to fine sands and silts at the toe or distal portion of the fan.

Nature of the Clark Mountain Bajada

The first question to address is whether "the depositional environment across the project site is one of net aggradation." In their research on alluvial fans of the Soda Mountains, about 40 miles to the southwest of the project area, Harvey and Wells (2003) recognize five process-based alluvial fan morphological styles, briefly summarized in Table DR40-1:

TABLE DR40-1.
Process-based alluvial fan morphological styles recognized by Harvey and Wells (2003)

Fan Style	Characteristic Features
Aggradational	Normally deposition occurs near the fan apices, and may extend over most of the fan surface. Younger alluvium may accumulate in previously trenched areas.
Progradational	Proximal trenching of trunk channel(s) occurs, while deposition occurs on the distal surfaces, near the toe of the fan and below its knick point.
Erosional	These include both entrenchment of the fan surface from trunk streams in its distal region, or by channels heading on the fan surface. The main zone of dissection may vary from apex to toe of the fan.
Complex	Some alluvial fans display complex geomorphic behavior with different areas apparently behaving independently of one another such that, while
Stabilized	In this case there is no sediment provided to, and no erosion from a fan surface. Fresh erosional forms are absent, and stabilized surfaces typified by well-developed desert pavements and soils.

From a geomorphological perspective the alluvial fan complex, or bajada, over which the proposed project extends is not a stabilized surface. Relatively recent erosional land forms in the form of channels, bar-and-swale topography, and areas of recent sheet flow typify much of the Clark Mountain bajada. The channels originate not only near the head of the bajada, but also along its middle reaches and extend across its toe, suggesting that the fan surfaces there are not aggradational, either. On-going dissection across the bajada shows that its current morphology is best classified as "erosional" (Table DR40-1).

Although the Clark Mountain bajada is composed of fan surfaces that are largely erosional, it appears that there also was a change in morphological style during the middle or late Holocene (the last 8,000 years). Examination of satellite imagery of the bajada toe, and comparison with the adjacent toe of the Stateline Pass alluvial fan (Figure DR40-1), suggests that the bajada was progradational (Table DR40-1) in the geologically recent past. Figure DR40-1 shows the north end of the Ivanpah playa, which was occupied by a perennial lake at least during the early Holocene (ca. 9,600 B.P. [radiocarbon years before present]; Spaulding, 1999). A beach zone is clearly evident at the toe of the Stateline Pass alluvial fan on the north-northwest margin of the playa, and a zone of darker beach material derived from the Clark Mountain bajada extends south along the west shore for another approximately 0.75 mile. However, by the end of this distance, the beach on the west side of the basin is overridden by the toe of the Clark Mountain bajada (Figure DR40-1). For this analysis it is assumed that the beach was formed during the early Holocene high stand of Ivanpah Dry Lake, which is correlated with a widespread and pronounced pluvial episode in this region that ended by about 8,700 B.P. (Wells et al., 2003). The progradation of the Clark Mountain fan toe onto the western edge of the Ivanpah playa apparently occurred afterwards. Progradation was then followed by a switch to the current, erosional style, perhaps during the late Holocene (the last 4,000 years).

Examination of a high resolution aerial photograph of the project area reveals surface morphology expected from a bajada dominated by alluvial fans undergoing widespread erosion (Figure DR40-2). The surface is covered with wide networks of braided or anastomosing channels, and the interfluves between the channels appear generally young with soils that are poorly developed if not altogether absent. Alluvial fan dissection such as that taking place currently is often attributed to a reduction of new sediment carried to the fan by floods and debris flows issuing from canyon mouths (e.g., Harvey and Wells, 2003). The switch from a progradational to an erosional style by the fans of the Clark Mountain bajada may, therefore, be linked to increased vegetation cover and reduced sediment yield associated with generally increased effective moisture during the late Holocene (Spaulding 1990; Koehler, Anderson, and Spaulding, 2004). This effect (increased effective moisture promoting increased vegetation cover resulting in enhanced slope stability; see Bull [1991]) would have been most pronounced at higher elevations where dense scrub and woodland occur, and all source areas for the alluvium on the fans of the Clark Mountain bajada lie above 4,000 feet amsl.

Despite its widespread effects, erosion has not destroyed all older surfaces on the Clark Mountain bajada. Older, remnant alluvial fan segments occur, and they represent areas of net aggradation to the extent that eolian silts tend to accumulate below the desert pavement armoring their surfaces (Wells, McFadden, and Dohrenwend, 1989; Wells and Harvey, 2003). The primary objective of the work described below was to identify these surfaces and to determine whether they possessed archaeological potential.

Older Surfaces on the Clark Mountain Bajada and their Subsurface Archaeological Potential

A fundamental aspect of arid lands geomorphology is that older alluvial surfaces tend to be distinctly different in appearance from younger surfaces. This is due to an interrelated series of time-dependent processes that begin after deposition of the lobe of an alluvial fan. These interrelated processes include:

- Progressive leveling of initially pronounced bar and swale topography
- Reduction of clast size by fracturing
- Reduction of clast angularity
- Increasing development of desert varnish on clasts with resistant surfaces
- The development of an increasingly uniform pavement with "interlocked" clasts
- Accretion of a layer of eolian silt immediately beneath the first layer of stones

Older alluvial surfaces are distinctly darker due to the thick coatings of dark brown to black desert varnish on their constituent clasts (Bull, 1991). Their relatively low albedo (reflectivity) makes it possible to identify them using remote imagery since the more recently eroded surfaces of the bajada are very light colored and, therefore, possess high albedo.

Desert pavement development has been the subject of study for some time (see Bull, 1991), but it was not until the final decades of the 20th century that researchers appreciated the extent to which desert pavements represent accretionary deposits (see Wells, McFadden, and Dohrenwend, 1987). Conventional wisdom held that pavements form when wind and sheet wash removes finer clays, silts, and sands from the upper layer of alluvium, leaving a lag of pebbles as a desert pavement surface. However, this conceptualization is inconsistent with the presence of a largely stone-free zone beneath most desert pavements composed principally of carbonate-rich eolian silt (desert loess). Research on desert pavements of differing age on the margins of Silver and Soda Lake playas, about 40 miles to the west of the Ivanpah SEGS project, shows that the older the pavement surface, the greater the thickness of the underlying layer of eolian silt (as well as the darker the pavement, the more level its surface, etc…) (Wells, McFadden, and Dohrenwend, 1987; Harvey and Wells, 2003). In other words, a desert pavement surface is a single layer of clasts born upward on an ever-accreting layer of eolian silt (ibid.). Clasts become entrained in the silt layer, but they are scattered and such layers are always matrix-supported and not clast-supported.

Harvey and Wells (2003) and MacDonald, McFadden, and Wells (2003) also provide examples of debris-flow levies and boulder trains where eolian silt is not a major component of the subsurface. These coarser-grained facies of alluvial fans are cored with larger rocks, and this structure does not appear to be as permissive to the development of a subsurface layer dominated by eolian silt. They nevertheless do display other age-dependent features such as reduced albedo associated with greater desert varnish development, and a tendency for their microtopography to become leveled with increasing age.

An implication of the accretionary model of desert pavement development is that, if lithic tools are left on the surface of an alluvial fan, they will be incorporated as clasts in a desert pavement. These artifacts would be born upward as elements of the pavement as the stone-free zone beneath accumulates. This process is central to the interpretation of the geoarchaeology and chronology of CA-SBr-6566. At this site late Paleoindian (Lake Mojave Complex) artifacts were found well-integrated into an older desert pavement surface. Reliable dating of the site was made possible by a nearby detailed mapping study of fan surfaces (Wells et al., 1989), where dated high-stands of pluvial Lake Mojave were related to the degree of development of alluvial surfaces in the shoreline area. Relative development of the desert pavement, discussed above, allowed Apple and York (1993) to securely assign the surface of CA-SBr-6566 to Unit Qf2, an alluvial unit dated to between 9,000 and 12,000 B.P. (Wells et al., 1989), an age consistent with that inferred for the Lake Mojave complex (Warren and Ore, 1978).

Unit Qf2 at CA-SBr-6566 possessed a well developed desert pavement with clasts in many cases so coated with desert varnish that their mineral fabric could not be discerned. A thick "stone-free zone" also extended to depths of 1.6 to 3.3 feet below the pavement. Phase 2 testing of CA-SBr-6566 revealed that artifacts extended to a depth of nearly 2.6 feet below the surface, essentially throughout the column of accreted eolian silt (Apple and York (1993). Although no subsurface occupation horizons were identified, the recovery of artifacts at depth demonstrated that lithic tools worked into an older (in this case, terminal Pleistocene to early Holocene) desert pavement are predictors of the presence of subsurface archaeology. The processual explanation for this is that most desert pavement surfaces are accretionary. A corollary is that the "original" occupation surface of a site on a terminal Pleistocene or early Holocene alluvial fan is likely to be several feet below the current pavement, regardless of the artifacts that may comprise part of that pavement. In accretionary soils environments in the Mojave Desert, surface sites can be more than that. They can also possess a subsurface component.

Application and Testing for Subsurface Potential. Using the basic relationship between surface age and decreasing albedo, a high resolution aerial photograph of the project area was inspected and older, darker remnant surfaces were delineated within all three project units. The darkest surfaces, or those with lowest albedo, were assigned the lowest numbers on an arbitrary scale of 1 (low albedo, comparatively dark surface) to 5 (a high albedo, relatively bright surface). Separate ratings for apparent roughness (L, low; M, moderate; H, high) were also applied to the surfaces, but not carried forward in the analysis for simplicity's sake.

Networks of older surfaces representing alluvial fan remnants were found in the southern-central and northern portions of Ivanpah 1, the southern and northwestern portions of Ivanaph 3, and sparsely scattered throughout Ivanpah 2 (Figure DR40-2). Of the approximately 3,356 acres comprising the three Ivanpah sites, approximately 472 acres (14 percent) are covered by darker, remnant fan surfaces. The juxtaposition of many of these surfaces suggests that they are indeed remnants of broader, older alluvial fan segments that are being destroyed by erosion under the current geomorphic regime. After delimiting and assigning qualitative values for albedo and roughness, a subset of the delimited surfaces was subject to field inspection to: (1) confirm that they represented older alluvial fan remnants, and (2) determine whether prehistoric cultural materials are present on those surfaces. Based on the relationships described above, the presence of lithic artifacts as a component of a desert pavement would indicate subsurface archaeological potential. Their absence would suggest that no subsurface archaeological potential exists.

Twenty-eight separate surfaces delineated by remote imagery analysis were subject to field inspection in Ivanpah 1, 2, and 3, as well as two younger surfaces selected in the field for comparative purposes. The surfaces delineated on the aerial photograph were located in the field with the use of a hand-held Trimble GPS into which their coordinates had been uploaded. In the field it was found that these alluvial fan remnants could be readily distinguished from the surrounding bajada not only by their darker, stony surfaces but also because they stood in relief several feet above the surrounding, lighter and more recently disturbed surfaces.

Most delineated surfaces were desert pavements or incipient pavements, while a few were more appropriately characterized as stony debris flow remnants. The relationship between the degree of pavement development (desert varnishing, clast size, clast angularity, surface roughness) and surface age is assumed to be directly proportional as it is elsewhere in the Mojave Desert (e.g., MacDonald, McFadden, and Wells, 2003). In the field, the surfaces identified with the aerial coverage were subject to a simple rating system that assigned a value on a scale of 1 to 5 depending on the degree of development of that surface's:

- Bar-and-swale topography, from uniform and level (1), to irregular and dissected (5)
- Clast size, from comparatively small (1) to large (5)
- Clast angularity, from well rounded (1) to highly angular (5)
- Degree of desert varnish development on clasts with resistant mineralogies, from dark (1) to none (5)
- Desert pavement structure from a tightly interlocked single layer (1) to a jumbled aggregate of stones or gritty alluvium mantling the surface (5)

The lower the number, the older that surface is likely to be. While the point of this exercise was not to test the accuracy of the remote imagery analysis, it nevertheless was important to objectively determine whether it provided a reliable means of locating older and more stable fan remnants in the project area. To evaluate this, the albedo value of a surface derived from inspection of the aerial photograph was compared to the average score of the field ratings of surface development, described above, for that surface. Table DR40-2 summarizes these comparisons.

TABLE DR-40-2
Comparison of the Albedo of Remnant Alluvial Fan Surfaces with Average Field Ratings for Surface Development

		Field Rating, Surface Development	
Relative Age	**Albedo[1]**	**Average Score (± 1σ)**	**N**
Oldest	1	1.4 ± 0.2	2
	2	2.3 ± 0.5	10
	3	2.8 ± 0.4	13
Youngest	4	3.3 ± 0.1	3

[1] Score represents a qualitative value of surface brightness such that "1" is the darkest surface and "5" is the brightest. Bright surfaces (5) were delimited and not subject to field review.

While the sample sizes (N) are generally too low to yield statistically valid values of sigma (σ), the σ values reflect the variability encountered. And although that variability was marked, it is evident from the comparisons in table DR40-2 that albedo is a good general predictor of surface age based on field characteristics.

During two days of field checking that involved walking from isolated fan surface to isolated surface, no darkened, stony or desert pavement surfaces were encountered that had not been previously delimited by remote imagery analysis. There were only two surfaces that were of such low albedo that a value of "1" was assigned to them, one is shown in Figure DR40-3. Both had relatively well-developed stony surfaces, although the desert pavements were not fully developed. Clast size was not uniform, many retained subangular shapes, and desert varnish development was not extensive (see Figure DR40-3, Photo b). Therefore, even these relatively dark surfaces appear to be younger than the Late Pleistocene and early Holocene pavements covering fan surfaces Qf1 and Qf2 in the Mojave Sink, not far to the west (Wells, McFadden, and Dohrenwend, 1989). In this case, the stony nature of these surfaces suggests that they are former debris flow deposits.

At the younger end of the continuum of potential surface age on the Clark Mountain bajada, only a few stations were established on surfaces with albedo ratings of "4" or above. These relatively bright surfaces are products of the current phase of fan erosion and surface disruption. Along with three surfaces with an albedo rating of "4" (Table DR40-2), two even brighter surfaces were chosen for field inspection as control. Both were on interfluves between recently active channels, and one was selected because a subfossil pinyon (*Pinus monophylla*) log was found on it (see Figure DR40-4, Photo b). This log was transported from elevations above 6,000 feet on Clark Mountain onto the middle reaches of the bajada (approx. 3,000 feet), by the last flood responsible for shaping the surface upon which it was found. The fact that such logs can persist on the desert floor for millennia was demonstrated by the late C. W. Fergusson of the Tree-ring Laboratory of the University of Arizona. He radiocarbon dated several bristlecone and pinyon pine logs recovered from desert scrub habitats on the bajadas flanking the Sheep Range, about 65 miles north-northeast of the project (Spaulding, 1981, p. 21). The characteristics of this specimen are much the same as those with outer rings dating to between 1,100 and 3,400 B.P. The resin-rich pine wood resists bacterial decay, except on surfaces in contact with the soil, and the fluting and channeling that develops on the exterior (Figure DR40-4, Photo b) is the product of scouring by wind-driven sand and ice crystals over the centuries. Thus, if this pinyon log is of the same age as those from the Sheep Range (early- to middle-late Holocene), then a surface that is relatively young based on brightness and lack of desert pavement (Figure DR40-4, Photo a), nevertheless may have been stable for more than 1,000 years.

Between the very dark and presumably oldest surfaces, and the young and bright surfaces that occurred throughout the project area, a range of older stabilized surfaces were documented that displayed moderate loss of albedo. Examples are provided in Figure DR40-5. Their surface texture varied substantially from moderate desert pavement developed on a polymineralic alluvium (Figure DR40-5, photo a), to stony surfaces with pavement largely restricted to relict swales developed on limestone alluvium (Figure DR40-5, photo a).

Absence of Cultural Materials. The alluvial fan remnants delimited using remote imagery and subject to field review were subject to close inspection for surface archaeology by both W. Geoffrey Spaulding and Aaron Fergusson. (See AFC Appendix 5.3D for Mr. Fergusson's resume, Dr. Spaulding's resume will be provided upon request). No lithic tools or other artifacts were located on these surfaces during these field reviews. Based on the geomorphic relationships described above, especially the dynamics of desert pavement development, these older and relatively stable surfaces are, therefore, unlikely to possess subsurface archaeological potential. This is consistent with the results of the Class III cultural resources inventory, which documented the general absence of prehistoric material throughout the project area.

The absence of archaeological materials from relatively stable fan surfaces cannot be attributed to the dominantly erosional style of the Clark Mountain bajada, as might be the case on the younger surfaces. The absence of cultural material is consistent with the absence of any marked concentration of resources that might have been a focus of prehistoric subsistence activities on middle reaches of the Clark Mountain bajada. The creosote bush-white bursage desert scrub would have offered no particular concentration of resources to attract prehistoric peoples, either recently or at anytime during the middle and late Holocene. Productive ecosystems and high value resources (such as water) would have been found at lower elevations near the ephemeral lake shore, at higher elevations near springs and in more productive woodland ecosystems, or in habitats characterized by special edaphic circumstances such as the vast sand sheet southeast of Ivanpah playa where abundant perennial grasses occur (Robinson, Flint, and Spaulding, 1999). Hence, the absence of evidence for prehistoric occupation on the older alluvial fan remnants is explicable in terms of the absence of resources that would have attracted prehistoric peoples to the middle reaches of this bajada. Absence of subsurface potential fundamentally would be for the same reason. To this we must add that, to the extent that any of the surfaces encountered were early Holocene in age (10,000 to 8,000 B.P.), which seems likely, a more mesic vegetation type would have prevailed at the time, and carrying capacity for game such as the desert bighorn would have been greater (e.g., Warren, 1986). Nevertheless, our sample of 28 remnant fan surfaces, and 2 more recent but relatively stable surfaces, yielded no detectable evidence of prehistoric human occupation. We propose, based on this model of surface development and these field data, that the surface and subsurface archaeological potential of the middle reaches of the Clark Mountain bajada, even on stable and potentially accretionary fan remnants, is negligible.

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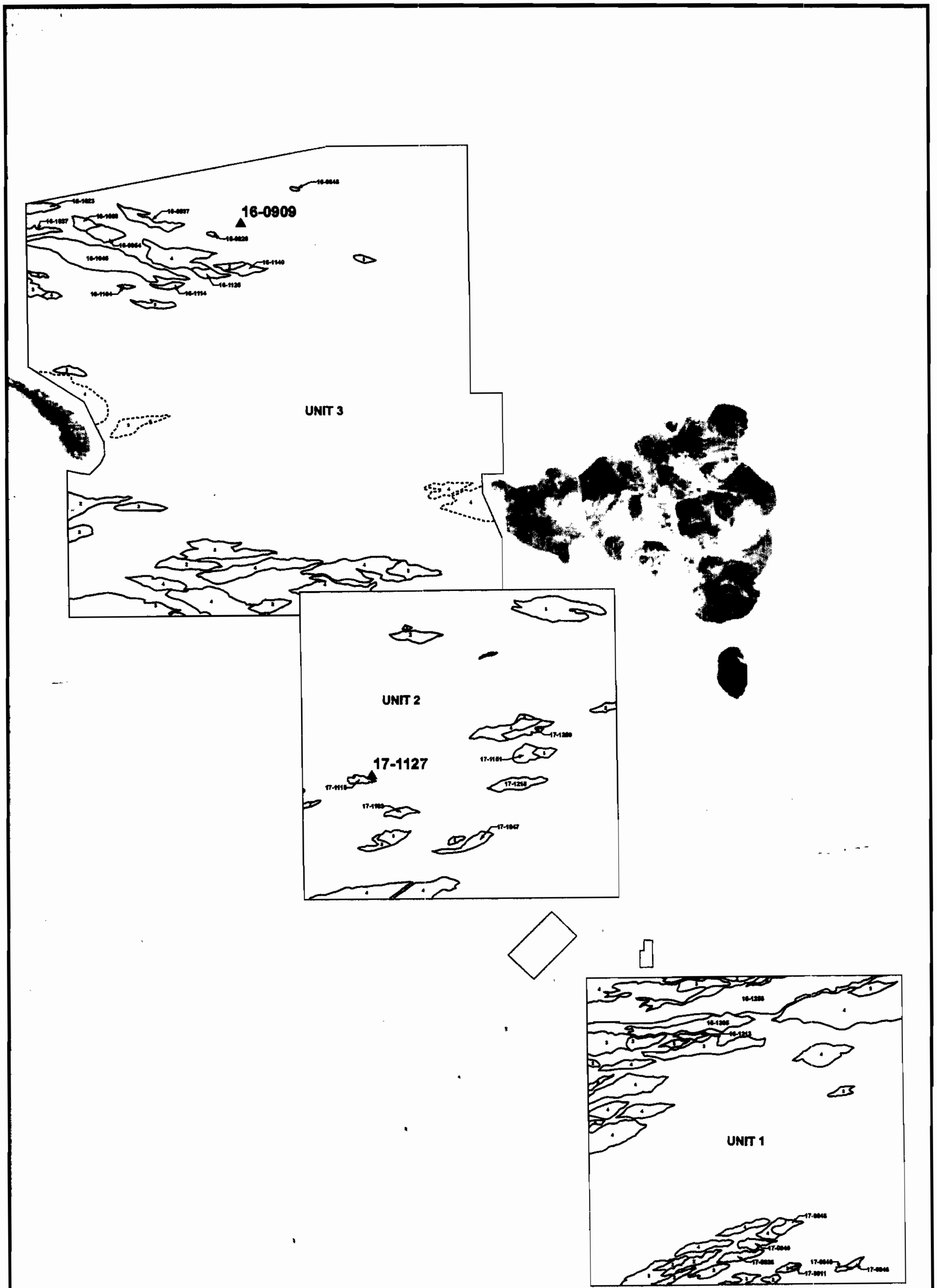
Satellite imagery of the northeastern edge of the Clark Mountain bajada (CMB) and Stateline Pass, the southern portion of the alluvial fan (SPAF).

FIGURE DR40-1
PROGRADATION OF THE CLARK MTN BAJADA
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL



Legend

Low Albedo Surface
(darkest) 2 (←——→) 4 (lightest)

16-1258
17-0858 } Station Numbers for field-checked surfaces

▲ Recent Surface Assessed for Control

Uncertain Extent

Heliostat Field/Structure

Feet: 0 · 850 · 1,700 · 2,550

Note:
Aerial photograph of the project area, showing the remnant alluvial fan surfaces identified by their low albedo. Those surfaces that were field checked are designated by their six digit station number.

FIGURE DR40-2
ALLUVIAL FAN SURFACES IDENTIFIED BY THEIR LOW ALBEDO
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

ES062007009SAC Figure_DR40-2.ai 02/07/08 ldaus

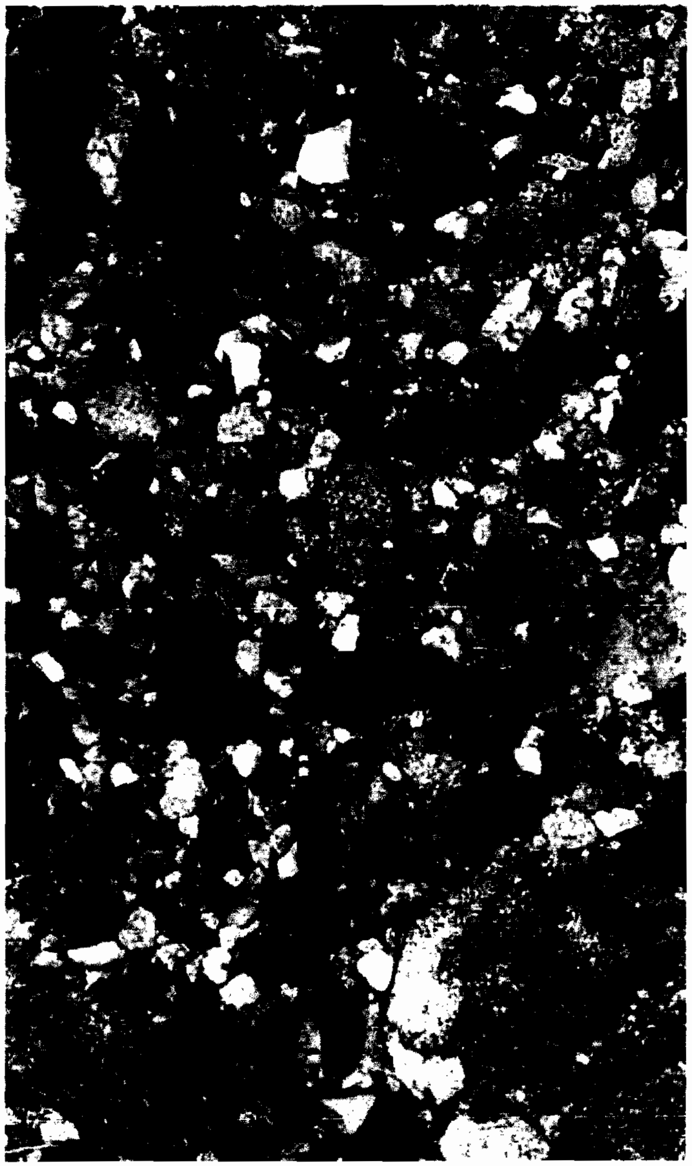


Photo a. Close-up of the stony surface (pencil for scale)


Photo b. View northwest across the surface

FIGURE DR40-3
OLDER SURFACE WITH LOWEST ALBEDO VALUE (STA. 16-0920)
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

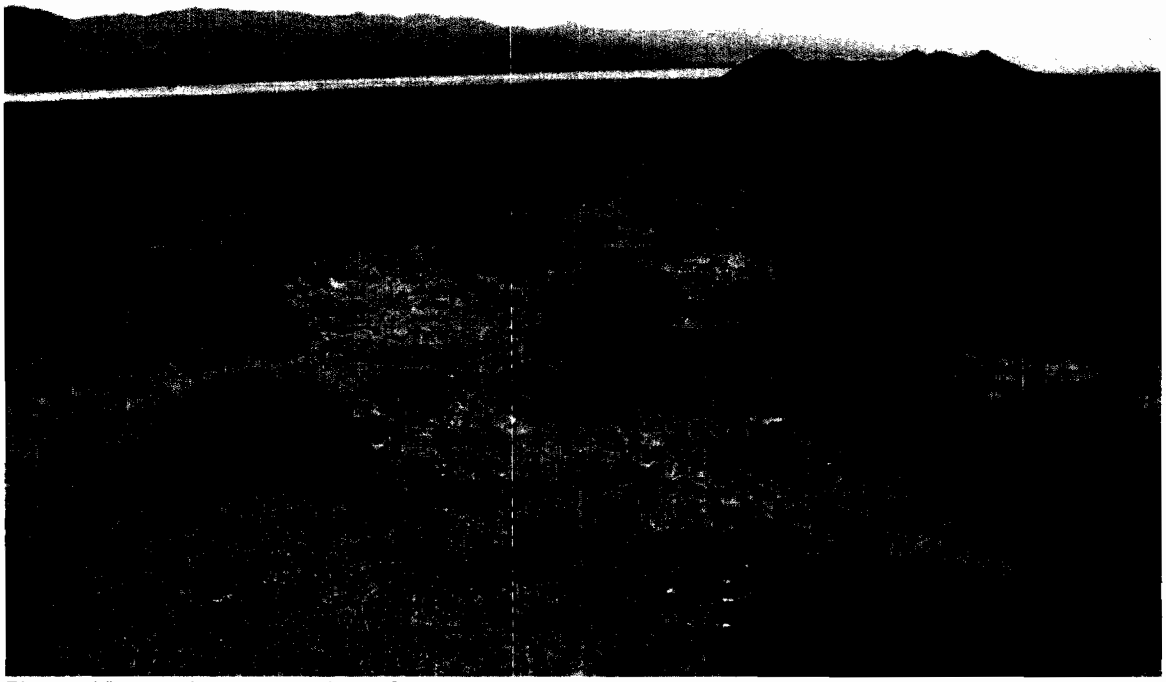


Photo a. View southeast across the surface

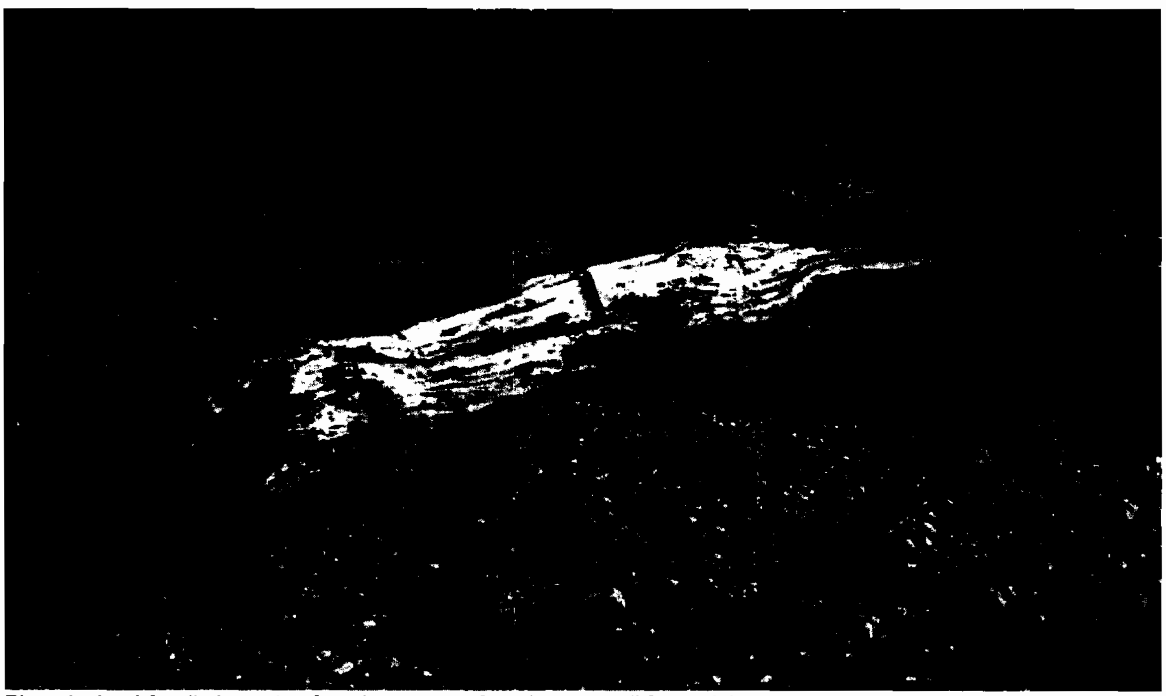


Photo b. A subfossil pinyon log found on that surface (note pencil for scale)

FIGURE DR40-4
A BRIGHT AND RELATIVELY YOUNG ALLUVIAL FAN SURFACE AT STA. 16-0909
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

ES062007009SAC Figure_DR40-5.ai 02/07/08 tdaus

Photo a. Desert pavement developed on a polymineralic surface at STA. 17-0911 (glove for scale)

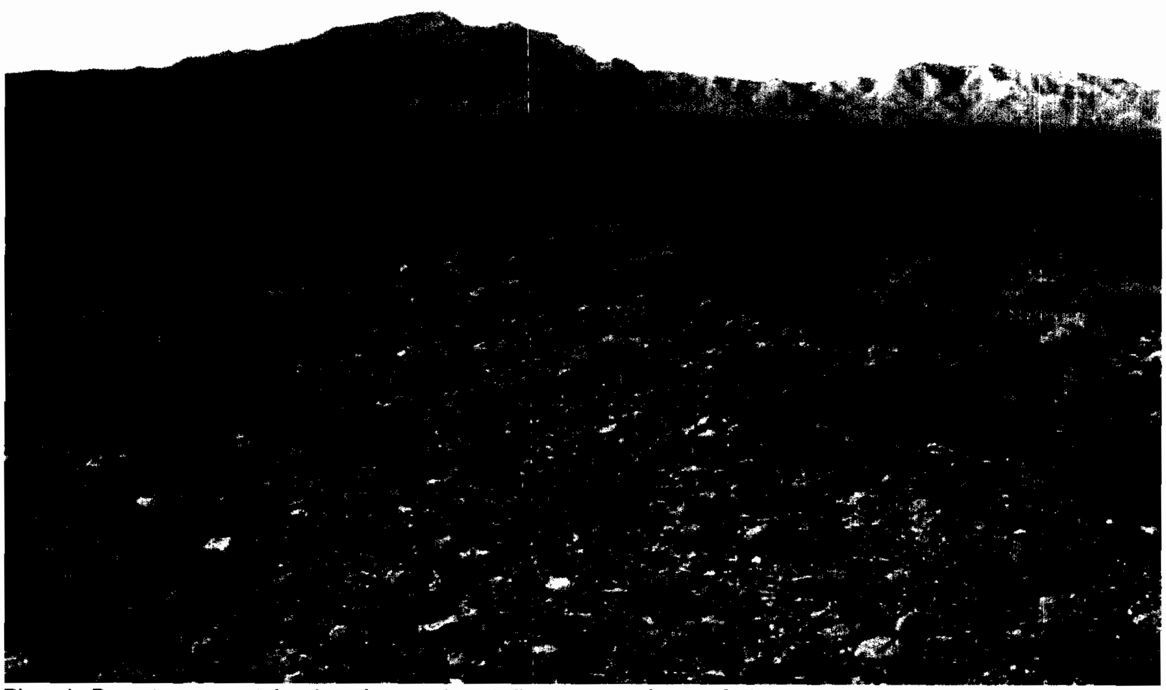


Photo b. Desert pavement developed on a primarily limestone surface at STA. 16-1313. View west to Clark Mountain.

FIGURE DR40-5
MODERATELY DEVELOPED PAVEMENT SURFACES
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

Land Use (44-49)

Background

As stated in the AFC, the July 2002 Northern and Eastern Mojave Desert Management Plan (NEMO) amends the BLM California Desert Area Conservation Plan (CDCA) for the area identified as the Northern and Eastern Mojave Desert. The ISEGS site is located in the southeastern portion of the NEMO Planning Area Boundary. The NEMO Plan addresses threatened and endangered species conservation and recovery and adoption of public land health standards, evaluation of segments for eligibility in the National Wild and Scenic river system, and changes resulting from the California Desert Protection Act passed in 1994. The NEMO Plan also designates routes of travel in Desert Wildlife Management Areas consistent with Federal regulations.

The management of backcountry roads and trails (routes) is an important part of BLM's management of public lands. The use of these routes by Off Highway Vehicles (OHV) and related established recreation activity is a major concern for the BLM. The Ivanpah Valley falls within the NEMO plan amendment area and includes routes of travel designated for OHV use in that land use plan amendment. The ISEGS project overlays several of these routes. The analysis for the project will need to consider the impact to these designated routes and their uses. Where use, if any, will be allowed through or in the vicinity of the project, special prescriptions will need to be discussed. Where use would be discontinued, alternative means of transportation will need to be described. Finally, because the use of routes is such a sensitive subject for the public, consideration should be given to conditions of approval which serve to ensure continued existence of this recreation.

Data Request

44. Provide a complete inventory and assessment of travel routes within and adjacent to the planning area using the California BLM Route Inventory Data Dictionary.

Response: The Applicant is working with BLM staff to obtain maps and/or data as well as to identify the current status of these routes. The Applicant acknowledges that if it is determined that the travel routes in the area of the Ivanpah SEGS could be disturbed through implementation of the three phases of the project, then a plan will be developed, in coordination with BLM, that avoids or mitgiates potential impacts on these existing routes. As necessary, this plan will also identify fencing, gates, and dust abatement and restoration measures that would be taken to manage the use of the routes designated open within and adjacent to the facility.

45. Identify all routes that would be closed due to development of the facility.

Response: This information will be provided pending receipt of information described in Data Response 44.

46. Identify all routes that would be rerouted and would be proposed for new alignment.

Response: This information will be provided pending receipt of information described in Data Response 44.

47. Identify all routes that would remain open to the public.

Response: This information will be provided pending receipt of information described in Data Response 44.

48. Identify all fencing, gates, and dust abatement measures that would be taken to manage use of routes designated open within and adjacent to the facility.

Response: This information will be provided pending receipt of information described in Data Response 44.

49. Please develop appropriate mitigation for numbers 42 through 45.

Response: Applicant assumes this question is referring to numbers 45 through 48. Mitigation measures will be developed pending receipt of information described in Data Response 44.

Soils and Water Resources (53-55, 57-60, 63, 68)

Background

As described in the October 18, 2007 RWQCB letter (posted on the CEC's project webpage), specific post-construction stormwater controls are not discussed in the AFC. The RWQCB requires Low Impact Development (LID). The goal of LID is to maintain landscape functionality equivalent to predevelopment hydraulic conditions and minimize the generation of non-point source pollutants. To accomplish these goals, LID principles include:

- Helping maintain natural drainage paths and landscape features to slow and filter runoff and maximize groundwater recharge.
- Reducing the impervious ground cover created by development of the project and the associated transportation network.
- Managing runoff as close to the source as possible.

CEC and BLM staff need to see how principals of LID will be incorporated into the project design. Natural drainage features and patterns must be maintained to the extent feasible. Staff needs to evaluate designs that minimize impervious surface, such as permeable surface parking areas, directing runoff onto vegetated areas using curb cuts and rocks, swales, etc., and infiltrating runoff as close to the source as possible to avoid forming erosion channels.

The project must incorporate measures to ensure that stormwater generated by the project is managed onsite during both pre-construction and post-construction with development features that span the drainage channels or allow for broad crossings. Design features should be incorporated to ensure that runoff is not concentrated by the proposed project, thereby causing downstream erosion.

A draft copy of the Industrial Stormwater Pollution Prevention Plan (SWPPP) is presented as Appendix 5.15A. Section 2.4 (Description of Storm Drainage System and Outfalls) of the Industrial SWPPP discusses the proposed project grading and control measures for managing stormwater runoff. The project is proposing to maintain existing sheet flow conditions where possible, except in the power block area. Section 5.11.6.2 (Permanent Erosion Control Measures) of the AFC discusses in general terms the type of permanent soil erosion control measures that can be expected at the project site and that will be included as part of the final SWPPP.

Data Request

53. Please provide a project grading plan.[1]

Response: A conceptual grading plan was provided as part of AFC Appendix 5.15A , Construction SWPPP - Attachment B. In addition, detail drawings for typical rock filters and other flow and erosion control features have been provided as part of the Draft Drainage Erosion and Sediment Control Plan provided as Attachment DR57-1.

54. Provide an appropriately scaled detailed drawing of the location of all project access routes and indicate whether these are paved, graveled, or graded. This should include the access routes to and between the heliostat mirrors.

Response: The location and types (paved, graveled or graded) of project access routes have been provided in project drawings Ivan-0-DW-048-735-001 through Ivan-0-DW-048-735-007 (following Data Response 6). Roads connecting all three power blocks will be graded and paved including the re-routed Colosseum Road. The proposed dirt access roads within the heliostat arrays will be leveled if required (minor cuts and fills) and only to the extent that minimal access is provided for heliostat installation and maintenance. Drawings Ivan-0-DW-048-735-006 and Ivan-0-DW-048-735-007 have been created to provide additional clarity regarding typical areas of disturbance within the heliostat array fields.

55. Provide a calculation of the amount and area of compacted soils resulting from biweekly traverses by a truck mounted tanker for washing of heliostat arrays and cutting of vegetation.

Response: The approximate area of all 10 heliostat fields is 2,482.4 acres of which approximately 17.5 percent are dirt access roads for heliostat maintenance. Therefore, the approximate total area within the 10 heliostat fields that may be subject to compaction is approximately 434 acres.

The approximate area of compacted soils was calculated assuming a 3-foot average width of ground disturbance (compaction zone) for each tire track made by a truck-mounted water tanker, with a total of a 6-foot width of ground disturbance for every dirt access road inside each of the 10 heliostat fields. Due to the compacted nature of the soil observed onsite, it is assumed that the soil could compact to a maximum depth of approximately 4 inches from biweekly traverses by a truck-mounted water tanker. Therefore, the approximate total area of the 434 acres (18,905,040 square feet) that may be subject to compaction within the 10 heliostat fields is multiplied by 4 inches (0.33 ft) of soil compaction is 233,627 cubic yards (or 6,307,923 cubic feet).

Background

To determine the potential erosion impacts to water and soil resources from construction of the project, the California Energy Commission (CEC) requires a draft Drainage Erosion and Sediment Control Plan (DESCP). The draft DESCP is to be

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[1] Response to this item can be addressed in the draft Drainage Erosion and Sediment Control Plan requested in #57.

updated and revised as the project moves from the preliminary to final design phases and is to be a separate document from the construction Storm Water Pollution Prevention Plan (SWPPP). The final DESCP, submitted prior to site mobilization, must be developed and signed by a professional engineer/erosion control specialist.

Data Request

57. Please provide a draft DESCP containing elements A through I listed below. These elements will outline site management activities and erosion/sediment control Best Management Practices (BMPs) to be implemented during site mobilization, excavation, construction, and post-construction activities. The level of detail in the draft DESCP should correspond to the current level of planning for site construction and corresponding site grading and drainage. Please provide all conceptual erosion control information for those phases of construction and post-construction that have been developed or provide a statement when such information will be available.

a. Vicinity Map: A map(s) at a minimum scale 1"=100' shall be provided indicating the location of all Project elements and depictions of all significant geographic features including swales, storm drains, and sensitive areas.

b. Site Delineation: All areas subject to soil disturbance, such as the construction area, laydown area, parking area, all linear facilities, and landscaping areas shall be delineated showing boundary lines and the location of all existing and proposed structures, pipelines, roads, and drainage facilities.

c. Watercourses and Critical Areas: The DESCP shall show the location of all nearby watercourses including swales, storm drains, and drainage ditches. Indicate the proximity of those features to the Project construction, laydown, and landscape areas and all transmission and pipeline construction corridors.

d. Drainage Map: The DESCP shall provide a topographic site map(s) at a minimum scale 1"=100' showing existing, interim, and proposed drainage systems and drainage area boundaries. On the map, spot elevations are required where relatively flat conditions exist. The spot elevations and contours shall be extended off-site for a minimum distance of 100 feet in flat terrain.

e. Drainage of Project Site Narrative: The DESCP shall include a narrative of the drainage measures to be taken to protect soil and water resources onsite and downstream. The narrative shall include a summary of the hydraulic analysis prepared by a professional engineer/erosion control specialist. The narrative shall state the watershed size in acres that was used in the calculation of drainage measures. The hydraulic analysis should be used to support the selection of BMPs and structural controls to divert off-site and on-site drainage around or through the construction and laydown areas.

f. Clearing and Grading Plans: The DESCP shall provide a delineation of all areas to be cleared of vegetation and areas to be preserved. The plan shall provide elevations, slopes, locations, and extent of all proposed grading as shown by contours, cross-sections, or other means. The locations of any disposal areas, fills, or other special features shall also be shown. Illustrate existing and proposed topography tying in proposed contours with existing topography.

g. Clearing and Grading Narrative: The DESCP shall include a table with the quantities of material excavated or filled during construction in all area such as the construction area, laydown area, and transmission and pipeline corridors. This table shall identify whether the materials removed and brought in were temporarily or permanently added or removed and the amount of such material brought in or removed.

h. Best Management Practices Plan: The DESCP shall identify on the topographic site map(s) the location of the site specific BMPs to be employed during each phase of construction, initial grading, project element excavation and construction, and final grading/stabilization. BMPs shall include measures designed to prevent wind and water erosion. Treatment control BMPs used during construction should enable testing of groundwater and/or stormwater runoff prior to discharge.

i. Best Management Practices Narrative: The DESCP shall show the location (as identified in H above), timing, and a maintenance schedule of all erosion and sediment control BMPs to be used prior to initial grading, during project excavation and construction, final grading/stabilization, and post-construction. Separate BMP implementation schedules shall be provided for each phase of construction. The maintenance schedule should include post-construction maintenance of structural control BMPs or a statement provided when such information will be available.

Response: Due to the size of the DESCP, seven copies are being provided to CEC staff as Attachment DR57-1. (Electronic copies will be provided to the parties upon request). As stated in the "Background," the DESCP is an evolving document. It will be updated and revised when detailed construction drawings are available.

Background

Approximately 3,400 acres of land will be disturbed by the project construction activity. Section 5.11.4.6 (Construction) of the AFC states that "...substantial water erosion and dust control measures will be required to prevent an increased dust load and sediment load to ephemeral washes on and off the project site." In section 4.2.4 (Erosion Control) in the AFC, year-round and rainy season erosion control practices are discussed. To the extent not discussed in Item 57 above, please provide the following information.

Data Request

58. Describe in detail the purpose, construction, and effectiveness of the controls to protect slopes susceptible to erosion and the controls to stabilize non-active areas, and provide an appropriately scaled map showing the location and engineering drawings illustrating the construction of these controls.

Response: This information is provided in the DESCP as part of Data Response 57.

59. Describe and illustrate the measures to maintain the integrity of existing onsite and adjacent offsite drainages and how existing drainages would be altered.

Response: This information is provided in the DESCP as part of Data Response 57.

60. Describe and illustrate the purpose, construction, and effectiveness of proposed rock filters, local diversion berms, and how existing drainage patterns would be altered.

Response: Rock filters and check dams will be strategically placed throughout the project site to provide areas for sediment deposition and promote sheet flows of stormwater. Where available, native materials (rock and gravel) are to be used for the construction of the rock filter and check dams. Periodic maintenance will be conducted as required after major storm events and when the volume of material behind the dams exceeds 50 percent of the original volume. Diversion berms will be positioned on the uphill slope of each receiver tower to catch stormwater and re-direct it before dispersal as sheet flow. Rock filters and check dams are not intended to alter drainage patterns but are intended to minimize soil erosion. A detailed drawing of proposed rock filters dams, check filter dams and local berms has been provided (see Ivan-0-DW-048-735-007, following Data Response 6).

Background

Section 5.11.4.6 (Construction) of the AFC discusses stockpiling soil from grading operations. An estimated 156,875 cubic yards of material will be cut and reused as fill at the site. The cut soil will have to be stockpiled at a staging area prior to use as fill, and the topsoil will be separately stockpiled from the underlying soil. In addition, an estimated 412,600 cubic yards of vegetation will be generated and available as mulch for erosion control. To minimize and control soil erosion and transport, a DESCP and SWPPP would be developed.

Data Request

63. Describe and illustrate the soil stockpile staging locations, confirming the locations would be within the proposed project footprint or within an area to which the applicant has legal access.

Response: Please see Data Response 6.

Background

San Bernardino County Ordinance No. 3872 applies to groundwater management in the unincorporated, non-adjudicated desert region of the county. San Bernardino County (County) and Bureau of Land Management (BLM) have entered into a Memorandum of Understanding (MOU) that provides that BLM will require conformance with County Ordinance No. 3872 for all projects proposing to use groundwater from beneath Public Lands. The MOU also provides that the County and BLM will work cooperatively to ensure that conditions required of project applicants will jointly conform to applicable local, state, and federal laws and regulations.

Data Request

68. Please provide copies to the BLM of all correspondence, including applications, data, and approvals, with or between the County, for permitting water wells associated with the proposed project.

Response: Since the preparation Data Response, Set 1A, Alicia Torre with BrightSource Energy, and Applicant's Environmental Consultant, Alicia Gasdick, CH2M HILL, discussed the permitting of groundwater wells associated with the proposed project with Wes Reeder, San Bernardino County Geologist. The approach to compliance with the County's permit requirements including CEQA requirements and timing was discussed in detail. Based on the discussion, Mr. Reeder contacted Carrie Hyke, Senior Planner with the County's Advanced Planning Division, to determine the appropriate approach for compliance with the County's permit requirements for the proposed project. Mr. Reeder provided the following e-mail later that afternoon (Attachment DR68-1). The referenced Groundwater Monitoring Plan Guidelines are provided as Attachment DR68-2. Based on the discussion with Mr. Reeder and his subsequent e-mail, the Applicant suggests that the CEC's and BLM's process include all of the information required by the County to issue its groundwater permit and that the Applicant apply for the groundwater permit following issuance of the Final Staff Assessment/Final Environmental Impact Statement (FSA/FEIS).

As part of the conversation with Mr. Reeder on January 31, 2008, the groundwater impacts of the proposed project were also discussed. Ms. Torre discussed the potential for the proposed project to result in a 2.1-foot drop in groundwater elevations at one-half mile from the proposed project wells (one-half mile is approximately the distance from the proposed project wells to the nearest golf course well). Mr. Reeder noted that a 2.1-foot drop in groundwater elevations at the golf course wells was not considered a significant impact in his opinion. Mr. Reeder indicated that a 15-foot drop or greater may be significant; however, this amount far exceeds the elevation declines estimated to occur under the proposed project. Mr. Reeder also noted that the subsidence of ground in certain areas near Ivanpah Dry Lake has raised some concerns.

ATTACHMENT DR68-1

Gasdick, Alicia/SAC

From: Gasdick, Alicia/SAC
Sent: Sunday, February 10, 2008 8:28 PM
To: Gasdick, Alicia/SAC
Subject: FW: Ivanpah SEGS Project--wells
Attachments: GroundwaterMonitoringPlanGuidelines.pdf

From: Reeder, Wes - Building and Safety [mailto:wreeder@lusd.sbcounty.gov]
Sent: Thursday, January 31, 2008 4:43 PM
To: Alicia Torre; alicia.gasdick@ch2mhill.com
Cc: Hyke, Carrie - Planning
Subject: Ivanpah SEGS Project

I spoke with Carrie Hyke, Senior Planner with the Advanced Planning Division and she concurred that the most reasonable approach will be to generate all of the required information during the CEC's EIS process and then utilize that information as the CEQA documentation for the County's permit.

Attached is a copy of our Groundwater Monitoring Plan Guidelines. As I indicated, if after CEQA review we feel that the proposed groundwater extraction may result in impacts, then a Groundwater Monitoring Plan may be required. Such a plan is currently required for the Primm Golf Course.

If you would like to discuss our CEQA requirements further, you can contact Carrie Hyke at 909.387.4371

Wes Reeder, PG, EG
County Geologist
Land Use Services Department
San Bernardino County
909.387.4240
wreeder@lusd.sbcounty.gov

County of San Bernardino – Public and Support Services Group
Land Use Services Department

ATTACHMENT DR68-2

GUIDELINES

FOR PREPARATION OF A

GROUNDWATER MONITORING PLAN

Rev 1/98
Rev 6/00

CONTENTS

1.0 INRODUCTION

The purpose of these guidelines is to outline components that may be included in a Groundwater Monitoring Plan required for specific projects involving groundwater extraction. These are general guidelines and should be utilized as such. The scope of monitoring necessary for a particular project will vary depending upon a site's hydrogeologic conditions and associated resources as well as the total volume of groundwater to be extracted. These guidelines may therefore be too comprehensive for some projects and not comprehensive enough for others. Each project and each monitoring plan warrants individual consideration.

1.1 Purpose of the Groundwater Monitoring Plan

The purpose of the Groundwater Monitoring Plan (the Plan) is to establish monitoring, testing and reporting procedures; locate monitoring, extraction and survey points; define significance criteria; and discuss various mitigation measures in the event that adverse impacts occur. The plan may be part of a Hydrogeology Report required prior to project approval. Potential adverse impacts should be defined in the Hydrogeology Report and the Plan should summarize these potential adverse impacts.

The Plan should include methods and procedures to monitor:

(1) Groundwater Production,

(2) Groundwater Levels,

(3) Water Quality (selected general mineral and physical parameters and any constituents of concern specific to the project area), and

(4) Potential Land Subsidence Due To Groundwater Withdrawal.

The Plan requires summarization of all monitoring data and submission of annual reports to the County of San Bernardino, and a more comprehensive summary and analysis of data is to be included in the five-year report. The County will determine how long monitoring and reporting will continue. Monitoring reports should be prepared and signed by a State of California Registered Geologist (Project Hydrogeologist).

2.0 MONITORING, TESTING AND REPORTING PROCEDURES

2.1 Production Monitoring

Production data for all project extraction wells should be recorded from instantaneous readings of flow meters or other approved methods of measurement at each well. The production meter readings should be extrapolated and compiled into monthly summary tables for presentation and analysis in the annual reports. Where possible, cumulative (totalizer) flow meter readings should also be used to record actual production.

Field procedures used to collect production data should be specified in the Plan and verified annually by a State of California Registered Geologist. Methods for estimating production in the case of meter malfunction should be discussed in the Plan.

2.2 Depth To Static Water Level Monitoring

Depth to static groundwater levels should be recorded monthly for all project monitoring wells and summarized in appropriate tables for presentation and analysis in the annual groundwater monitoring reports. Depth to static water levels should be converted to groundwater elevations by subtracting depth to water from the reference point and expressed as feet above mean sea level. If necessary, corrections should be made for changes in barometric (or other) fluctuations. Hydrographs and groundwater elevation contours should be included as figures in the annual reports to aid in the analysis of groundwater level trends. The direction and rate of groundwater flow should be shown on appropriate water level contour maps along with the method used for calculation.

Field procedures for groundwater level data collection should be specified in the Plan and verified by a State of California Registered Geologist on an annual basis.

2.3 Water Quality Monitoring

Water quality samples should be collected from each project monitoring well and analyzed for selected parameters on a quarterly basis (minimum). The parameters to be monitored, as well as the monitoring schedule, should be specified in the Plan. Selected general mineral and physical parameters, such as TDS (field measurement may be adequate), as well as any constituents of concern in the project area should be included. Selection of appropriate constituents should be mutually agreed upon by the County and the project proponent.

Water quality analysis results should be summarized in appropriate tables for presentation and analysis in the annual reports. Water quality contours for selected parameters and either tri-linear plots or stiff diagrams should also be included as figures in the annual reports to aid in the analysis of water quality trends.

Field procedures for collecting water quality samples should be specified in the Plan and annually verified by a State of California Registered Geologist.

2.4 Subsidence Monitoring

The project proponent should retain a State of California Licensed Land Surveyor to perform a Second Order Class I land survey (1:50,000) of the well field and project area. The survey should incorporate a nearby benchmark located on basement rock if possible. An existing USGS benchmark may be used if it is in an appropriate location, otherwise, the surveyor should establish a benchmark. Survey monuments in the project area should be constructed on concrete pads at or near the production well installations.

The survey should be repeated annually to determine any vertical and horizontal variation in the vicinity of the project area. Results should be included in each annual groundwater monitoring report.

2.5 Reporting Procedures

2.5.1 Annual Reports

Annual reports summarizing all monitoring data must be prepared and submitted to the County for review.

Baseline water level and water quality conditions should be established for comparison with the data compiled for each annual report. Ideally, pre-project historical data should be used to establish baseline conditions. If historical records are not available for determination of baseline conditions in the project area, then the first several years of annual monitoring must be used for this purpose. The results of the first land survey should serve as the baseline conditions for annual comparison. The Plan should specify the methods that will be used to define baseline conditions in the project area.

The annual reports should be prepared by a State of California Registered Geologist, and should contain the following components:

- Baseline water level and water quality conditions (to be defined in the first annual report if historical data is available). Presentation of baseline conditions should include water level elevation contours, water quality contours, and a figure showing the results of the initial land survey;
- Tables summarizing monthly groundwater extraction readings for each project extraction well (cumulative tables for each annual report);
- Tables summarizing monthly depth to static water level and groundwater elevation measurements for all monitoring wells (cumulative tables for each annual report);
- Hydrographs for all monitoring wells;
- Groundwater elevation contours for a selected period or periods (to remain consistent in subsequent annual reports);
- Tables summarizing quarterly water quality analyses results for the monitoring wells (cumulative tables for each annual report);
- Water quality contours for a selected period or periods (to remain consistent in subsequent annual reports);
- Results of annual land subsidence monitoring survey;
- Summary tables of any data collected from private wells in the project area (see

Section 3.1.2);

- Summary of project developments potentially affecting groundwater, such as increased production or new production wells;

- Discussion of groundwater production, groundwater level elevation, and groundwater quality trends as compared to the baseline conditions;

- Preliminary discussion of potential problems and suggested mitigation strategies; and

- Re-evaluation of the adequacy of the monitoring network and Plan.

2.5.2 Five-Year Report

The fifth annual report must be submitted to the County in the form of a revised Hydrogeology Report. Along with the components of the annual reports, the five-year report should include a re-evaluation of the hydrology of the project area based upon the monitoring data and any other information available since the initial Hydrogeology Report.

The Plan should be revised as necessary as part of the scope of the five-year report.

A State of California Registered Geologist should prepare the five-year report, which should contain the following components in addition to the components of previous annual reports:

- Summary of total project groundwater pumped from the basin;

- Documentation of any trends in groundwater levels evident from the monitoring data;

- Documentation of any trends in water quality measurements evident from the monitoring data;

- Contours of the most recent static groundwater level elevations and groundwater level elevation changes over the previous five years; and

- Documentation of any reduction in yields from nearby non-project wells where such wells were monitored (See Section 3.1.2).

As part of the re-evaluation of the hydrogeology of the project area, the five-year report should also include:

- Discussion and hydrogeologic interpretation of all groundwater production, water level elevation, water quality, and land survey data collected in five years;

- Revised estimates of groundwater recharge and storage in the project area;
- Recommendations for continued groundwater development;

- Detailed evaluation of impact of groundwater development on surface and groundwater resources and suggested mitigation measures (if undesirable impacts have occurred); and

- Re-evaluation of monitoring network, frequency, and overall Plan adequacy.

3.0 LOCATION OF MONITORING WELLS, PRODUCTION WELLS AND SURVEY POINTS

3.1 Monitoring Well Requirements

The monitoring well network should be selected based on the distribution of wells, the availability of historical data, access to the wells, and the magnitude of possible impacts due to project operations. The number of monitoring wells required will vary according to the project. The County will specify the minimum number of additional monitoring wells to be constructed if adequate wells are not available. The Plan should include a project basemap which shows monitoring and other well locations.

If very few monitoring wells are available, project production wells may be used as monitoring wells, either temporarily or permanently, upon approval by the County.

3.1.1 Proposed Groundwater Monitoring Well Locations

The Plan should discuss the proposed locations and construction schedules of additional monitoring wells if they are required. Proposed monitoring well locations should be included on the project basemap.

The Land Use Services Department should be included in the process of siting any new groundwater monitoring wells in the project area.

3.1.2 Monitoring Of Private Wells

Monitoring of private wells in the project area should be offered to area residents. In some cases, private wells may be used to fulfill monitoring well requirements. However, collection of data from private wells may also be used to evaluate and document project impacts on water supply in the area.

3.2 Production Well Locations

The Plan should discuss proposed locations and construction schedules of any additional project production wells that are planned at the time the Plan is written. Proposed production well locations should be included on the project basemap.

3.3 Survey Point Locations

The survey point locations for the land survey should be established by the State of California Licensed Land Surveyor performing the survey, as discussed in Section 2.4. The project basemap should include the survey monument locations.

4.0 SIGNIFICANCE CRITERIA AND MITIGATION MEASURES

If at any time the groundwater monitoring data indicates trends toward significant groundwater level declines, degradation of water quality, or land subsidence caused by groundwater withdrawal during the expected lifetime of the project, the appropriate annual report should include recommendations for mitigating these impacts.

Significance criteria that will be used to assess impacts due to groundwater withdrawal during the course of the monitoring program should be defined in the Plan. If the data available at the time of Plan preparation is inadequate to define significance criteria for any or all areas of monitoring, the first five years of monitoring data can be used to develop such criteria. A Revised Groundwater Monitoring Plan should then be submitted with the five-year monitoring report.

The Plan must include a discussion of possible mitigation measures and their implementation in the event that monitoring data indicate adverse impacts. The County requires that reduced groundwater withdrawal must be considered as a possible mitigation measure.

The Plan should also include proposed methods of mitigation if groundwater resource management (or mismanagement) may impact surface water resources. The Project Biologist may be involved in this phase of the Groundwater Monitoring Plan, as impacts to should groundwater and surface water may affect biological resources.

If at any time the Project Hydrogeologist or the County Geologist determines or judges that adverse impacts to groundwater have occurred or will occur, the County reserves the right to require the project proponent to implement adequate measures to mitigate such impacts.

Traffic and Transportation (82-84)

Background

Section 5.12.3.2 (Existing Traffic Conditions) of the AFC states that existing daily average and peak volumes on selected roadway segments in the vicinity of the project site were obtained from Caltrans and San Bernardino County traffic counts. Peak hour volumes presented in Figures 5.12-3 and 5.12-4 indicate that 26 trips would exit Primm Valley Golf Club in the AM peak hour and that 26 trips would enter the Primm Valley Golf Club in the PM peak hour; however, average daily traffic (ADT) is not presented in the AFC. The San Bernardino County traffic website cited in the AFC indicates an ADT volume of 249 trips for Yates Well Road but does not include peak hour data.

Page 5.12-6 indicates that northbound I-15 operates at Level of Service (LOS) F on Fridays; however, volume-to-capacity ratios for I-15 are not presented.

Data Request

82. Provide the existing ADT for Primm Golf Club access road and Colosseum Road.

Response: As stated in Applicant's December 28, 2007 letter, the Applicant objects to this data request as burdensome. Without waiving this objection, Applicant provides the following response. The Applicant anticipates that existing traffic volumes on the golf course access road will be very similar to volumes on Yates Well Road, east of the I-15 interchange. San Bernardino County existing ADT for Yates Well Road was 249 vehicles/day (both directions).

To validate these assumptions, Primm Valley Golf Course was contacted and provided the data presented in Table DR82-1. Their activity varies greatly with the seasons. For the worst case, during winter time, there are as many as 96 golfers arriving every hour starting at 9:50 a.m. Tee times start at 7:00 a.m. during the summer, but only 48 golfers per hour can be served (straight tee time scheduling only allows half as many golfers as split tee time scheduling). The afternoon peak occurs 5 to 5.5 hours later, starting at approximately 1:00 p.m. in the summer. The golf course staff estimate an average of 2 golfers/vehicle. Therefore, the peak hour for golfers in the summer has 24 vehicles. In the winter, the peak hour may be as high as 48 vehicles/hour, but this occurs at 9:50 a.m. (well after the construction workers have arrived).

In the hour before the first tee time, the golf course staff arrive. An average of 24 vehicles carrying golf course staff arrive during this time, plus one bus carrying staff. Based on these data, the worst case scenario would be when construction traffic travels during the arrival of golf course staff or the first hour of tee times, when the volumes are 24 vehicles per hour. (This information confirms our original estimate.)

Note that these estimates are for the highest volume of golf course traffic, which generally occurs on weekends. Weekday traffic will generally be somewhat lower (because there are fewer golfers), but the general conclusions are similar for weekend and weekday traffic.

TABLE DR82-1
2007 Tee Time Schedule

Month	Tee Times	Golf Tee Time Format	Number of Golfers per Month	Average Number of Golfers per day	Average Golfers per Vehicle
January	9:50am- 12:00pm	Split Tee Times	3,987	129	2
February	9:50am- 12:00pm	Split Tee Times	5,058	181	2
March	8:00am - 2:00pm	Straight Tee Times	7,657	247	2
April	7:30am - 3:30pm	Straight Tee Times	5,921	197	2
May	7:30am - 3:30pm	Straight Tee Times	6,956	224	2
June	7:00am - 3:30pm	Straight Tee Times	6,973	232	2
July	7:00am - 3:30pm	Straight Tee Times	4,007	129	2
August	7:00am - 3:30pm	Straight Tee Times	4,477	144	2
September	7:00am - 3:30pm	Straight Tee Times	3,882	129	2
October	7:30am - 2:30pm	Straight Tee Times	6,995	226	2
November	9:50am- 12:00pm	Split Tee Times	4,783	159	2
December	9:50am- 12:00pm	Split Tee Times	2,952	95	2
TOTAL			63,648		

Straight Tee Times: There are on the average of 48 players per hour during these times. The bulk of the golfers arrive between 7:30 a.m. and 11:30 a.m. and usually depart 5 to 5.5 hours after arriving.

Split Tee Times: During these times the Club averages 96 players per hour. Bulk of guests arrive between 8:30 a.m. and 11:00 a.m.

Employees
The Golf Club has a staff of 110 employees. Monday through Friday there are about 70 employees on the road per day. Fifty employees are on the road 1.5 hours before the first tee time and the other 20 employees arrive between 9:00 a.m. and 10:00 a.m.
The Golf Club staff average 2 per carload, with a bus bringing in 25 people per day (1.5 hours before our first tee time and leaving between 2:00 p.m. and 3:00 p.m.)

Source: Primm Valley Golf Club

83. Provide existing average and peak Saturday and Sunday trips for Primm Golf Club access road and Colosseum Road.

Response: As stated in Applicant's December 28, 2007 letter, the Applicant objects to this data request as burdensome. Without waiving this objection, Applicant provides the following response. See Data Response 82.

84. Provide peak hours traffic data for Yates Well Road.

Response: As stated in Applicant's December 28, 2007 letter, the Applicant objects to this data request as burdensome. Without waiving this objection, Applicant provides the following response. See Data Response 82.

Transmission System Engineering (93)

Background

Staff requires the System Impact Study (SIS) and/or Facilities Study (FS) to identify potential downstream transmission facilities that may be required due to interconnection of the ISEGS to the California Independent System Operation (California ISO) grid and to determine if the interconnection would comply with the NERC/WSCC, and/or Utility planning standards and reliability criteria.

Data Request

93. Please submit a complete SIS report prepared by Southern California Edison (SCE) and/or California ISO for interconnection of the 400 MW ISEGS based on 2010 summer peak and off peak system conditions (scheduled on-line date of the ISEGS).

a. The study should include a power flow, short circuit and transient stability analyses with a mitigation plan for any identified reliability criteria violations. In the report, list all major assumptions in the base cases including major path flows, major generations including queue generation and loads in the area systems.

b. Identify the reliability and planning criteria utilized to determine the reliability criteria violations.

Response: Five copies of the Final System Impact Study (SIS) for Ivanpah 2 (Attachment DR93-1B) – the second phase of the ISEGS project (ISO Queue Position #131) – are being provided to CEC Staff. Please note that the CAISO refers to this project as DPT 1. (Electronic copies of Attachment DR93-1B will be provided to the other parties upon request.) The next two SIS reports will be provided once they are delivered by the CAISO to the Applicant. Per recent communications, the CAISO estimates that the second SIS (for Ivanpah 1) will be available in early March and the third, for Ivanpah 3, in mid-April.

Please note that the CAISO is conducting its studies in order of queue position: Ivanpah 2 (#131), Ivanpah 1 (#162) and Ivanpah 3 (#233). The FERC tariff and CAISO rules do not require that projects be constructed in queue order.

The submitted SIS was performed using 2013 heavy summer and 2013 light spring base cases. SCE policy is to perform an SIS using a study year that would allow the inclusion of all senior queue position generation (generation ahead of a particular project in the queue). This policy allows for the study to accurately determine the ultimate system reinforcements required for each proposed new generation project. There are senior queue position generators with on-line dates of 2013 in the area of the Ivanpah SEGS project (e.g., ISO Queue Position 110). Therefore, by SCE policy, the SIS for the first phase of ISEGS was performed using 2013 base cases.

All the information requested in Data Requests 93.a. and 93.b. is included in this SIS for Ivanpah 2 (Attachment DR93-1B). The 230 kV upgrade plan of service described in the Final SIS Report will provide the transmission capacity required for all three Ivanpah projects and other projects in the area as well.

Visual Resources (100)

Background

According to the AFC (Figure 5.6-1), the proposed project lies within 1 mile of a designated National Scenic Area (NSA).

Data Request

100. Identify an appropriate range of affected viewers to base analysis upon, including recreational viewer groups in addition to golf course visitors.

Response: In addition to the recreation use data provided by the National Park Service (NPS) in Data Response, Set 1A, recreation use data have been obtained from the Bureau of Land Management (BLM) and the Primm Valley Golf Club. The data are provided below.

BLM does not formally track recreation use at the Stateline Wilderness Area, Mesquite Mountain Wilderness Area, or the Clark Mountain Range. Annual recreation use in 2007 has been estimated by BLM at 365 users at each of these recreation areas. 2007 annual recreation use at the Ivanpah Dry Lake is estimated at 5,000 users (non-motorized use only; the area is closed to motorized use). In addition, the area where the Ivanpah SEGS project would be constructed is used for recreation. There are an estimated 1,500 users annually in that area, consisting of off-highway vehicle enthusiasts (OHVs - including SUVs and quadrunners), horseback riders, and motorcyclists. The source of this information is:

Downing, Elaine. Wilderness/Recreation Planner. Bureau of Land Management, Needles Field Office. 2008. Personal communication with Wendy Haydon/CH2M HILL on January 31, 2008.

In addition, total annual recreation use at the Primm Valley Golf Club in 2007 was 63,648 golfers (see Table DR82-1). The source of this information is:

Yelenich, Mark. PGA - Director of Golf. Primm Valley Golf Club. 2008. Personal communication with Loren Bloomberg/CH2M HILL on January 17, 2008.

As a worst-case, recreationists other than the golfers would have potential views of the proposed project, though actual views would depend on the location of the recreationalists relative to the Ivanpah SEGS project. As indicated in the AFC, while playing the Desert course at the Primm Valley Golf Club, the golfers would have views only from certain holes and of limited duration.