# Hydrology and Water Quality Assessment

## Bonanza Peak Energy Project

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# Hydrology and Water Quality Assessment

## Bonanza Peak Energy Project

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## ACRONYMS AND ABBREVIATIONS

| Acronym | Description |
|---|---|
| AFY | acre-feet per year |
| AGR | Agricultural supply designation |
| BMP | Best Management Practices |
| CCR | California Code of Regulations |
| CEQA | California Environmental Quality Act |
| COLD | Cold Freshwater Habitat |
| ERM | Environmental Resources Management, Inc. |
| FEMA | Federal Emergency Management Agency |
| HEC-HMS | Hydrologic Engineering Center Hydrologic Modeling System |
| HEC-RAS | Hydrologic Engineering Center River Analysis System |
| LID | Low Impact Development |
| MCL | Maximum contaminant level |
| mg/L | milligrams per liter |
| Mercury Provision | Tribal Subsistence Beneficial Uses and Mercury Provision, State Water Board Resolution No. 2017-0027 |
| ml | milliliter |
| MUN | Municipal and Domestic designation |
| MWac | megawatt alternating current |
| $NH_3$ | Un-ionized ammonia |
| $NH_4^+$ | Ammonium ion |
| NOAA | National Oceanic and Atmospheric Administration |
| Project | Utility scale solar photovoltaic energy generating facility |
| PV | photovoltaic |
| REGPA | Renewable Energy General Plan Amendment |
| RWQCB | State of California Regional Water Quality Control Board |
| SEDA | Solar Energy Development Area |
| SMCL | Secondary maximum contaminant level |
| SPWN | Spawning, Reproduction, and/or Early Development |
| SWPPP | Storm Water Pollution Prevention Program |
| USACE | United States Army Corps of Engineers |
| USDA | United States Department of Agriculture |

| Acronym | Description |
|---|---|
| USEPA | United States Environmental Protection Agency |
| USGS | United States Geological Survey |
| WARM | Warm Freshwater Habitat |

# EXECUTIVE SUMMARY

Bonanza Peak Solar, LLC, a subsidiary of Hanwha Renewables (Applicant), requests a Renewable Energy Permit from Inyo County, California to construct, own, operate, and maintain a utility scale solar photovoltaic (PV) energy generating facility on private lands. The requested term for the REP is 50 years.

The Bonanza Peak Energy Project (Project) will include solar photovoltaic arrays, access roads, an operations and maintenance (O&M) building, and an approximately 0.5-mile generation tie-line (gen-tie corridor) within unincorporated Inyo County, California. The gen-tie corridor will continue into Nevada to the northeast; only the portion of the project within California is considered within this scope. The Project Area encompasses approximately 3,387 acres with a Developed Area of no greater than 2,400 acres, as dictated by the Inyo County Renewable Energy General Plan Amendment. The hydrology and water quality characteristics of the Project were assessed, including stormwater analysis and the impacts of construction and regular operations on groundwater and surface water quality. Groundwater usage and supply are assessed in the Water Supply Assessment (ERM 2025).

Portions of the Developed Area are near the Federal Emergency Management Agency (FEMA) Special Flood Hazard Area Zone A designations. Zone A is an area of approximate floodplain boundaries with a 1 percent annual chance of flooding for any year and an approximately 40 percent chance of flooding over 50 consecutive years. Therefore, Environmental Resources Management, Inc. (ERM) conducted a stormwater analysis and flood assessment for a site-specific analysis of the 24-hour 100-year storm event using hydrologic and hydraulic modeling.

To mitigate flood risk, proposed infrastructure will be constructed outside FEMA-designated 100-year flood zones. The site-specific hydraulic modeling indicates some localized flooding will occur within the Developed Area. The planned infrastructure should be built above the modeled water surface elevation in these areas of localized flooding (typical flooding depths of 1.0 to 1.2 feet) plus any additional freeboard as required by local governing authorities, with the stricter standards governing. These recommendations are provided based on the existing site conditions analysis.

The California Environmental Quality Act (CEQA) environmental impact questions for hydrology and water quality were addressed for the Project, and Inyo County Renewable Energy General Plan Amendment (REGPA) Environmental Impact Report Mitigation Measures HYD-1 and HYD-3 were included as part of this analysis. Following a review of the construction phase and regular operations, it was determined that the Project will have a less than significant impact on all defined hydrology and water quality CEQA questions. The less than significant impact is supported by:

- Location of infrastructure outside areas of flooding wherever possible;
- Necessary construction of infrastructure within the flood area above the modeled floodplain wherever possible;
- Implementation of regulatory requirements for the preparation of a Storm Water Pollution Prevention Plan;

- Implementation of best management practices to minimize the impacts of construction activities on the existing hydrology and surface water quality in the proposed Project boundaries;
- Implementation of HYD-1 and HYD-3 mitigation measures (per Inyo County REGPA); and
- Indication of sufficient water supply to support the Project per the water supply assessment completed for the groundwater basin (Pahrump Valley Groundwater Basin [Basin 6-028]) where the Project is proposed.
- The Water Supply Assessment concluded that sufficient water supply is available to support Project construction, operation, and decommissioning activities, with a total life-of-project demand of approximately 1,824 AF.

# 1. HYDROLOGY AND WATER QUALITY ANALYSIS

Supplementary figures are provided in Appendix A (Figure A to Figure D).

## 1.1 PROJECT DESCRIPTION

Bonanza Peak Solar, LLC, a subsidiary of Hanwha Renewables (Applicant), requests a Renewable Energy Permit from Inyo County, California to construct, own, operate, and maintain a utility scale solar photovoltaic (PV) energy generating facility on private lands. The requested term for the Renewable Energy Permit is 50 years.

The Bonanza Peak Energy Project (Project) would be located in the Charleston View Solar Energy Development Area (SEDA) in southeastern Inyo County, adjacent to the Nevada state line just north of Old Spanish Trail Highway.

The solar generation facility, including the PV arrays, substation, and other electrical equipment, would be within a 3,382-acre Project Area with a Developed Area of no greater than 2,400 acres, as dictated by the Inyo County Renewable Energy General Plan Amendment (REGPA; Inyo County 2015). The Project has a planned net generating capacity of up to 500 megawatts alternating current.

The PV electrical generation facility includes installation of fencing, access roads, an operations and maintenance (O&M) building, PV modules, single axis tracker racking, inverters, electrical distribution equipment, overhead and underground power lines, substation, interconnection switchyard, and an overhead transmission line racking system. While the generation tie-line corridor will continue into Nevada to the northeast, only the portion of the Project within California is considered within this scope.

Construction is anticipated to begin as soon as January 2027. The Project may be built in one or more phases within an approximately 18-month construction period. Proposed grading is estimated at approximately 89 acres and will only occur for interior access roads along electrical collection line corridors, the substation, the operations and maintenance building, and associated unlined sediment (stormwater) control basins. Most of the Developed Area will remain at existing grade.

## 1.2 CALIFORNIA ENVIRONMENTAL QUALITY ACT REQUIREMENTS

The CEQA impact questions for the Hydrology and Water Quality section (Section X of CEQA Guidelines Appendix G) are defined in the CEQA Checklist Evaluation of Environmental Impact (CEQA Guidelines Appendix G). The impact questions are:

Would the project:

- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?
- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
  - Result in a substantial erosion or siltation on or offsite;
  - Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or offsite;
  - Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
  - Impede or redirect flood flows?
- Be located in a flood hazard, tsunami, or seiche zone, risking release of pollutants due to project inundation?
- Conflict with or obstruct implementation of water quality control plan or sustainable groundwater management plan?

## 1.3 REGPA REQUIREMENTS

As stated in HYD-1 *"Site-specific hydrologic investigations will be completed for proposed utility scale solar facility development projects within the individual SEDAs and the OVSA (i.e., those with grading, excavation or other activities potentially affecting hydrologic conditions, as determined by the County), as well as the potential off site transmission corridors associated with the Trona, Chicago Valley, and Charleston View SEDAs (if applicable), prior to final project design approval. All applicable results and recommendations from these investigations will be incorporated into the associated individual final project design documents to address identified potential hydrologic concerns, including but not necessarily limited to: drainage alteration, runoff rates and amounts, flood hazards, and existing/planned storm drain system capacity. The final project design documents will also encompass applicable standard design and construction practices from sources including NPDES, Basin Plan and County standards, as well as the results/recommendations of County plan review (with all related requirements to be included in applicable engineering/design drawings and construction contract specifications)."*

If a specific hazard related to HYD-1 would occur or is likely to occur, Inyo County provides general recommended mitigation measures for HYD-1. Any identified site-specific remedial measures take priority over the general mitigation recommendations provided by Inyo County (County of Inyo 2015), Project impacts and recommended mitigation measures are described in Section 1.6.

As stated in HYD-3 *"Site-specific water quality investigations will be completed for long-term solar facility operations associated with applicable proposed development projects within the individual SEDAs and the OVSA (i.e., those with activities potentially affecting water quality conditions, as determined by the County), as well as the potential off site transmission corridors associated with the Trona, Chicago Valley, and Charleston View SEDAs (if applicable), prior to final project design approval. All applicable results and recommendations from these investigations will be incorporated into the associated individual final project design documents to address identified*

*potential long-term water quality issues related to conditions such as: anticipated and potential pollutants to be used, stored or generated onsite; the location and nature (e.g., impaired status) of on-site and downstream receiving waters; and project design features to avoid/address potential pollutant discharges. The final project design documents will also encompass applicable standard design practices from sources including NPDES, Basin Plan and County standards, as well as the results/recommendations of project-related hazardous materials investigations and regulatory standards (with all related requirements to be included in applicable engineering/design drawings and construction contract specifications)"*

Inyo County provides general recommended Best Management Practices (BMPs) for HYD-3. Any identified site-specific BMPs take priority over the general BMPs recommendations provided by Inyo County (County of Inyo 2015), which include:

- *Low Impact Development (LID)/Site Design BMPs: LID/site design BMPs are intended to avoid, minimize, and/or control post development runoff erosion potential and pollutant generation to the maximum extent practicable by mimicking the natural hydrologic regime. The LID process employs design practices and techniques to effectively capture, filter, store, evaporate, detain, and infiltrate runoff close to its source through efforts such as: (1) minimizing developed/ disturbed areas to the maximum extent feasible; (2) utilizing natural and/or unlined drainage features in onsite storm water systems; (3) disconnecting impervious and pervious surfaces to slow concentration times and directing flows from impervious surfaces into landscaped or vegetated areas; and (4) using pervious surfaces in developed areas to the maximum extent feasible.*
- *Source Control BMPs: Source control BMPs are intended to avoid or minimize the introduction of pollutants into storm drains and natural drainages to the maximum extent practicable by reducing onsite pollutant generation and off-site pollutant transport through measures such as: (1) installing "No Dumping" stencils/tiles and/or signs with prohibitive language (per current County guidelines) at applicable locations such as drainages and storm drain inlets to discourage illegal dumping; (2) designing trash storage areas to reduce litter/pollutant discharge through methods such as paving with impervious surfaces, installing screens or walls to prevent trash dispersal, and providing attached lids and/or roofs for trash containers; (3) designing site landscaping (if applicable) to maximize the retention of native vegetation and use of appropriate native, pest resistant and/or drought-tolerant varieties to reduce irrigation and pesticide application requirements; and (4) providing secondary containment (e.g., enclosed structures, walls, or berms) for applicable areas such as trash or hazardous material use/storage.*
- *Treatment Control/LID BMPs: Treatment control (or structural) BMPs are designed to remove pollutants from runoff to the maximum extent practicable through means such as filtering, treatment, or infiltration. Treatment control and/or LID BMPs are required to address applicable pollutants and must provide medium or high levels of removal efficiency for these pollutants (per applicable regulatory requirements). Based on the anticipated pollutants of concern, potential LID and treatment control BMPs may include (1) providing water quality treatment and related facilities such as sediment basins, vegetated swales, infiltration basins, filtration devices and velocity dissipators to treat appropriate runoff flows and reduce volumes*

*prior to off-site discharge (per applicable regulatory requirements); and (2) conducting regular inspection, maintenance, and as-needed repairs of pertinent facilities and structures.*

## 1.4 SUMMARY OF HYDROLOGIC AND WATER QUALITY OBJECTIVES

The Developed Area in California is contained within a drainage subbasin of the Spring Mountains located in Nevada. The drainage subbasin includes an unnamed stream feature located south of the Developed Area which runs southeast to northwest. Hydrologic and hydraulic analyses are provided in the following sections.

The Project and Inyo County water quality is guided by the Lahontan Region Water Quality Control Board in the South Lahontan Basin (State of California RWQCB 2025). The water quality objectives provided by the Lahontan Region - State of California Regional Water Quality Control Board (RWQCB) are:

- Ammonia: The neutral, un-ionized ammonia species ($NH_3$) is highly toxic to freshwater fish. The fraction of toxic $NH_3$ to total ammonia species ($NH_4^+$ + $NH_3$) is a function of temperature and pH. Tables A to D in Appendix A were derived from United States Environmental Protection Agency (USEPA) ammonia criteria for freshwater. Ammonia concentrations shall not exceed the values listed for the corresponding conditions in these tables.
- Bacteria: Waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources, including human and livestock wastes. The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20/100 milliliters (ml), nor shall more than 10 percent of all samples collected during any 30-day period exceed 40/100 ml.
- Biostimulatory Substances: Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect the water for beneficial uses.
- Chemical Constituents: Waters designated as MUN (Municipal and Domestic) shall not contain concentrations of chemical constituents in excess of the maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL) based upon drinking water standards specified in the following provisions of Title 22 of the California Code of Regulations (CCR), which are incorporated by reference into this plan: Table 64431-A of Section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), Table 64444-A of Section 64444 (Organic Chemicals), Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels-Ranges).
- Chlorine, Total Residual: For the protection of aquatic life, total chlorine residual shall not exceed either a median value of 0.002 milligrams per liter (mg/L) or a maximum value of 0.003 mg/L. Median values shall be based on daily measurements taken within any 6-month period.
- Color: Waters shall be free of coloration that causes nuisance or adversely affects the water for beneficial uses.

- Dissolved Oxygen: The dissolved oxygen concentration, as percent saturation, shall not be depressed by more than 10 percent, nor shall the minimum dissolved oxygen concentration be less than 80 percent of saturation. For waters with the beneficial uses of COLD (cold freshwater habitat), COLD with SPWN (spawning, reproduction, and/or early development), WARM (warm freshwater habitat), and WARM with SPWN, the minimum dissolved oxygen concentration shall not be less than that specified in Table E in Appendix A.
- Floating Material: Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect the water for beneficial uses. For natural high-quality waters, the concentrations of floating material shall not be altered to the extent that such alterations are discernable at the 10 percent significance level.
- Mercury (fish tissue): Statewide water quality objectives for mercury in fish tissue were established via the "Tribal Subsistence Beneficial Uses and Mercury Provisions" (State Water Board Resolution No. 2017-0027) (Mercury Provisions) for the reasonable protection of people and wildlife that consume fish and apply to all the inland surface waters, enclosed bays, and estuaries of the State designated with the applicable beneficial uses. The Mercury Provisions should be consulted in their entirety for a complete accounting of the water quality objectives and associated implementation provisions. The Mercury Provisions can be found on the State Water Board's Plans and Policies web page at the following address: https://www.waterboards.ca.gov/plans_policies/
- Oil and Grease: Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect the water for beneficial uses. For natural high-quality waters, the concentration of oils, greases, or other film or coat generating substances shall not be altered.
- Nondegradation of Aquatic Communities and Populations: All wetlands shall be free from substances attributable to wastewater or other discharges that produce adverse physiological responses in humans, animals, or plants; or that lead to the presence of undesirable or nuisance aquatic life. All wetlands shall be free from activities that would substantially impair the biological community as it naturally occurs due to physical, chemical, and hydrologic processes.
- pH: In fresh waters with designated beneficial uses of COLD or WARM, changes in normal ambient pH levels shall not exceed 0.5 pH units. For all other waters of the region, the pH shall not be depressed below 6.5 nor raised above 8.5.
- Radioactivity: Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. Waters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the CCR, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect.

- Sediment: The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect the water for beneficial uses.
- Settleable Material: Waters shall not contain substances in concentrations that result in the deposition of material that causes nuisance or that adversely affects the water for beneficial uses. For natural high-quality waters, the concentration of settleable materials shall not be raised by more than 0.1 milliliter per liter.
- Suspended Material: Waters shall not contain suspended materials in concentrations that cause nuisance or that adversely affect the water for beneficial uses. For natural high-quality waters, the concentration of total suspended materials shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.
- Tastes and Odors: Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish or other edible products of aquatic origin, that cause nuisance, or that adversely affect the water for beneficial uses. For naturally high-quality waters, the taste and odor shall not be altered.
- Temperature: The natural receiving water temperature of all waters shall not be altered unless it can be demonstrated to the satisfaction of the RWQCB that such an alteration in temperature does not adversely affect the water for beneficial uses. For waters designated WARM, water temperature shall not be altered by more than 5 degrees Fahrenheit above or below the natural temperature. For waters designated COLD, the temperature shall not be altered. Temperature objectives for COLD interstate waters and WARM interstate waters are as specified in the "Water Quality Control Plan for Control of Temperature in The Coastal and Interstate Waters and Enclosed Bays and Estuaries of California", including any revisions.
- Toxicity: All waters shall be maintained free of toxic substances in concentrations that are toxic to or that produce detrimental physiological responses in human, plant, animal, or aquatic life.
- Turbidity: Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses. Increases in turbidity shall not exceed natural levels by more than 10 percent.

The water quality objectives for groundwaters are:

- Bacteria: In groundwaters designated as MUN, the median concentration of coliform organisms over any seven-day period shall be less than 1.1/100 ml.
- Chemical Constituents: Groundwaters designated as MUN shall not contain concentrations of chemical constituents in excess of the MCL or SMCL based on drinking water standards specified in the following provisions of Title 22 of the CCR, which are incorporated by reference into this plan: Table 64431-A of Section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), Table 64444-A of Section 64444 (Organic Chemicals), Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels Ranges). This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. Waters designated as AGR (Agricultural

Supply) shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses (i.e., agricultural purposes).

- Radioactivity: Groundwaters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the CCR, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect.
- Tastes and Odors: Groundwaters shall not contain taste or odor-producing substances in concentrations that cause nuisance or that adversely affect beneficial uses. For groundwaters designated as MUN, at a minimum, concentrations shall not exceed adopted secondary maximum contaminant levels specified in Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels-Ranges) of Title 22 of the CCR, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect.

Water quality impacts for the Project are addressed in Section 1.6.

## 1.5 STORMWATER ANALYSIS

### 1.5.1 FEDERAL EMERGENCY MANAGEMENT AGENCY FLOODPLAINS

The Developed Area is located within a FEMA designated Zone X which represents areas with a 0.2 percent or less annual chance of flooding (Figure 1). FEMA further delineates Zone X into two sub-categories: areas with a 0.2 annual percent chance flood and areas of less than a 0.2 annual percent chance flood. The majority of the Developed Area is within the less than 0.2 annual percent chance flood designation; the southwestern portion of the Developed Area is located within the 0.2 annual percent chance flood boundary. The Developed Area and associated infrastructure is sited to avoid placement within Federal Emergency Management Agency (FEMA) Special Flood Hazard Area Zone A designations (Figure 1). Zone A is an area with a 1 percent annual chance of flooding for any year and a ≈40 percent chance of flooding over any 50 consecutive year period. These areas are approximate and have not been defined through an engineer's estimate using a detailed hydrologic/hydraulic study. Therefore, ERM conducted a flood assessment for a site-specific analysis of the 24-hour 100-year storm event using hydrologic and hydraulic modeling software described below in Section 1.5.2 and Section 1.5.3.

### 1.5.2 HYDROLOGIC MODELING

Hydrologic modeling was completed using United States Army Corps of Engineers' (USACE) Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS). The software simulates the hydrologic process and estimates rainfall runoff. The software implements infiltration aspects and outputs flow hydrographs. Hydrologic modeling was completed for existing site conditions during a 24-hour, 1 percent annual chance of exceedance (i.e., 100-year) frequency storm event.

HEC-HMS requires inputs of terrain data, drainage subbasins, rainfall depths, and mean infiltration curve numbers to estimate runoff. The United States Geological Survey (USGS) 3-D Elevation

Program 1/3 arc second resolution elevation data from 2023 and 2025 were merged to integrate the entire drainage basin and used for terrain inputs. The terrain data were processed to define the drainage subbasins and streams using the built-in functionality within HEC-HMS.

The rainfall input data were prescribed as a frequency storm and collected from the Precipitation Frequency Data Server [1], which provides National Oceanic and Atmospheric Administration (NOAA) Atlas 14 precipitation frequency estimates for the Project (Table 1).

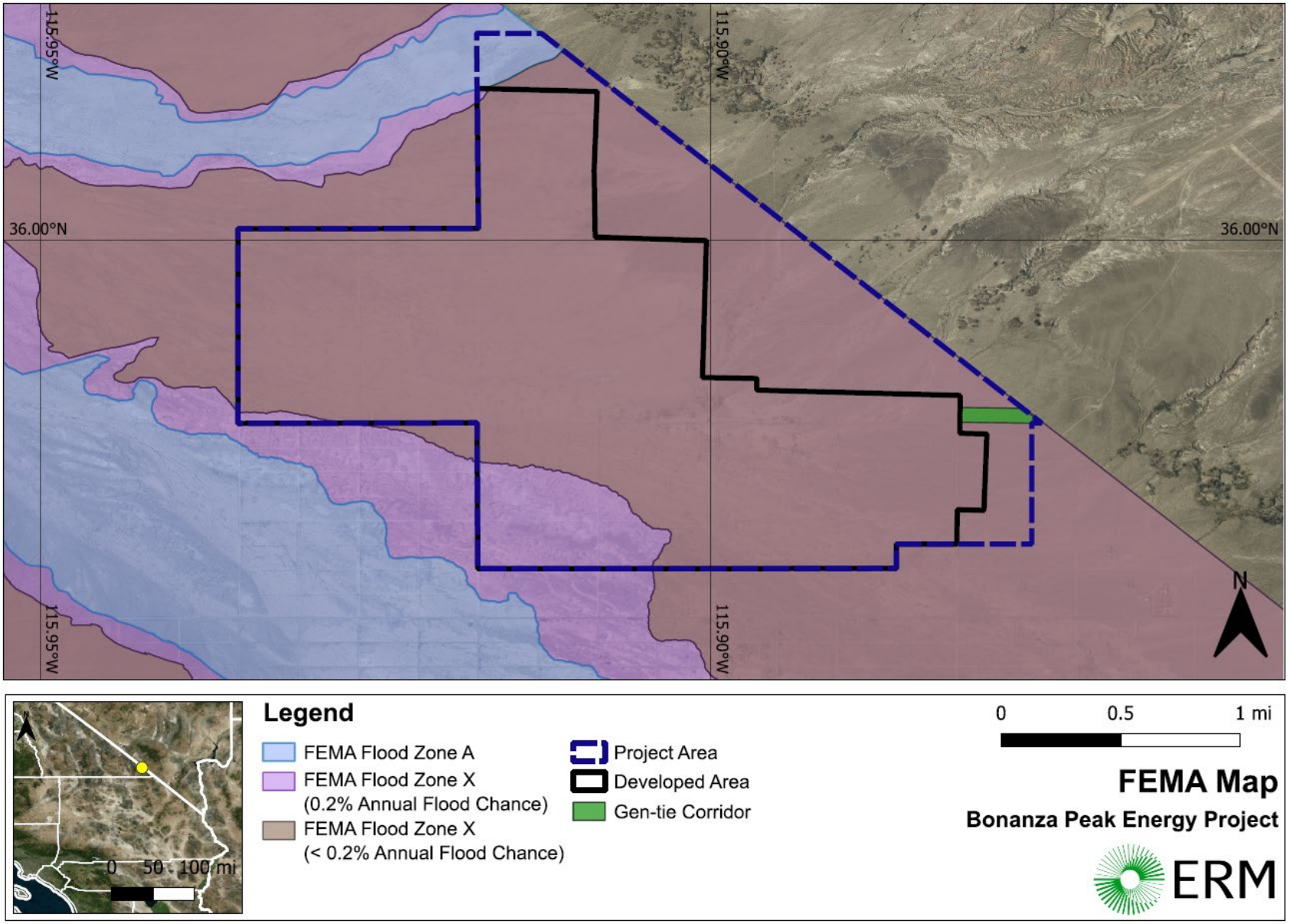
TABLE 1. NOAA ATLAS 14 ANNUAL MAXIMUM PRECIPITATION DEPTH DURATION FREQUENCY ESTIMATES (INCHES).

| Duration | Precipitation Depth Duration Frequency Based on 1/100 Event (Inches) |
|---|---|
| 5-minute: | 0.415 |
| 10-minute: | 0.595 |
| 15-minute: | 0.72 |
| 30-minute: | 1.01 |
| 60-minute: | 1.4 |
| 2-hour: | 1.68 |
| 3-hour: | 1.86 |
| 6-hour: | 2.18 |
| 12-hour: | 2.55 |
| 24-hour: | 3.23 |

Soil data were downloaded from the United States Department of Agriculture's (USDA) Gridded Soil Survey Geographic [2] database (Figure A in Appendix A), which provides detailed soil data developed by the National Cooperative Soil Survey. Hydrologic soil groups describe infiltration potential. Generally, hydrologic soil group A has the highest infiltration rate and lowest runoff. The infiltration rate decreases with each hydrologic soil group, reaching its lowest infiltration rate in group D. Areas with missing soil data, including the entire Developed Area and gen-tie corridor were processed as hydrologic soil group A following the soil descriptions in the geotechnical report for the Project (Mott MacDonald 2021). Most of the drainage subbasin areas from the Spring Mountains within the model's domain had available soil data from Gridded Soil Survey Geographic database. Land cover data were downloaded from the USGS National Land Cover Database [3] (Figure B in Appendix A). Land cover data define the land and water types in the region. The land cover impacts runoff potential and can be used in conjunction with soil data to improve infiltration and runoff estimation.

[1] https://hdsc.nws.noaa.gov/pfds/
[2] https://www.nrcs.usda.gov/resources/data-and-reports/gridded-soil-survey-geographic-gssurgo-database
[3] https://www.usgs.gov/centers/eros/science/national-land-cover-database

FIGURE 1. FEMA FLOOD ZONES WITHIN AND NEAR THE DEVELOPED AREA.



The infiltration curve numbers were identified for each subbasin by using the soil and land cover data and using the infiltration curve number lookup table by the HEC-HMS reference guide [4] (Table 2; Figure C in Appendix A). Curve number is a method to estimate runoff based on precipitation depth, soil data, land cover, and soil moisture. A high curve number represents high runoff potential, and a low number represents low runoff potential.

TABLE 2. CURVE NUMBER TABLE FOR NATIONAL LAND COVER DATA AND HYDROLOGIC SOIL GROUPS.

| National Land Cover Data | | Hydrologic Soil Group | | | |
|---|---|---|---|---|---|
| Land Use Description | Land Use Value | A | B | C | D |
| Open Water | 11 | 98 | 98 | 98 | 98 |
| Developed, Open Space | 21 | 49 | 69 | 79 | 84 |
| Developed, Low Intensity | 22 | 57 | 72 | 81 | 86 |
| Developed, Medium Intensity | 23 | 61 | 75 | 83 | 87 |
| Developed, High Intensity | 24 | 81 | 88 | 91 | 93 |
| Barren Land (Rock/Sand/Clay) | 31 | 78 | 86 | 91 | 93 |
| Deciduous Forest | 41 | 45 | 66 | 77 | 83 |
| Evergreen Forest | 42 | 25 | 55 | 70 | 77 |
| Mixed Forest | 43 | 36 | 60 | 73 | 79 |
| Shrub/Scrub | 52 | 55 | 72 | 81 | 86 |
| Grassland/Herbaceous | 71 | 50 | 69 | 79 | 84 |
| Pasture/Hay | 81 | 49 | 69 | 79 | 84 |
| Cultivated Crops | 82 | 67 | 78 | 85 | 89 |
| Woody Wetlands | 90 | 30 | 58 | 71 | 78 |
| Emergent Herbaceous Wetlands | 95 | 30 | 58 | 71 | 78 |

The mean curve number was then calculated for each subbasin in HEC-HMS. The 100-year frequency storm event was simulated with the Soil Conservation Service curve method, and the resulting hydrograph was processed for the downstream subbasin. The resulting hydrographs were used as a timeseries input for the hydraulic modeling process.

### 1.5.3 HYDRAULIC MODELING

Hydraulic modeling was completed using USACE's HEC-RAS, which simulates 1-D steady and unsteady state and 2-D unsteady state flows. For this study, the 2-D unsteady state flow simulation was implemented, which provides high resolution spatially varying flood inundation at the Developed Area. Hydraulic simulation was performed for the 24-hour 100-year frequency

[4] https://www.hec.usace.army.mil/confluence/hmsdocs/hmsguides/gis-tutorials-and-guides/creating-a-curve-number-grid-and-computing-subbasin-average-curve-number-values

storm event. HEC-RAS 2-D unsteady state flow simulations require a model mesh, hydrograph inputs as boundary conditions, terrain data, and infiltration curve number data for the rain-on-grid method to estimate flow throughout the model domain (area). The model mesh was created in HEC-RAS's RAS Mapper module. The mesh was created with a varying resolution of computational grid cells that increases in density from 50 by 50 feet in relatively flat areas or areas with little terrain variation to 30 by 30 feet in areas near the stream feature and along the Developed Area. The 3-D Elevation Program 1/3 arc second elevation data from USGS were utilized again for the terrain input (Figure D in Appendix A). The curve number data discussed in Section 1.5.2 was used again, but without calculating mean values within the subbasins as required for HEC-HMS. Instead, curve numbers were used for each grid cell. Rain-on-grid was utilized with the rainfall input discussed in Section 1.5.2 to simulate rainfall directly on the Developed Area. Frictional losses were prescribed based on the land cover data with associated Manning's roughness coefficients (Manning's n values) from the HEC-RAS 2D User's Manual [5] (Table 3).

TABLE 3. MANNING'S N VALUES.

| National Land Cover Data | | Manning's n |
|---|---|---|
| Land Use Description | Land Use Value | |
| Open Water | 11 | 0.025 |
| Developed, Open Space | 21 | 0.03 |
| Developed, Low Intensity | 22 | 0.06 |
| Developed, Medium Intensity | 23 | 0.08 |
| Developed, High Intensity | 24 | 0.12 |
| Barren Land (Rock/Sand/Clay) | 31 | 0.023 |
| Deciduous Forest | 41 | 0.1 |
| Evergreen Forest | 42 | 0.08 |
| Mixed Forest | 43 | 0.08 |
| Shrub/Scrub | 52 | 0.07 |
| Grassland/Herbaceous | 71 | 0.025 |
| Pasture/Hay | 81 | 0.025 |
| Cultivated Crops | 82 | 0.02 |
| Woody Wetlands | 90 | 0.045 |
| Emergent Herbaceous Wetlands | 95 | 0.05 |

[5] https://www.hec.usace.army.mil/confluence/rasdocs/r2dum/latest/developing-a-terrain-model-and-geospatial-layers/creating-land-cover-mannings-n-values-and-impervious-layers

### 1.5.4 STORMWATER ANALYSIS RESULTS

Maximum flood depth estimates for the 24-hour 100-year storm event and existing conditions are provided in Figure 2. The maximum flood depth is approximately 1.2 feet in a small southern section of the Developed Area (35.976°, -115.912°). The central portion of the Project site experiences some inundation, with flood depths ranging from approximately 0.2 to 1.0 feet and the majority below 0.6 feet.

## 1.6 PROJECT IMPACTS

The CEQA environmental impact questions for hydrology and water quality are provided and addressed for the Project below.

*Would the Project:*

*a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?*

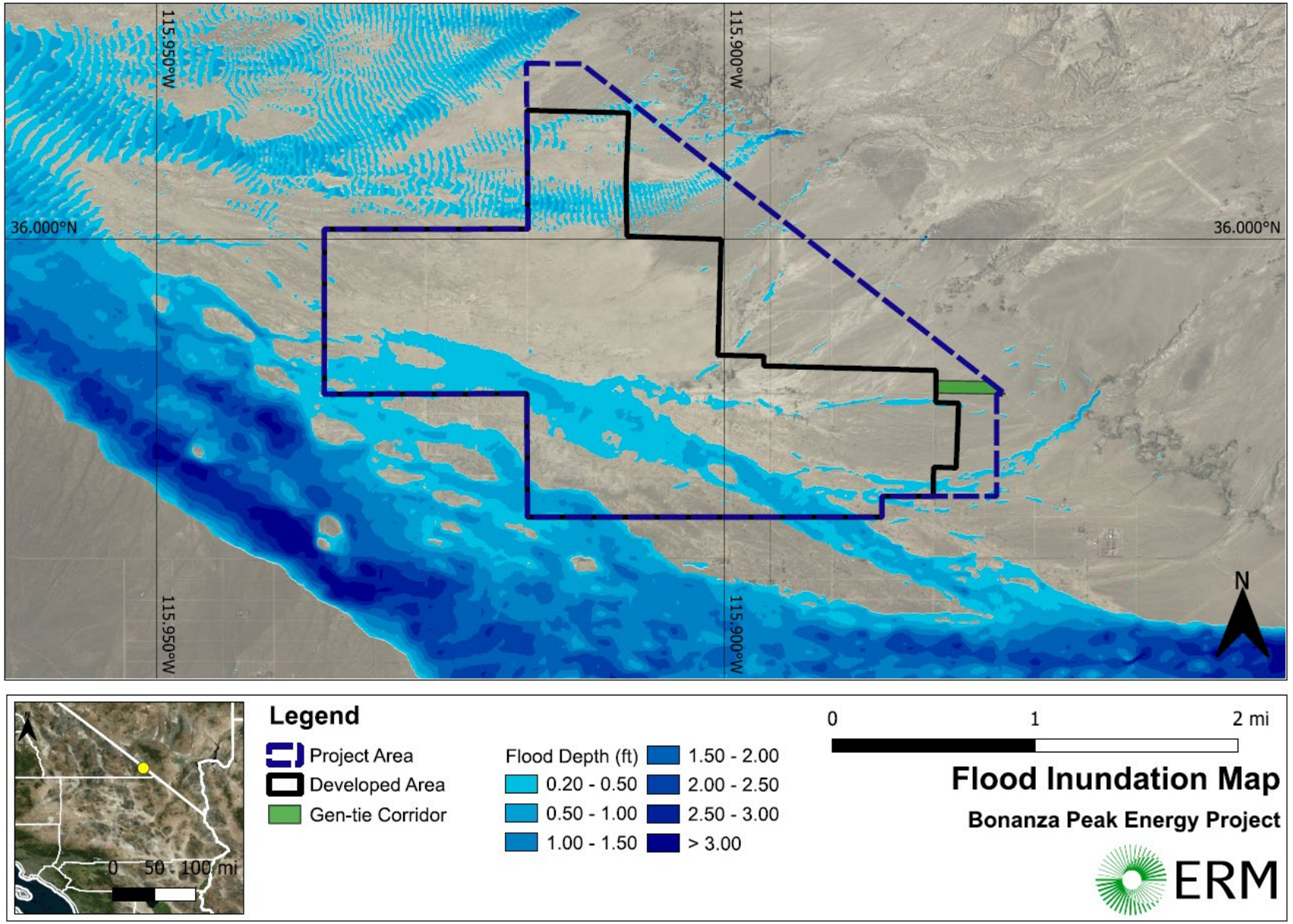
Project Impact Analysis: **Less Than Significant Impact**

No site-wide grading will be performed. The PV modules will be installed on foundation posts approximately 4.5 feet in height and will be constructed at existing grade. The electrical inverters are proposed on pads 2.5 feet above ground elevation. Proposed grading is minimal, estimated at approximately 89 acres. Grading will only be performed at proposed roads, substation site, and detention basins, and the substation site proposed on pads 2.5 feet above existing ground elevation. Grading at the Project can lead to sediment transport from runoff events. However, the Developed Area is relatively flat, and grading is only proposed at specified locations (roads, substation site, O&M building, and detention basins) which minimizes the potential for substantial runoff and sediment transport. Additionally, the potential for water quality impacts from runoff will be limited to short-term construction, restoration, or decommissioning periods. A Construction SWPPP will be prepared for the Project. A Construction SWPPP is required for projects that will disturb more than an acre of land. The SWPPP will follow the guidelines described in the Clean Water Act and National Pollutant Discharge Elimination System Construction General Permit[6]. The Construction SWPPP will include site-specific BMPs to limit the impacts of erosion, construction related impacts, and potential degradation of water quality.

The proposed building and road construction can alter runoff drainage patterns and will increase the total area of impervious surfaces within the Developed Area. The planned construction is minimal compared to the total Developed Area and includes stormwater management and detention basin designs. Post-construction BMPs will be implemented to stabilize site surfaces and require that any minor increase in flows is appropriately managed within the Project footprint. With implementation of these measures potential alterations to drainage will be minimal.

[6] https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html

FIGURE 2. FLOOD INUNDATION MAP (FT).



The planned construction and Developed Area alterations have the potential to substantially impact groundwater quality. Accidental releases of hazardous materials during construction and decommissioning activities may impact surface water quality. Materials that could contribute to this impact include:

- Fuels (diesel, gasoline)
- Lubricants (oils, grease)
- Hydraulic fluid
- Antifreeze
- Transmission fluid
- Cement slurry
- Other fluids used by vehicles and equipment

Equipment leaks can occur due to poor maintenance, unnoticed damage, improper refueling, or operator error. A Hazardous Materials Business Plan following California Health and Safety Code, Division 20, Chapter 6.95, Article 1, Sections 25500 to 25519[7] will be produced for the Project. This plan will identify hazardous material and waste storage areas; outline proper handling, storage, transportation, and disposal techniques; describe methods to prevent spills and minimize impacts in case of a spill; establish procedures for handling unexpected hazardous materials encountered during construction; and define public and agency notification procedures for spills, emergencies, and fires. The Hazardous Materials Business Plan will be available onsite to mitigate any hazardous material risk. Implementation of these measures will minimize potential impacts to water quality.

A water supply assessment was prepared for the Project which identified that the Project's groundwater supply will come from the Pahrump Valley Groundwater Basin (Basin 6-028) directly onsite (ERM 2025). The quality of the groundwater in the Pahrump Valley Groundwater Basin is suitable for all beneficial uses. In the Mesquite Valley Groundwater Basin, the quality of groundwater in the northern half of the basin is suitable for most beneficial uses. The quality of groundwater in the southern half of the basin near Mesquite Lake tends to be marginal-to-inferior for both domestic and irrigation purposes. See the Water Supply Assessment for more details (ERM 2025). Routine panel washing is not anticipated, as occasional rainfall is expected to adequately remove dust and debris under typical conditions.

Post-construction- and operations-phase BMPs will include measures to prevent potential degradation of water quality. Post-construction destabilization of Developed Area surfaces will be addressed through typical, industry standard BMPs such as revegetation as soon as practicable after disturbance and construction. Longer term stabilization will be accomplished through minimizing slopes of final grades. Operations-phase BMPs will include measures to prevent inadvertent destabilization of Developed Area surfaces and ensure that any minor increases in flows are appropriately managed within the Project footprint. With implementation of these measures potential alterations to drainage will be minimal. Therefore, the Project would not

[7] https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=HSC&division=20.&title=&part=&chapter=6.95.&article=1.

violate water quality standards and impacts related to surface or groundwater quality would be less than significant.

b) *Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?*

Project Impact Analysis: **Less Than Significant Impact**

The water demands for this Project include both temporary demands in the construction and decommissioning phases, as well as demand for long-term operation of the solar farm. The Project overlies the Pahrump Valley Groundwater Basin (Basin 6-028) and the Project's groundwater supply will come from this basin. The water supply assessment prepared for the Project (ERM 2025) uses conservative estimates for water consumption quantities during construction, and operations and maintenance (O&M). During the total 18-month construction phase the Project would use an estimated 1,094 acre-feet of water. Operational water demand is estimated at approximately 0.014 acre-feet per year (AFY) and would primarily occur as a result of non-potable water use at the O&M building. Over the anticipated 48.5-year operational life of the Project, this equates to a total operational water demand of approximately 0.68 AF. While the specific decommissioning activities that will occur at the end of the Project life cannot be known with certainty at this time, for purposes of the analysis, the Water Supply Assessment conservatively assumed that decommissioning activities would require the same daily water demand as construction for one year. Accordingly, decommissioning water demand is estimated at approximately 729 AF. Based on these estimates, total life-of-project water demand is approximately 1,824 AF.

It was determined in the Water Supply Assessment that the Project will have sufficient water supply during the construction, operations, and decommissioning phases. Both the next 20 years (analysis period required by SB 610) and the anticipated 51-year duration of the Project have sufficient water supply to meet all the onsite water needs, and the Project will not have a significant long-term negative impact to the groundwater basin supply.

Additionally, the Project would include minimal new impervious surfaces associated with access roads, PV solar arrays (e.g., inverter pads, though not the pole-mounted PV panels), and pads for the substation. As such, the Project would not substantially interfere with groundwater recharge.

A detailed, Project-specific decommissioning and reclamation plan will be developed and approved prior to the start of decommissioning activities. Water use during decommissioning will be primarily for dust suppression purposes. These measures will make sure that dust generated from equipment removal, site grading (if necessary), and soil disturbance is adequately controlled in accordance with applicable air quality and health standards. Exact volumes have not yet been determined and are not included within this Hydrology and Water Quality document due to the uncertainty associated with, and the and the extended time frame before, any decommissioning would occur (after the useful life of the Project).

Based on this analysis, the Project would not decrease groundwater supplies or interfere substantially with groundwater recharge and the impact would be less than significant.

*c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:*

*i. Result in a substantial erosion or siltation on or offsite;*

*ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or offsite;*

*iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or*

*iv. Impede or redirect flood flows?*

Project Impact Analysis: **Less Than Significant Impact**

The Project will not substantially alter the existing drainage pattern of the Developed Area. The current relatively flat terrain will require no significant grading across most of the Developed Area.

Proposed grading is limited to approximately 89 acres and will occur primarily for interior access roads along electrical collection line corridors, the substation, the operations and maintenance building, and unlined sediment (stormwater) control basins. Because grading is limited, drainage patterns will not be substantially altered.

The PV modules will be installed on foundation posts approximately 4.5 feet in height and will be constructed at existing grade. The electrical inverters are proposed on pads 2.5 feet above ground elevation. Grading will only be performed at proposed roads, substation site, and detention basins, and the substation site is proposed on pads 2.5 feet above existing ground elevation. The proposed buildings and road construction can alter nearby runoff drainage patterns and will increase the area of impervious surfaces within the Developed Area. However, as mentioned in section a above, the proposed construction is minimal relative to the total area of the Developed Area, so the drainage pattern will not be substantially altered. As mentioned, a SWPPP will be prepared for the Project. The developed SWPPP will limit the impacts of erosion- and construction-related impacts that could impact the drainage pattern of the Developed Area. The minimal alterations and the SWPPP will result in non-substantial erosion, siltation, or runoff increase. During operation, stormwater would remain on site and the Project would be required to not increase stormwater flows of the Project.

The Developed Area is outside the bounds of the FEMA 100-year flood plain for the unnamed streams. The construction plan will not call for significant construction activities within the FEMA 100-year flood plain bounds, which will avert significant alteration of the course of the streams and any significant increase in erosion, siltation, runoff, or the redirection of flood flows in the unnamed streams.

The impact risk is less than significant considering the minimal alterations to the drainage patterns and the minimal addition of impervious area as a percentage of the overall Project area.

*d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?*

Project Impact Analysis: **Less Than Significant Impact**

The Project will be constructed outside the bounds of a FEMA Flood Zone A. Zone A is an area with a 1 percent annual chance of flooding for any year and an approximately 40 percent chance of flooding over 50 years. The Project is not coastal or at risk of a tsunami inundation. Additionally, the Project is not located near a lake so there is no risk of seiche inundation. There is no dam or large levee near the Project which could potentially lead to substantial inundation. Therefore, potential impact related to the release of pollutants due to flood hazard, tsunami, or seiche zones is less than significant.

e) *Conflict with or obstruct implementation of water quality control plan or sustainable groundwater management plan?*

Project Impact Analysis: **Less Than Significant Impact**

The Project  is contained within the South Lahontan Basin which contains policies on water quality. The Project overlies the Pahrump Valley Groundwater Subbasin (Basin Number 6-028) and this groundwater basin is the anticipated location of groundwater wells (existing or new) that will be used as a source of Project-related water. The Project is not located within an area regulated by a Groundwater Sustainability Agency. The basins are denoted with a low priority status (ERM 2025). Therefore, there is currently no sustainable groundwater management plan for the groundwater basin within which the Project is located. The Project will be subject to the policies outlined in the Lahontan Basin Water Quality Control Plan. During operation, stormwater would remain on site and the Project would be required to not increase stormwater flows of the Project. Onsite stormwater design will address applicable water quality policies outlined in the Lahontan Basin Water Quality Control Plan by following the guidelines described in the Clean Water Act and National Pollutant Discharge Elimination System. Therefore, the Project will not obstruct implementation of the current water quality control plan.

The Project operation will not violate the current water quality guidelines. Routine panel washing is not anticipated, as occasional rainfall is expected to adequately remove dust and debris under typical conditions. Therefore, potential impact related to a conflict or obstruction to water quality control plan or sustainable groundwater management plan is less than significant.

The HYD-1 and HYD-3 mitigation measures descriptions are provided and addressed for the Project below:

HYD-1:

- *Drainage Alteration: (1) locate applicable facilities and activities (e.g., staging areas and soil/material stockpiles) outside of surface drainage courses and drainage channels; (2) reroute surface around applicable facilities, with such rerouting to be limited to the smallest area feasible and rerouted drainage to be directed back to the original drainage course at the closest feasible location (i.e., the closest location to the point of diversion); and (3) use drainage structures to convey flows within/through development areas and maintain existing drainage patterns.*

The Project will be constructed outside of the FEMA Zone A 100-year flood boundaries. Therefore, significant construction activities associated with the Project will occur outside of any extensive surface drainage courses and drainage channels. Site grading and drainage design will require that

existing water flow paths are preserved or properly redirected to prevent unintended water accumulation or erosion.

- *Runoff Rates and Amounts: (1) minimize the installation of new impervious surfaces (e.g., by surfacing with pervious pavement, gravel or decomposed granite); and (2) use flow regulation facilities (e.g., detention/retention basins) and velocity control structures (e.g., riprap dissipation aprons at drainage outlets) to maintain predevelopment runoff rates and amounts.*

Engineering plans will integrate stormwater management features such as detention basins, permeable surfaces, and properly sized culverts to handle peak runoff and prevent downstream flooding. The PV modules will be installed on foundation posts approximately 4.5 feet in height and will be constructed at existing grade. The electrical inverters are proposed on pads 2.5 feet above ground elevation. Grading will only be performed at proposed roads, the substation site, and the detention basins. Furthermore, the substation site proposed on pads 2.5 feet above existing ground elevation. This minimizes the creation of impervious surfaces.

- *Flood Hazards: (1) work to locate proposed facilities and activities outside of mapped 100 year floodplain boundaries; (2) based on technical analyses such as HEC-RAS studies, restrict facility locations to avoid adverse impacts related to impeding or redirecting flood waters; and (3) based on HEC-RAS studies, use measures such as raised fill pads to elevate proposed structures above calculated flood levels, and/or utilize protection/containment structures (e.g., berms, barriers or waterproof doors) to avoid flood damage.*

The HEC-RAS study results identify areas where flood waters could occur and associated flood depths. The infrastructure will be higher than the calculated flood levels to avoid adverse impacts such as flood damage. Sections 1.5.4 and 1.5.5 provide more details on the BMPs for the flood hazards.

- *Storm Drain System Capacity: (1) implement similar measures as noted above for runoff rates and amounts; and (2) utilize additional and/or enlarged facilities to ensure adequate on and offsite storm drain system capacity.*

The Project will follow all applicable federal, state, and local water management guidelines, ensuring compliance with flood control and stormwater requirements.

HYD-3:

- *LID/Site Design BMPs: LID/site design BMPs are intended to avoid, minimize and/or control post development runoff, erosion potential and pollutant generation to the maximum extent practicable by mimicking the natural hydrologic regime. The LID process employs design practices and techniques to effectively capture, filter, store, evaporate, detain and infiltrate runoff close to its source through efforts such as: (1) minimizing developed/disturbed areas to the maximum extent feasible; (2) utilizing natural and/or unlined drainage features in onsite storm water systems; (3) disconnecting impervious and pervious surfaces to slow concentration times and directing flows from impervious surfaces into landscaped or vegetated areas; and (4) using pervious surfaces in Developed Areas to the maximum extent feasible.*

The Developed Area is limited to the 2,400-acres as outlined in the REGPA and proposed grading is minimal, estimated at a total of 89 acres. Grading will be primarily for interior access roads

along electrical collection line corridors, the substation, and the operations and maintenance building. Included in the 89 acres is grading and clearing for unlined sediment (stormwater) control basins to capture stormwater and sediment leaving the site. The PV modules will be installed on foundation posts approximately 4.5 feet in height and will be constructed at existing grade. The electrical inverters are proposed on pads 2.5 feet above ground elevation. Grading will only be performed at proposed roads, substation site, and detention basins, and the substation site proposed on pads 2.5 feet above existing ground elevation. The limited proposed construction minimizes the creation of impervious surfaces.

- *Source Control BMPs: Source control BMPs are intended to avoid or minimize the introduction of pollutants into storm drains and natural drainages to the maximum extent practicable by reducing onsite pollutant generation and off-site pollutant transport through measures such as: (1) installing "No Dumping" stencils/tiles and/or signs with prohibitive language (per current County guidelines) at applicable locations such as drainages and storm drain inlets to discourage illegal dumping; (2) designing trash storage areas to reduce litter/pollutant discharge through methods such as paving with impervious surfaces, installing screens or walls to prevent trash dispersal, and providing attached lids and/or roofs for trash containers; (3) designing site landscaping (if applicable) to maximize the retention of native vegetation and use of appropriate native, pest resistant and/or drought-tolerant varieties to reduce irrigation and pesticide application requirements; and (4) providing secondary containment (e.g., enclosed structures, walls, or berms) for applicable areas such as trash or hazardous material use/storage.*

  A Hazardous Materials Business Plan following California Health and Safety Code, Division 20, Chapter 6.95, Article 1, Sections 25500 to 25519 [8] will be produced for the Project. This plan will identify hazardous material and waste storage areas; outline proper handling, storage, transportation, and disposal techniques; describe methods to prevent spills and minimize impacts in case of a spill; establish procedures for handling unexpected hazardous materials encountered during construction; and define public and agency notification procedures for spills, emergencies, and fires. The Hazardous Materials Business Plan will be available onsite to mitigate any hazardous material risk. Proper signage prohibiting dumping will be posted at drainages and drain inlets to discourage illicit dumping by staff on the Project grounds. Trash storage areas will be designed to reduce pollutants by using BMPs such as providing lids and installing screens or walls to prevent trash dispersal. Implementation of these measures will minimize potential impacts to water quality.

  - *Treatment Control/LID BMPs: Treatment control (or structural) BMPs are designed to remove pollutants from runoff to the maximum extent practicable through means such as filtering, treatment, or infiltration. Treatment control and/or LID BMPs are required to address applicable pollutants and must provide medium or high levels of removal efficiency for these pollutants (per applicable regulatory requirements). Based on the anticipated pollutants of concern, potential LID and treatment control BMPs may include (1) providing water quality treatment and related facilities such as sediment basins, vegetated swales,*

[8] https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=HSC&division=20.&title=&part=&chapter=6.95.&article=1.

*infiltration basins, filtration devices, and velocity dissipators to treat appropriate runoff flows and reduce volumes prior to off-site discharge (per applicable regulatory requirements); and (2) conducting regular inspection, maintenance and as-needed repairs of pertinent facilities and structures.*

A Storm Water Pollution Prevention Plan (SWPPP) will be prepared for the Project which will address any pollution concerns during construction. The SWPPP will follow the guidelines described in the Clean Water Act and National Pollutant Discharge Elimination System Construction General Permit. The Construction SWPPP will include site-specific BMPs to limit the impacts of erosion, construction-related impacts, and potential degradation of water quality.

## 1.7 CONCLUSIONS

The Project is expected to have a less than significant impact on all potential hydrology and water quality areas identified in the CEQA Guidelines. The mitigation measures will be met as described in the REGPA. The relatively flat terrain and Project operations require minimal alteration to the Developed Area for construction. The required Construction SWPPP will address construction-related stormwater quality issues, and the Project design will provide appropriate measures to manage Project drainage and prevent significant impacts to water quality including erosion, pollution, and drainage pattern alterations while following the guidelines in the Lahontan Basin Water Quality Control Plan.

There is no current sustainable groundwater management plan for the Project's groundwater basin. The groundwater basin contains sufficient water to sustain the Project, and the Project will have minimal impact on the long-term groundwater basin supply. Therefore, there are minimal pre-construction water quality concerns.

The hydraulic analysis indicates that the flood depth along the Developed Area ranges from approximately 0.2 to 1.2 feet, with the largest flood depths contained within a small southern section of the Developed Area. The Project plan states that the PV modules will be installed on foundation posts approximately 4.5 feet in height and will be constructed at existing grade. The electrical inverters are proposed on pads 2.5 feet above ground elevation. Grading will only be performed at proposed roads, substation site, and detention basins (approximately 89 acres combined), and the substation site proposed on pads 2.5 feet above existing ground elevation. The hydraulic modeling indicates that 2.5-foot pads sufficiently elevate the infrastructure above the 1.0 to 1.2 feet flood depths. However, the construction plan should include any additional freeboard as required by local governing authorities with the stricter standards governing.

# 2. REFERENCES

County of Inyo. 2015. Volume I Inyo County Renewable Energy General Plan Amendment Final Program Environmental Impact Report Responses to Comments. https://www.inyocounty.us/services/planning-department/environmental-reviews

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Mott MacDonald. 2021. 174 Power Global Bonanza Peak Solar Farm Geotechnical Recommendation Report.

State of California Regional Water Quality Control Board (RWQCB). 2025. Water Quality Control Plan for the Lahontan Region (Basin Plan). https://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/references.html.

# APPENDIX A SUPPLEMENTARY TABLES AND FIGURES

TABLE A. ONE-HOUR AVERAGE CONCENTRATION FOR AMMONIA FOR COLD WATERS.

## ONE-HOUR AVERAGE CONCENTRATION FOR AMMONIA[1,2]

Waters Designated as COLD, COLD with SPWN, COLD with MIGR (Salmonids or other sensitive coldwater species present)

| | Temperature, C | | | | | | |
|---|---|---|---|---|---|---|---|
| pH | 0 | 5 | 10 | 15 | 20 | 25 | 30 |
| Un-ionized Ammonia (mg/liter $NH_3$) | | | | | | | |
| 6.50 | 0.0091 | 0.0129 | 0.0182 | 0.026 | 0.036 | 0.036 | 0.036 |
| 6.75 | 0.0149 | 0.021 | 0.030 | 0.042 | 0.059 | 0.059 | 0.059 |
| 7.00 | 0.023 | 0.033 | 0.046 | 0.066 | 0.093 | 0.093 | 0.093 |
| 7.25 | 0.034 | 0.048 | 0.068 | 0.095 | 0.135 | 0.135 | 0.135 |
| 7.50 | 0.045 | 0.064 | 0.091 | 0.128 | 0.181 | 0.181 | 0.181 |
| 7.75 | 0.056 | 0.080 | 0.113 | 0.159 | 0.22 | 0.22 | 0.22 |
| 8.00 | 0.065 | 0.092 | 0.130 | 0.184 | 0.26 | 0.26 | 0.26 |
| 8.25 | 0.065 | 0.092 | 0.130 | 0.184 | 0.26 | 0.26 | 0.26 |
| 8.50 | 0.065 | 0.092 | 0.130 | 0.184 | 0.26 | 0.26 | 0.26 |
| 8.75 | 0.065 | 0.092 | 0.130 | 0.184 | 0.26 | 0.26 | 0.26 |
| 9.00 | 0.065 | 0.092 | 0.130 | 0.184 | 0.26 | 0.26 | 0.26 |
| Total Ammonia (mg/liter $NH_3$) | | | | | | | |
| 6.50 | 35 | 33 | 31 | 30 | 29 | 20 | 14.3 |
| 6.75 | 32 | 30 | 28 | 27 | 27 | 18.6 | 13.2 |
| 7.00 | 28 | 26 | 25 | 24 | 23 | 16.4 | 11.6 |
| 7.25 | 23 | 22 | 20 | 19.7 | 19.2 | 13.4 | 9.5 |
| 7.50 | 17.4 | 16.3 | 15.5 | 14.9 | 14.6 | 10.2 | 7.3 |
| 7.75 | 12.2 | 11.4 | 10.9 | 10.5 | 10.3 | 7.2 | 5.2 |
| 8.00 | 8.0 | 7.5 | 7.1 | 6.9 | 6.8 | 4.8 | 3.5 |
| 8.25 | 4.5 | 4.2 | 4.1 | 4.0 | 3.9 | 2.8 | 2.1 |
| 8.50 | 2.6 | 2.4 | 2.3 | 2.3 | 2.3 | 1.71 | 1.28 |
| 8.75 | 1.47 | 1.40 | 1.37 | 1.38 | 1.42 | 1.07 | 0.83 |
| 9.00 | 0.86 | 0.83 | 0.83 | 0.86 | 0.91 | 0.72 | 0.58 |

1 To convert these values to mg/liter N, multiply by 0.822

2 Source: U. S. Environmental Protection Agency. 1986. Quality criteria for water, 1986. EPA 440/5-86-001.

Source: State of California Regional Water Quality Control Board (RWQCB), 2025

TABLE B. ONE-HOUR AVERAGE CONCENTRATION FOR AMMONIA FOR WARM WATERS.

## ONE-HOUR AVERAGE CONCENTRATION FOR AMMONIA[1,2]

Waters designated WARM, WARM with SPWN, WARM with MIGR (Salmonids or other sensitive coldwater species absent)[3]

| | Temperature, °C | | | | | | |
|---|---|---|---|---|---|---|---|
| pH | 0 | 5 | 10 | 15 | 20 | 25 | 30 |
| Un-ionized Ammonia (mg/liter $NH_3$) | | | | | | | |
| 6.50 | 0.0091 | 0.0129 | 0.0182 | 0.026 | 0.036 | 0.051 | 0.051 |
| 6.75 | 0.0149 | 0.021 | 0.030 | 0.042 | 0.059 | 0.084 | 0.084 |
| 7.00 | 0.023 | 0.033 | 0.046 | 0.066 | 0.093 | 0.131 | 0.093 |
| 7.25 | 0.034 | 0.048 | 0.068 | 0.095 | 0.135 | 0.190 | 0.190 |
| 7.50 | 0.045 | 0.064 | 0.091 | 0.128 | 0.181 | 0.26 | 0.26 |
| 7.75 | 0.056 | 0.080 | 0.113 | 0.159 | 0.22 | 0.32 | 0.32 |
| 8.00 | 0.065 | 0.092 | 0.130 | 0.184 | 0.26 | 0.37 | 0.37 |
| 8.25 | 0.065 | 0.092 | 0.130 | 0.184 | 0.26 | 0.37 | 0.37 |
| 8.50 | 0.065 | 0.092 | 0.130 | 0.184 | 0.26 | 0.37 | 0.37 |
| 8.75 | 0.065 | 0.092 | 0.130 | 0.184 | 0.26 | 0.37 | 0.37 |
| 9.00 | 0.065 | 0.092 | 0.130 | 0.184 | 0.26 | 0.37 | 0.37 |
| Total Ammonia (mg/liter $NH_3$) | | | | | | | |
| 6.50 | 35 | 33 | 31 | 30 | 29 | 29 | 20 |
| 6.75 | 32 | 30 | 28 | 27 | 27 | 26 | 18.6 |
| 7.00 | 28 | 26 | 25 | 24 | 23 | 23 | 16.4 |
| 7.25 | 23 | 22 | 20 | 19.7 | 19.2 | 19.0 | 13.5 |
| 7.50 | 17.4 | 16.3 | 15.5 | 14.9 | 14.6 | 14.5 | 10.3 |
| 7.75 | 12.2 | 11.4 | 10.9 | 10.5 | 10.3 | 10.2 | 7.3 |
| 8.00 | 8.0 | 7.5 | 7.1 | 6.9 | 6.8 | 6.8 | 4.9 |
| 8.25 | 4.5 | 4.2 | 4.1 | 4.0 | 3.9 | 4.0 | 2.9 |
| 8.50 | 2.6 | 2.4 | 2.3 | 2.3 | 2.3 | 2.4 | 1.81 |
| 8.75 | 1.47 | 1.40 | 1.37 | 1.38 | 1.42 | 1.52 | 1.18 |
| 9.00 | 0.86 | 0.83 | 0.83 | 0.86 | 0.91 | 1.01 | 0.82 |

1 To convert these values to mg/liter, multiply by 0.822

2 Source: U. S. Environmental Protection Agency. 1986. Quality criteria for water, 1986. EPA 440/5-86-001.

3 These values may be conservative, however, if a more refined criterion is desired, USEPA recommends a site-specific criteria modification.

Source: State of California Regional Water Quality Control Board (RWQCB), 2025

TABLE C. FOUR DAY AVERAGE CONCENTRATION FOR AMMONIA FOR COLD WATERS.

## FOUR DAY AVERAGE CONCENTRATION FOR AMMONIA[1,2]

Waters Designated as COLD, COLD with SPWN, COLD with MIGR (Salmonids or other sensitive coldwater species present)

| | Temperature, °C | | | | | | |
|---|---|---|---|---|---|---|---|
| pH | 0 | 5 | 10 | 15 | 20 | 25 | 30 |
| Un-ionized Ammonia (mg/liter $NH_3$) | | | | | | | |
| 6.50 | 0.0008 | 0.0011 | 0.0016 | 0.0022 | 0.0022 | 0.0022 | 0.0022 |
| 6.75 | 0.0014 | 0.0020 | 0.0028 | 0.0039 | 0.0039 | 0.0039 | 0.0039 |
| 7.00 | 0.0025 | 0.0035 | 0.0049 | 0.0070 | 0.0070 | 0.0070 | 0.0070 |
| 7.25 | 0.0044 | 0.0062 | 0.0088 | 0.0124 | 0.0124 | 0.0124 | 0.0124 |
| 7.50 | 0.0078 | 0.0111 | 0.0156 | 0.022 | 0.022 | 0.022 | 0.022 |
| 7.75 | 0.0129 | 0.0182 | 0.026 | 0.036 | 0.036 | 0.036 | 0.036 |
| 8.00 | 0.0149 | 0.021 | 0.030 | 0.042 | 0.042 | 0.042 | 0.042 |
| 8.25 | 0.0149 | 0.021 | 0.030 | 0.042 | 0.042 | 0.042 | 0.042 |
| 8.50 | 0.0149 | 0.021 | 0.030 | 0.042 | 0.042 | 0.042 | 0.042 |
| 8.75 | 0.0149 | 0.021 | 0.030 | 0.042 | 0.042 | 0.042 | 0.042 |
| 9.00 | 0.0149 | 0.021 | 0.030 | 0.042 | 0.042 | 0.042 | 0.042 |
| Total Ammonia (mg/liter $NH_3$) | | | | | | | |
| 6.50 | 3.0 | 2.8 | 2.7 | 2.5 | 1.76 | 1.23 | 0.87 |
| 6.75 | 3.0 | 2.8 | 2.7 | 2.6 | 1.76 | 1.23 | 0.87 |
| 7.00 | 3.0 | 2.8 | 2.7 | 2.6 | 1.76 | 1.23 | 0.87 |
| 7.25 | 3.0 | 2.8 | 2.7 | 2.6 | 1.77 | 1.24 | 0.88 |
| 7.50 | 3.0 | 2.8 | 2.7 | 2.6 | 1.78 | 1.25 | 0.89 |
| 7.75 | 2.8 | 2.6 | 2.5 | 2.4 | 1.66 | 1.17 | 0.84 |
| 8.00 | 1.82 | 1.70 | 1.62 | 1.57 | 1.10 | 0.78 | 0.56 |
| 8.25 | 1.03 | 0.97 | 0.93 | 0.90 | 0.64 | 0.46 | 0.33 |
| 8.50 | 0.58 | 0.55 | 0.53 | 0.53 | 0.38 | 0.28 | 0.21 |
| 8.75 | 0.34 | 0.32 | 0.31 | 0.31 | 0.23 | 0.17 | 0.135 |
| 9.00 | 0.195 | 0.189 | 0.189 | 0.195 | 0.148 | 0.116 | 0.094 |

1 To convert these values to mg/liter N, multiply by 0.822.

2 Source: U. S. Environmental Protection Agency. 1992. Revised tables for determining average freshwater ammonia concentrations. USEPA Office of Water Memorandum, July 30, 1992.

Source: State of California Regional Water Quality Control Board (RWQCB), 2025

TABLE D. FOUR DAY AVERAGE CONCENTRATION FOR AMMONIA FOR WARM WATERS.

## FOUR DAY AVERAGE CONCENTRATION FOR AMMONIA[1,2]

Waters designated WARM, WARM with SPWN, WARM with MIGR (Salmonids or other sensitive coldwater species absent)[3]

| | Temperature, °C | | | | | | |
|---|---|---|---|---|---|---|---|
| pH | 0 | 5 | 10 | 15 | 20 | 25 | 30 |
| Un-ionized Ammonia (mg/liter $NH_3$) | | | | | | | |
| 6.50 | 0.0008 | 0.0011 | 0.0016 | 0.0022 | 0.0031 | 0.0031 | 0.0031 |
| 6.75 | 0.0014 | 0.0020 | 0.0028 | 0.0039 | 0.0055 | 0.0055 | 0.0055 |
| 7.00 | 0.0025 | 0.0035 | 0.0049 | 0.0070 | 0.0099 | 0.0099 | 0.0099 |
| 7.25 | 0.0044 | 0.0062 | 0.0088 | 0.0124 | 0.0175 | 0.0175 | 0.0175 |
| 7.00 | 0.0078 | 0.0111 | 0.0156 | 0.022 | 0.031 | 0031 | 0.031 |
| 7.75 | 0.0129 | 0.0182 | 0.026 | 0.036 | 0.051 | 0.051 | 0.051 |
| 8.00 | 0.0149 | 0.021 | 0.030 | 0.042 | 0.059 | 0.059 | 0.059 |
| 8.25 | 0.0149 | 0.021 | 0.030 | 0.042 | 0.059 | 0.059 | 0.059 |
| 8.50 | 0.0149 | 0.021 | 0.030 | 0.042 | 0.059 | 0.059 | 0.059 |
| 8.75 | 0.0149 | 0.021 | 0.030 | 0.042 | 0.059 | 0.059 | 0.059 |
| 9.00 | 0.0149 | 0.021 | 0.030 | 0.042 | 0.059 | 0.059 | 0.059 |
| Total Ammonia (mg/liter $NH_3$) | | | | | | | |
| 6.50 | 3.0 | 2.8 | 2.7 | 2.5 | 2.5 | 1.73 | 1.23 |
| 6.75 | 3.0 | 2.8 | 2.7 | 2.6 | 2.5 | 1.74 | 1.23 |
| 7.00 | 3.0 | 2.8 | 2.7 | 2.6 | 2.5 | 1.74 | 1.23 |
| 7.25 | 3.0 | 2.8 | 2.7 | 2.6 | 2.5 | 1.75 | 1.24 |
| 7.50 | 3.0 | 2.8 | 2.7 | 2.6 | 2.5 | 1.76 | 1.25 |
| 7.75 | 2.8 | 2.6 | 2.5 | 2.4 | 2.3 | 1.65 | 1.18 |
| 8.00 | 1.82 | 1.70 | 1.62 | 1.57 | 1.55 | 1.10 | 0.79 |
| 8.25 | 1.03 | 0.97 | 0.93 | 0.90 | 0.90 | 0.64 | 0.47 |
| 8.50 | 0.58 | 0.55 | 0.53 | 0.53 | 0.53 | 0.39 | 0.29 |
| 8.75 | 0.34 | 0.32 | 0.31 | 0.31 | 0.32 | 0.24 | 0.190 |
| 9.00 | 0.195 | 0.189 | 0.189 | 0.195 | 0.21 | 0.163 | 0.133 |

1 To convert these values to mg/liter N, multiply by 0.822.

2 Source: U. S. Environmental Protection Agency. 1992. Revised tables for determining average freshwater ammonia concentrations. USEPA Office of Water Memorandum, July 30, 1992.

3 These values may be conservative, however, if a more refined criterion is desired, USEPA recommends a site-specific criteria modification.

Source: State of California Regional Water Quality Control Board (RWQCB), 2025

TABLE E. WATER QUALITY CRITERIA FOR AMBIENT DISSOLVED OXYGEN CONCENTRATION.

**WATER QUALITY CRITERIA FOR AMBIENT DISSOLVED OXYGEN CONCENTRATION[1,2]**

| | Beneficial Use Class | | | |
|---|---|---|---|---|
| | COLD & SPWN[3] | COLD | WARM & SPWN[3] | WARM |
| 30 Day Mean | NA[4] | 6.5 | NA | 5.5 |
| 7 Day Mean | 9.5 (6.5) | NA | 6.0 | NA |
| 7 Day Mean Minimum | NA | 5.0 | NA | 4.0 |
| 1 Day Minimum[5,6] | 8.0 (5.0) | 4.0 | 5.0 | 3.0 |

1 From: USEPA. 1986. Ambient water quality criteria for dissolved oxygen. Values are in mg/L.

2 These are water column concentrations recommended to achieve the required intergravel dissolved oxygen concentrations shown in parentheses. For species that have early life stages exposed directly to the water column (SPWN), the figures in parentheses apply.

3 Includes all embryonic and larval stages and all juvenile forms to 30-days following hatching (SPWN).

4 NA (Not Applicable).

5 For highly manipulatable discharges, further restrictions apply.

6 All minima should be considered as instantaneous concentrations to be achieved at all times.

Source: State of California Regional Water Quality Control Board (RWQCB), 2025

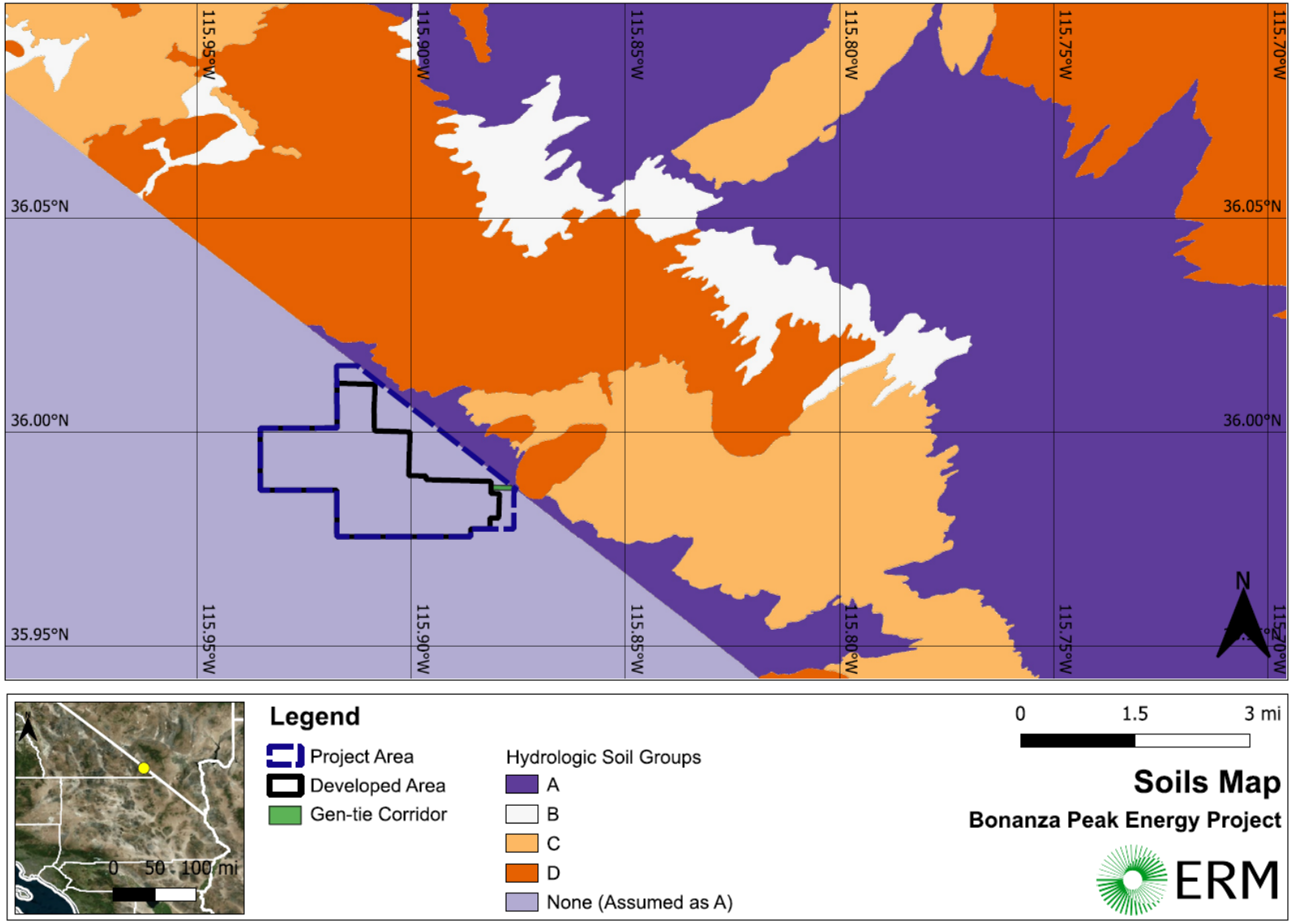



FIGURE A. HYDROLOGIC SOIL GROUP MAP.

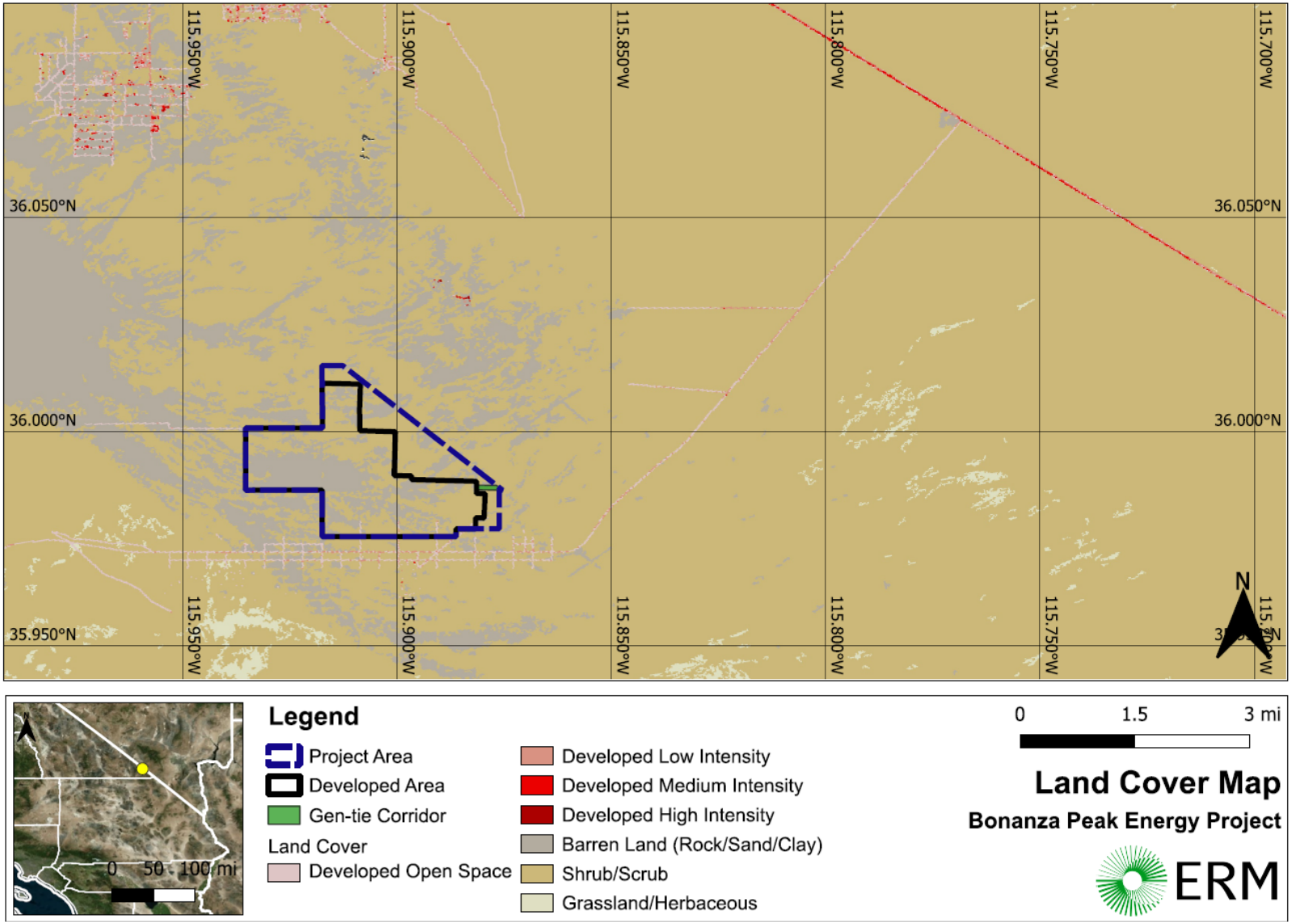



FIGURE B. HYDRAULIC MODELING LAND COVER MAP.

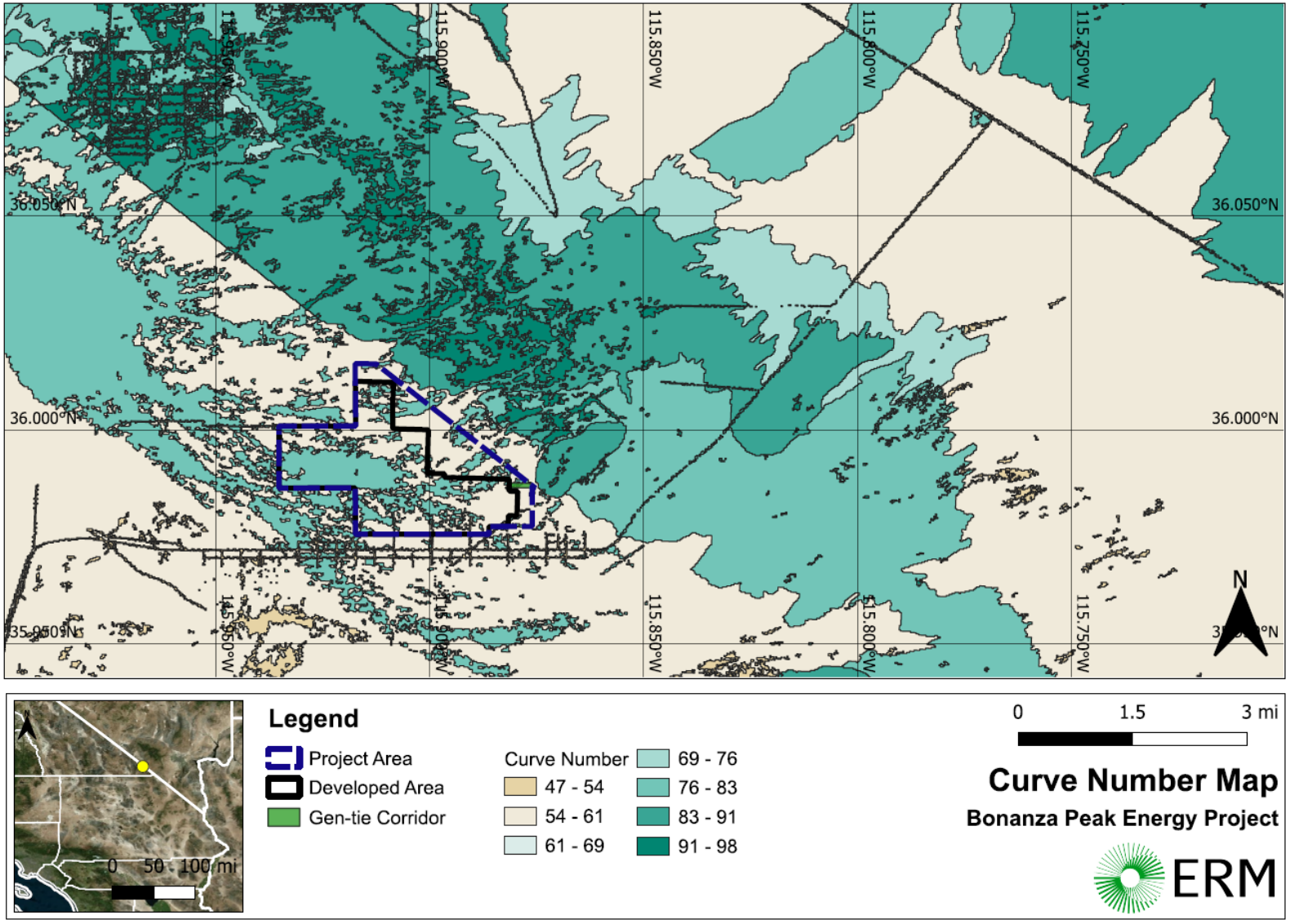



FIGURE C. HYDRAULIC MODELING CURVE NUMBER MAP.

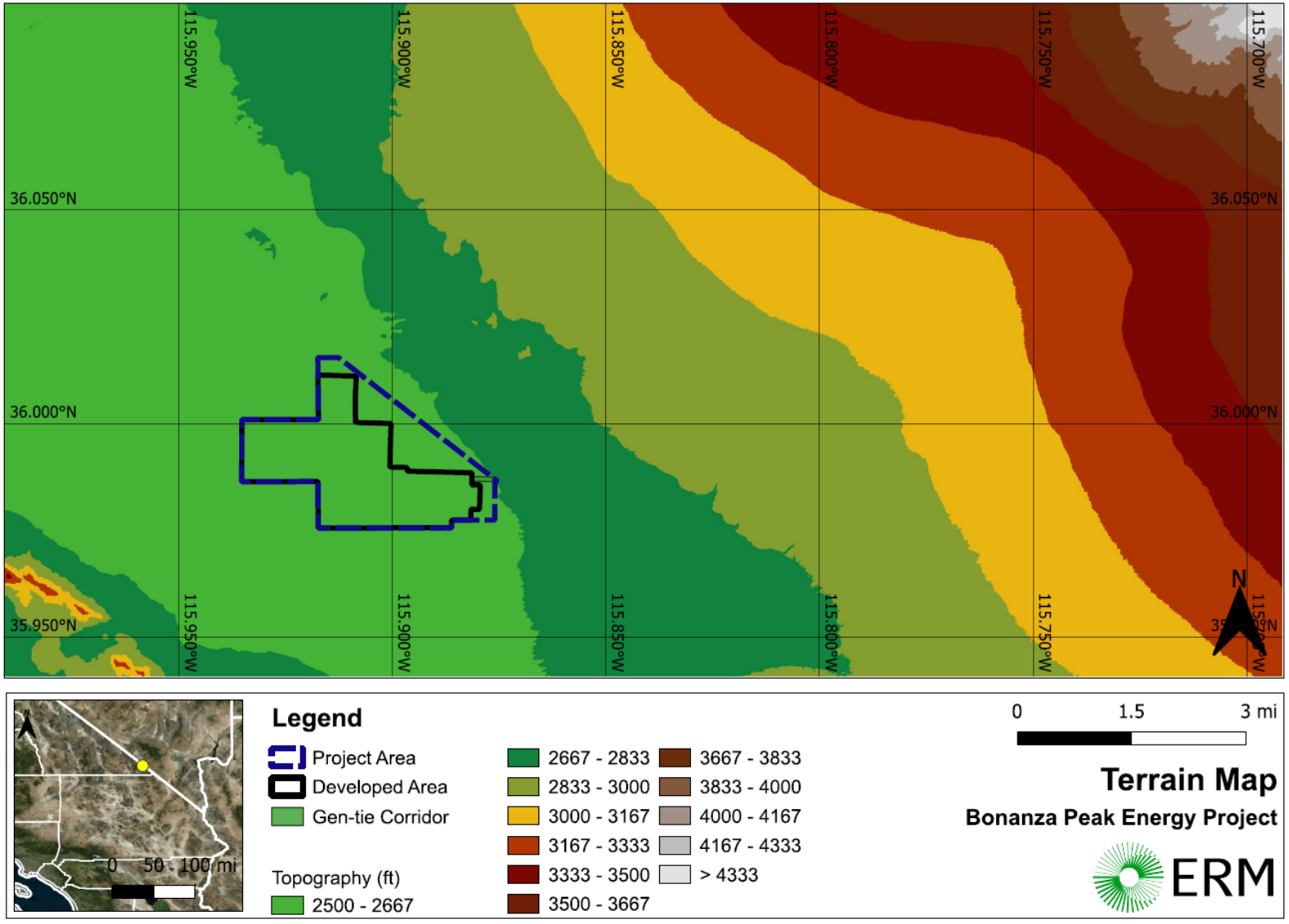



FIGURE D. HYDRAULIC MODELING TERRAIN MAP.



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